PSYCHOSOCIAL INTERVENTIONS FOR THE PREVENTION OF INJURY IN DANCE

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JUNE 2005

ABSTRACT

In this thesis, I investigated aspects of the multi-component stress and injury model, which Williams and Andersen (1998) suggested could be applied in areas beyond sport. Two studies (Studies 1 and 2) were carried out with the goal to develop interventions, which were tested for their efficacy in the reduction of injuries, in a third study (Study 3). The purpose of Study 1 was to investigate whether psychosocial factors, such as stress, anxiety, social support, and coping skills, could predict injuries (frequency and duration) among 105 ballet dancers (101 females; 4 males), using a regression design. The dancers were professional ballet dancers (n = 27), university ballet students (n = 19), and ballet institute students (n = 59), with a mean age of 20.46 years (SD = 5.50). They completed a modified version of the Adolescent Perceived Events Scale (APES) and Sport Experiences Survey (SES), which address life and dance stress respectively, the Sport Anxiety Scale (SAS), the Athletic Coping Skills Inventory-28 (ACSI-28), and a social support for dance measure. Frequency and duration of injuries were recorded for a 10-month period after completion of the psychosocial measures. From the correlation matrix of psychosocial scales and injury, I selected for regression analysis variables that showed at least moderate correlations with the frequency and duration of injury (i.e., peaking under pressure, goal setting/mental preparation, freedom from worry, confidence, negative dance stress, negative life stress). One regression analysis identified freedom from worry and confidence as significant predictors for frequency of injury. A second regression analysis identified freedom from worry and negative dance stress as significant predictors for duration of injury.

In Study 2, I examined the sources of stress and coping strategies of Korean professional ballet dancers, using in-depth interviews. Dancers (N = 20) were interviewed to identify the stressors they experienced and the coping strategies they used during practice or performance. Using inductive content analysis, I identified four major sources of stress that emerged from the data: physical (i.e., physical appearance, poor physical condition), psychological (i.e., desire, slump, personality), social (i.e., relationship with a dance director and other dancers), and situational factors (i.e., performance demands, finance). The results demonstrated that physical appearance (e.g., maintaining particular body type, keeping low body weight) was a preeminent problem. I also found that three general dimensions for coping were psychological strategies (i.e., individual cognitive and emotional strategies, avoidance strategies), behavioural strategies (i.e., dysfunctional behaviour, hobby activities, social interaction, dance related behaviour), and physical relaxation. The coping strategies mentioned most frequently in this study belonged to the behavioural strategies dimension. In particular, the dancers employed dysfunctional behaviour (e.g., overeating, drinking alcohol) to cope with stress. Identification of sources of stress and coping strategies not only help to identify the specific stressors and coping skills surrounding dance environments, but also provide a basis for designing intervention programs, which may help reduce stress through developing coping skills.

The purpose of Study 3, the final study, was to examine the effects of two psychological interventions designed to prevent injury among dancers by enhancing coping skills. Participants were 35 ballet dancers. They were assigned

to three conditions, control (n = 12), autogenic training (n = 12), and a broad-based coping skills condition, including autogenic training, imagery, and self-talk (n = 11). The 12-week interventions were designed on the basis of quantitative and qualitative results from the previous studies in the thesis. For weeks 13 to 24, participants were asked to practice their respective intervention three times a week. During the 24-week period (12 weeks training plus 12 weeks practice) training staff at the dance academies recorded injuries on a record sheet each day. Participants wrote injury records by themselves for another 24 weeks. Multivariate analysis of variance (MANOVA) and univariate tests for each dependent variable showed that the broad-based coping skills condition enhanced coping skills, in particular: peaking under pressure, coping with adversity, confidence and achievement motivation, and concentration. Separate analyses of covariance (ANCOVA), one using pre-intervention injury frequency as the covariate and one using pre-intervention injury duration as the covariate revealed that dancers in the broad-based coping skills condition spent less time injured than those in the control condition.

Overall, results indicated that the broad-based coping skills intervention was effective for enhancing targeted coping skills and reducing injury occurrence among Korean ballet dancers, supporting Williams and Andersen's (1998) model of stress and injury. Because the broad-based coping skills was an intervention designed for particular Korean ballet dancers, based on quantitative and qualitative research, this intervention program may not be applicable to Western dancers. For future research, I recommend the approach I employed in this thesis, as the basis for designing effective and efficient interventions for dancers.

ACKNOWLEDGMENTS

I would like to thank my supervisor, Professor Tony Morris, for his support and professional guidance throughout the study. Without his encouragement and enormous amount of patience, this thesis would not have been completed. I would also like to thank my co-supervisor, Associate Professor Mark Andersen, for his encouragement and valuable advice in helping me develop this thesis. I would also like to thank Gyeong-Suk, Bak and Young-Ja, Eom, for their cooperation and support in recruiting participants for the study. My appreciation goes to the people who agreed to take part in the studies.

On a personal note, I would like to thank my parents, Chang-Hwan, Noh and Jeong-Su, Oh, for support mentally and financially, patiently waiting for my study to be completed and mentioning whenever I went back to Korea. “I thought that you’d finished your study.” Thanks also to my brothers, Jae-Myeong and Jae-Bong, for always asking whenever I called to Korea “did you make a boyfriend?” Thank you to friends, postgraduate students, for making good memories, sharing their knowledge, and humour. Finally, special thanks to my wonderful friend, Aaron, for listening to my moaning and encouraging me to finish my thesis.

DOCTOR OF PHILOSOPHY PROFORMA

"I, Young-Eun Noh, declare that the PhD thesis entitled psychosocial interventions for the prevention of injury in dance is no more than 100,000 words in length, exclusive of tables, figures, appendices, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work."

Signature Date

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CHAPTER 1: INTRODUCTION

As dancers use their bodies for expressive purposes, they frequently overuse various body parts when they learn and perform dance techniques. Most dancers invest a great deal of effort in their preparation and this is often associated with injuries both in practice and during performance. Until recently, most researchers who were interested in dance studied aspects of injuries, including their frequency, the physical causes, and the effects of dance styles, such as ballet, modern, and aerobic dance (Kerr, Krasnow, & Mainwaring, 1992; Schafle, Requa, & Garrick, 1990). Attending to identified physical factors has not significantly reduced the frequency of dance injury (Krasnow, Kerr, & Mainwaring, 1994).

Bowling (1989) revealed that dance injuries were often caused by the demands of performing advanced techniques. He found that those who had chronic injuries experienced severe pain continually, and just over two-fifths of the dancers studied had sustained at least one injury in the previous six months that had affected their dancing. Furthermore, dancers incurred severe injuries that meant they could not perform any more. Bowling reported that these injuries also led to psychological distress, which was related to loss of position or status. In a study of ballet injuries, Garrick and Requa (1993) reported that 104 dancers had 309 injuries during a 3-year period. In particular, they stated it was remarkable that 23% of these dancers incurred 52% of all injuries. Garrick and Requa emphasised that identifying factors that cause injuries might permit interventions that would decrease the risk of injuries.

In sport, some researchers have observed that psychosocial factors affect injury vulnerability (Andersen & Williams, 1988, 1999; Fawkner, McMurrary, &

Summers, 1999; Petrie, 1993a; Williams & Andersen, 1997). Psychological factors are likely to play a part in dance injury, as they have been shown to affect the incidence of injuries in the similar performance context of sport (Williams, 2001). Little research, however, has directly investigated psychosocial factors that are related to injuries in dance.

Over the past 20 years, sport science researchers have made efforts to discover how to prevent sport injuries. Examination of physical and biomechanical factors has led to the conclusion that these variables alone cannot account for all the injuries that occur, so psychological factors have been examined (Andersen & Williams, 1988, 1999; Petrie, 1992, 1993a, 1993b; Smith, Ptacek, & Smoll, 1992). According to the stress-injury model proposed by Andersen and Williams (1988), when athletes experience stressful situations, they react with a stress response. Increases in stress are likely to be associated with narrowing attention, greater distractibility, and higher levels of muscle tension. These changes increase the probability of injuries. Andersen and Williams suggested that psychosocial factors, such as personality, history of stressors, and coping resources, influence the stress response and, thus, the likelihood of injury occurrence. Williams and Andersen (1998) reviewed the substantial research that tested aspects of their psychosocial model. The vast majority of this work supported the model, especially with respect to the roles of history of stressors, life event stress, and daily hassles. The involvement of coping resources, such as coping skills and social support, has been shown to moderate the effects of stress on sport injuries (Hardy, O'Connor, & Geisler, 1990; Petrie, 1993b; Smith, Smoll, & Ptacek, 1990). In view of the training and performance parallels between sport

and dance, it is likely that psychosocial factors could also affect the incidence of dance injuries. Patterson, Smith, Everett, and Ptacek (1998) found that life stress and social support were related to the incidence of injuries in ballet, as predicted by the model.

The development of the stress and injury model in sport has enhanced the understanding of factors that increase the incidence of injuries, and there is great potential for application of the model to injuries in dance. Elements of the model, however, need to be tested in the context of dance. In addition, the research will be expanded by examination of the impact on injury incidence of interventions that aim to affect the critical psychosocial variables. Thus, the aims of this thesis were to investigate the major sources of stress and the coping strategies used by dancers. This information had not previously been studied in the context of dance. Based on the results of the study of stress and coping, the research aimed to examine the impact of interventions designed to moderate the principal vulnerability factors among dancers. All this work tested various aspects of the psychosocial model of stress and injury, which Williams and Andersen (1998) suggested could be applied in areas well beyond sport.

CHAPTER 2: LITERATURE REVIEW

Introduction

In this chapter, a definition of injury and types of dance are presented, as well as a description of dance injuries. Major physical factors, which contribute to dance (theatrical dance idioms, such as ballet, modern dance) injury, are described. Williams and Andersen's (1998) stress and injury model is presented, including theory and research. Then, research on psychosocial factors and injury in dance is presented. Issues for application of the stress-injury model to dance are then considered. The chapter concludes by indicating the aim of the present thesis, based on the foregoing review.

Definition of Injury

Injuries can be defined in a variety of ways, such as in terms of the medical problems, by an assessment of their severity, from the time-loss they cause, in terms of their frequency, and by considering the activity modification they require. In dance, some researchers, who have examined the relationship between psychosocial factors and injury, have used injury report forms, which were designed for the purpose of research. For example, Hamilton, Hamilton, Meltzer, Marshall, and Molnar (1989) used history of injury to measure the earliest injury that participants could remember and measured the severity of each injury (i.e., major and minor injuries) by the ratings of an orthopaedist. The weakness of this definition of injury is that it is difficult to measure severity of injury, because this usually depends on an individual's responses to the injury or it is based on classifying injuries only according to the number of days for which normal activities are disrupted. In addition, it does not clearly distinguish what major or

minor injuries are and whether the injury was caused by dance. Petrie (1998) suggested that duration of injury is a more objective measurement than severity of injury. Another example, Krasnow, Mainwaring, and Kerr (1999) examined injury history and defined injury as any physical harm resulting in pain or discomfort that causes one or more of the following conditions: (a) cessation of dance activity during one or more classes, rehearsals, or performances; (b) a need to modify dance activity during one or more classes, rehearsals, or performances; (c) negative effects on training or performances during one or more classes, rehearsals, or performances; and (d) sufficient distraction or emotional distress to interfere with concentration or focus during one or more classes, rehearsals, or performances. The weakness of these definitions of injury is that they are not very sensitive. For example, dancers may experience similar injuries, but the responses are different, because of different pain tolerance levels and personality. It may be necessary to measure the perception of pain tolerance among dancers, in addition to other self-reported aspects of injury. Because techniques for the measurement of injury have some limitations, future research should develop more sensitive injury instruments to measure precise injury rates and to minimize limitations. For example, measures of frequency and duration of injuries should be prospective, and, preferably, they should be based on recording by somebody other than the participating athletes.

Types of Dance

Rovere, Webb, Gristina, and Vogel (1983) have divided dance into social dance and theatrical dance, such as classical ballet, modern dance, ethnic dance, and combinations of those three (e.g., Broadway). Every dance style has different

characteristics, such as clothing, technique, practice hours, body shape, and environment. Main dance types (i.e., ballet, modern, and Korean dance) are described briefly in terms of these characteristics.

Clothing

Dance is a visual art that is performed using the body as an instrument in space. Clothing is part of the usual spectacle, focuses the attention of audiences, influences the movements of the dancers, and reflects a cultural pattern, in particular in the context of ethnic dance. Every dance style requires special clothes. For example, ballet dancers wear the long romantic skirts or the short classical skirts, called "tutu", and pointe shoes that allow them to rise onto the tips of their toes to show romantic movements. In contrast, modern dancers typically wear simple tights and leotards or free-flowing gowns and no shoes, which allow more free movements (Penrod & Plastino, 1998), whereas Korean dancers wear Hanbok, which comprises a wrap floor-length skirt (Chima) and a bolero-like jacket (Jeogori) with special, tight-fitting, padded socks (Beoseon). Thus, legs have always remained hidden inside of a long skirt in Korean dance, whereas they are often fully displayed in ballet.

Technique

Different dance styles require distinctly different skills, steps, and fundamental physical demands. Ballet requires standard foot points, which are connected kinaesthetically with pointing along the centre line of the foot, and turn-out, which maintains the 180º external rotation of the lower extremities from the hip joints through the upper and lower legs and feet. Modern dance has no rules or techniques as an attitude toward dance, because it stresses individual

creativity and personal choreographic styles (Anderson, 1992). Modern dance involves free expression and movement based on the basic principles of "tension and relaxation", "fall and recovery", and "contraction and release". Because modern dance involves the distorted use of lines, shapes, and forms to achieve a new aesthetic, any topic can be expressed freely with any movements. Korean dance represents the interior aestheticism of the spirit through the deepest sense of ecstatic power, rather than exterior beauty of form, through rigid elaboration of technique. Korean dance makes more use of the shoulders, arms, hands, and heels, with very little leg movement. Thus, Korean dance emphasizes verticality, which is a persistent alternation between bending and extending knees. The upper half of the body involves shoulder movements that are often responded to by the arms, while the head moves in affirmation. Foot motion is typically based on steps, first on the heel, then forward with the toes up, rather than pointing the feet.

Practice

Ballet involves the earliest requirement to start dancing among the three dance forms. Ballet dancers should start dancing before puberty, to develop their joints and muscles to master the rigorous technique (Hamilton & Hamilton, 1991). In addition, ballet dancers practice for at least eight years in order to achieve high standards of technique, regardless of culture (Hamilton & Hamilton, 1991). To achieve advanced levels of technique, ballet dancers need to practice intensively with a tremendous amount of commitment and may forsake families and a variety of lifestyle factors, such as dating, holidaying. Normally, a professional ballet dancer has extreme work schedules for classes, rehearsals, and performances, during a six-day week over a season (Ryan & Stephens, 1989). Professional ballet

dancers are not only required to endure long hours of dancing, but also various demands from choreographers to achieve advanced techniques from classical to ultra-modern styles (Schafle et al., 1990).

Modern dancers tend either to begin dancing later, compared with ballet dancers, or to change their choice of dance form from ballet to modern in their mid-20s (Schafle et al., 1990). Modern dancers practice for five to ten years before entering companies, but there is little opportunity to become a professional dancer. Modern dancers learn diverse techniques, including Graham, Humphrey, or Wigman styles, as well as jazz.

In contrast, Korean dancers learn dancing during adolescence, but there is no limited time to start dancing. This is because Korean dance does not require dynamic techniques, such as the stretching and bending of the legs. Korean dancers can have long careers, during which they can perform at a high level. Normally, experienced performers can express the interior beauty, more sensitively than young performers.

Body Shape

Every dancer desires having an ideal body shape for the dance form, In particular, ballet dancers are expected to meet professional expectations of ultra-lean body shape, based on aesthetic considerations. To maintain low body weight, some ballet dancers use self-induced vomiting as a way to ameliorate the effects of overeating (Stephens, 1989). Modern dancers are required to have thin physiques that are less restricted than those considered to be ideal for ballet dancers. Potter, Lavery, and Bell (1996) found that modern dancers were older, heavier, and had more body fat than ballet dancers. In Korean dance, because

Korean dancers wear Hanbok, which can wrap around wide skirts and covers from the chest to the feet, it is not easy to recognize dancers' body frames.

Environment

Most ballet dancers leave their parents to enter ballet school, when they are very young (Hamilton & Hamilton, 1991). Because a professional career begins by late adolescence, dancers spend most of their time with their peers, dance directors, and choreographers in dance companies, that is, a close-knit "family" (Hamilton & Hamilton, 1991). Professional ballet dancers often experience stress from directors, due to a poor sense of the criteria used for professional evaluation (Hamilton & Hamilton, 1991). In addition, as professional careers are usually over by the mid-thirties, dancers have pressure to achieve their goals and to maintain the high workload requirements from companies (Hamilton & Hamilton, 1991). Another stressor is the financial pressure placed on ballet, modern, and Korean dancers, because they typically receive inadequate salary from dance companies. Dancers may need to support themselves doing other things (Penrod & Plastino, 1998) even though they are expected to dedicate themselves to intense work for five to ten years before entering dance companies. Given these circumstances, dancers need to cope with job-related or personal stress.

Injury

Injury is common among dancers. Solomon and Micheli (1986) suggested that different styles of dance lead to injuries to different parts of the body. The most frequent anatomical sites of ballet dancers' injuries are the foot, lumbar spine, and ankle (Garrick & Requa, 1993). For modern dancers, the knee, foot, toe, ankle, and spine are the areas most affected by injuries (Schafle et al., 1990).

It is not clear which parts of the body of Korean dancers have more injuries. Recently, Noh and Lee (2001) examined the frequency and severity of injury among dancers. Female dancers (N = 193), who majored in Korean dance (n = 91), modern dance (n = 51), and ballet (n = 51) were compared, using a history of injury questionnaire. The questionnaire included questions about dancers' careers and the frequency and severity of injury during the previous year. Noh and Lee found that ballet dancers had experienced a higher frequency and greater severity of dance injury compared to Korean and modern dancers, but Noh and Lee did not compare anatomical regions.

An overview of the literature in dance injures has examined classical ballet dancers, because it has been argued that ballet dancers are likely to experience higher rates of injury than dancers in other dance styles (Schafle et al., 1990). This happens because ballet requires high levels of physical demands, repetitive movements, accentuated movements and positions, like turn-out, and dancing a lot on the toes, which includes wearing pointe shoes (Caine & Garrick, 1996; Khan et al., 1995; Liederbach & Compagno, 2001). Despite abundant research and the acknowledgement that ballet is associated with a high risk of injury, there is little research focusing on the role of psychological factors in the prevention/reduction of injury. Future research is needed to consider the relationship between psychosocial factors and injury to help reduce injury rates in ballet dancers.

Injury in Dance

Dance is an art form in which the body is the instrument of expression. Dancers often push themselves to their physical limitations to achieve excellence.

Although some dancers do not have perfect bodies for ballet, for example, for doing turn-out anatomically, they try to compensate by using external rotation in order to seek a greater turn-out. In addition, professional dancers undertake a number of practice sessions, rehearsals, and performances at progressively higher levels of intensity to maintain their position in the group. Due to demanding workloads, seeking perfection, and pursuing advanced techniques, dancers often incur overuse syndromes and injuries (Hamilton, 1997; Ryan & Stephens, 1989; Teitz, 1991). Further, dancers frequently ignore minor injuries until they reach an advanced stage (Hamilton & Hamilton, 1991), because of the fear of losing their dancing roles and the extremely fierce competition for employment within the few major ballet companies. Dancers have a saying: one day of practice missed, the dancer can tell; two days missed, the fellow dancer can tell; and three days missed, the audience can tell.

Many dancers or directors believe that they should try to treat injuries through dance, rather than take a rest to care for the injury and heed medical opinion (Arnheim, 1980; Hamilton, 1999). When dancers continue to dance while injured, they increase stress, tension, and strain on other body parts, which may lead to injury of these areas (Arnheim, 1980). Dancers may miss opportunities to further their career, because of injury and be excluded from future performances. In addition, dancers seem to be less willing to seek medical help for their injuries, and when dancers do look for assistance, they are more likely to turn to alternative health practitioners, rather than traditional physicians, but athletes do not usually experience financial hardship to the same extent as dancers do, with respect to injury (Kerr et al., 1992). It is not surprising that, in a study of a range of dance

levels (e.g., age and professional status), Hamilton (1997) found that chronic injuries were significantly higher in professional (61%) and ex-dancers (66%) compared to older (46%) or younger (47%) dance students. Professional ballet dancers, who had injuries, reported that they were afraid of losing their places to other dancers. A severe dance injury can be devastating to dancers physically as well as psychologically. Compared with noninjured dancers, Hamilton and Hamilton (1991) found that injured dancers tended to abuse alcohol and drugs, such as marijuana and tranquillisers, and even considered suicide. In order to maintain their position or status among their peers, dancers may disregard their injuries or regard them as manageable nuisances. Hamilton (1997) also reported that dancers (89%) generally handle their injuries alone.

Adolescent dancers also need special consideration with respect to the prevention of injury. Young dancers are still growing physically and during this period, adolescent ballet dancers may have increased injury risk, because the skeleton is less dense, more fragile, and cortical bone is thinner (Krasnow et al., 1999). Rovere, Webb, Gristina, and Vogel (1983) reported that 87.8% of dance students ($N = 218$) experienced injuries during one year, including ankle, spine, foot, knee, and hip injuries and shin splints.

Dance injuries produce substantial financial and emotional costs to the individual and insurance companies. Garrick and Requa (1993) reported on 104 professional ballet dancers, who incurred 309 injuries, for which insurance disbursed nearly USD $400,000 for medical costs during a 3-year period. Dancers had 2.97 injuries on average, but the data were skewed. In particular, Garrick and Requa stated that it was remarkable that 23% of these dancers accounted for 52%

of all injuries. They also suggested a need for more research into the risk factors associated with injuries to dancers. Solomon, Micheli, Solomon, and Kelley (1995) also reported that 137 injuries occurred among 70 professional ballet dancers. Ten percent of these dancers accounted for a total of 23% of the injuries, that is, around 4.6 injuries each. The rest of the dancers in the study by Solomon et al. averaged 1.7 injuries for 2 years (1993-1994). For these 137 injuries, insurance companies paid USD $249,272. Efforts to reduce the frequency of injuries are warranted, both to ensure the long-term health of individuals in ballet and to reduce the substantial financial and emotional costs for families and insurance companies.

Major Factors Related to the Incidence of Dance Injury

Over the last two decades, researchers have begun to determine the factors influencing injury vulnerability and resiliency in dance. Most of the early investigations studied physical factors, aiming to explain how these factors lead to dance injury (Bronner & Brownstein, 1997; Garrick & Requa, 1993; Hardaker, Erickson, & Myers, 1986; Liederbach & Compagno, 2001). From the studies just described, there is no doubt that factors of a physical nature are among the causes of dance injuries.

Physical Factors Associated with Dance Injury

Many researchers have investigated the physical factors related to dance injuries, examining pathogenesis, epidemiological, mechanical, and anatomical characteristics, or environmental factors (Bronner & Brownstein, 1997; Garrick & Requa, 1993; Hardaker et al., 1986; Liederbach & Compagno, 2001).

Pathogenesis

The pathogenesis of dance injury is based on clinical observations, which explain how and why a particular injury occurs. Furthermore, pathogenesis provides a basis for precise diagnosis, logical treatment, and accurate prognosis for injury prevention. Hardaker, Erickson, and Myers (1986) divided the pathogenic causes of dance injury into three categories. These were injuries due to the failure of the shock-absorber system, the lever system, or environmental factors, or any combination of these elements. Repetitive impact loading of lower extremity muscle groups may lead to shock absorber failure and injury. In some circumstances, in particular, ballet dancers practice daily on hard floor surfaces, wearing pointe shoes or thin slippers, which are not designed to absorb shock. Modern dancers often wear no shoes at all. Major causes of shock-absorber failure are inadequate muscle strength in the lower extremities and lack of sufficient flexibility. Adolescent dancers with weak and inflexible muscle groups may become injured from doing pliés and jumps repeatedly, due to lack of strength from muscles to support the strenuous demands of these techniques and limited ability to control and rapidly arrest movement. Lever system failure relates to anatomy variations that can have either a direct or an indirect influence on the production of injuries. By emphasis on external rotation (turn-out) of the leg, dancers, who have limited rotation, place lateral stresses on the knee. As a result, dancers increase the risk for patellar subluxation and the symptoms of chondromalacia of the patella. Common environmental factors are floor surfaces, stage temperature for training and performance, and footwear. Poor floor surfaces and no shock-absorbing footwear increase the frequency of injury.

Anatomical Characteristics

The external rotation at the hip is a fundamental position across theatrical dance, such as ballet, modern, ethnic, and mixed forms (Hardaker et al., 1986). In particular, turn-out is an absolute essential in classical ballet, because it is not possible to perform ballet techniques without a substantial turn-out. To achieve the desired 90º of turn out, dancers have 60º to 70º external rotation at the hip joint and the other 20º to 30º of rotation from the natural outward inclination of the knee and the foot-ankle complex (Hardaker et al., 1986). Some dancers, who lack natural turn-out, however, attempt to compensate with excessive rotation either at the knee or at the foot and ankle (Hardaker et al., 1986). This maladaptive technique of forced external rotation at the knee often causes meniscus injuries (Hardaker et al., 1986). Garrick and Requa (1993) found that 104 professional ballet dancers reported that the most frequently injured regions were foot/toes (23.9%), lumbar spine (23%), ankle (13.3%), knee (6.8%), leg (6.1%), and hip (5.8%). Most of these body regions are involved in the turn-out.

Overtraining

Female dancers often start learning ballet by the age of eight and male dancers usually begin to practice four to nine years later than girls (Ryan & Stephens, 1989). Most ballet dancers learn more than one style of ballet and practice the other techniques and styles of modern, jazz, and character dance (Ryan & Stephens, 1989). Dancers practice intensely and overuse their bodies to achieve other techniques and styles. Dancers selected for companies must accept gruelling schedules of rehearsal and performance. A professional ballet dancer has a typical work schedule including 9 hr. in class, about 26 hr. in rehearsal, and 8-12

hr. in performance, for a total of 43-48 hr. during a six-day week during a season (Ryan & Stephens, 1989). This situation can cause overuse injuries or the overtraining syndrome.

Kadel and Teitz (1992) examined stress fractures and daily hours of training at two professional ballet companies. Female dancers ($N = 54$) completed a questionnaire regarding the location of the stress fracture, time off from dancing due to injury, and training schedule just before the fracture occurred. Kadel and Teitz found that dancers, who practiced more than five hours per day, had a significantly higher risk of stress fracture than those dancing less than five hours. In a recent study, Liederbach and Compagno (2001) replicated the Kadel and Teitz (1992) findings. Liederbach and Compagno surveyed 644 dancers (from a university conservatory, hospital-based outpatient orthopaedic clinic that specialized in the evaluation and treatment of dance injuries, and a professional ballet company) for over two years. Liederbach and Compagno used a standardized injury report form with an 126-item inventory including how many hours danced on the day of injury. They found that dancers who performed high intensity dance (heart rate greater than 160 bpm) (80% of injured dancers) and danced more than five hours (79% of injured dancers) had greater likelihood of getting injured. In addition, this study revealed that 90% of the total injury reports were related to feeling tired at the time of injury. Liederbach and Compagno stated that overtraining syndrome is associated with general fatigue, which is defined as "an acute impairment of exercise performance that includes both an increase in the perceived effort necessary to exert a desired force or power output and the eventual inability to produce that force or power output." (p. 117)

Khan et al. (1995) stated that injuries are more common in ballet dancers than in athletes. The common injuries in dance include posterior and anterior impingement of the ankle, stress fracture of the base of the second metatarsal, fibular stress fracture, and flexor hallucis longus tendinitis. Khan et al. emphasized that overuse contributed to the incidence of injuries. Garrick (1999) also examined musculoskeletal complaints in 54 students during a 20-month period. Garrick provided a professional clinic (e.g., physical therapists, a podiatrist, and an orthopaedic surgeon) for medical help to the ballet students weekly. Garrick revealed that overuse was associated with ankle injuries among preprofessional ballet school students. Hamilton (2000) suggested that dancers should pace themselves, listen to their bodies, and practice good work habits to avoid overtraining.

Technique

Improper technique is a factor linked to increases in injuries (Teitz, 1991), in particular, when young dancers misuse muscles during practice and adopt inappropriate positions of their body parts. In ballet, dancers attempt to gain 90 degrees of external rotation in the lower extremities. With malposition of the feet, improper attitude produces spine problems, such as scoliosis or spondylolysis (Teitz, 1991). Compared to other forms of dance, ballet dancers have more frequent injuries often due to the requirements of techniques related to turnout. Khan et al. (1995) also stated that forcing turn-out leads to midtarsal joint abduction and excessive subtalar pronation. They described different aspects of ballet technique that contribute to injury and affect different parts of the body resulting in foot and ankle problems, pain in the achilles tendon region, shin pain,

knee symptoms, hip symptoms, back symptoms, and thoracic and cervical spine symptoms.

Rovere, Webb, Gristina, and Vogel (1983) compared injury sites between 148 ballet and 70 modern dancers. There were differences related to dance forms. Ballet dancers often had problems of low-back strain, strained hamstrings, and shin splints. Modern dancers, however, often practiced folds and bends of the body and movements of the head and neck with the lower torso. Therefore, modern dancers had more cervical and upper-back strain problems.

Equipment Failure

There are two important factors under this category: flooring and shoes. When dancers are dancing on inappropriate floor surfaces, they experience more injuries (Teitz, 1991), because of poor shock absorbing and rebound capacity of the surface, which leads to more jarring-type injuries. Dancers also feel fatigue more quickly on such surfaces. Hard floors can cause a number of injuries of the lower extremities, such as posteromedial shin splints, medial ankle tendonitis, Achilles tendonitis, plantar fasciitis, and tibial and fibular stress fractures (Stephens, 1989). The optimal function of a dance floor is to provide a cushioning resilience (resilience of the spring or cushioning layer), to yield to the force of the dancer's body (balanced by the amount of support), and to prevent uncontrolled slipping (a coarser finish to provide more friction and grip on the floor); (Foley, 1998). Garrick (1999) also suggested that control of environmental factors, such as avoiding moisture accumulation on a dance floor, could prevent injuries.

The shoes that ballet dancers wear are also one of the contributors to injury risk (Teitz, 1991). In particular, professional ballerinas wear pointe shoes, which

may cause hammer toe deformity, calcaneal bursitis, Morton's neuroma, soft corns, hallux rigidus, and subungual hematomas (Ryan & Stephens, 1989; Teitz, 1991). These toe and foot conditions occur because, when ballet dancers try to do pointes, their toes squeeze into narrow toe boxes. In addition, due to construction of pointe shoes, which are made of satin and cardboard, they have little shock absorbency and no arch support. Thus, dancers' feet absorb external forces with minimal protection.

Bronner and Brownstein (1997) examined the types of injuries among 30 professional ballet dancers in a Broadway show. As in previous research (Evans, Evans, Carvajal, & Perry, 1996; Ryan & Stephens, 1989; Solomon et al., 1995), they found that ankle-foot injuries were the most frequently reported injuries (50%). Bronner and Brownstein suggested that choreography, environment (floor surface), and footwear were likely contributors to the increased incidence of foot and ankle injuries. They also indicated that financial demands, physiological factors, and psychological considerations might make dancers injuries worse, and various pressures could lead dancers to leave injuries untreated.

Although all these causes of injury are not psychological factors, I have discussed the factors that have been examined in the dance injury literature as background to the detailed examination of the psychosocial antecedents of injury. Until recently, researchers studied aspects of the physical causes of injuries and the effects on injury rates of a variety of dance styles, such as ballet, modern, and aerobic dance (Arnheim, 1980; Clanin, Davison, & Plastino, 1986; Rovere et al., 1983; Schafle et al., 1990; Sohl & Bowling, 1990). In spite of the substantial research into dance-related injuries, injuries have become more prevalent and

have affected the financial status or professional careers of dancers more seriously. Some researchers have begun to look elsewhere for injury risk factors. In particular, dance researchers have begun to focus on psychosocial factors, which have been studied in sport in relation to injury for 30 years.

Model of Stress and Injury in Sport

Because dance is similar to sport in terms of the levels of physical and performance demands, the model predicting how psychosocial factors influence sports injuries, proposed by Williams and Andersen (1998), may be applicable to dance. Over the past three decades, researchers have studied psychosocial variables that influence sport and exercise injuries. Andersen and Williams (1988) originally proposed a multicomponent stress and injury model for the prediction and prevention of sport injuries. Before the stress and injury model, researchers had investigated psychological aspects of injuries in sport without a theoretical foundation to explain the relationship between psychosocial factors and injury (Williams & Andersen, 1998). The stress – injury model has provided a theoretical framework to predict and prevent sport injury. Williams and Andersen developed and revised the model 10 years after they proposed it. In this section, I will describe the model and research that has examined it.

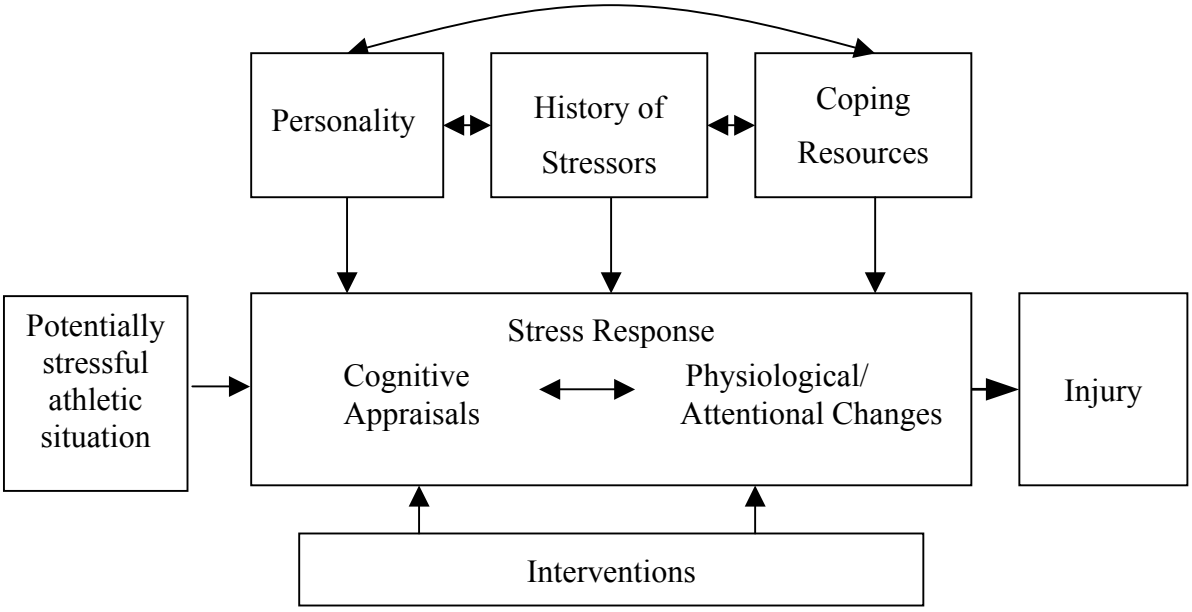

Figure 2.1. Williams and Andersen's (1998) Model of Stress and Injury

Williams and Andersen (1998) proposed the stress-injury model that is illustrated in Figure 2.1. According to Williams and Andersen, "when sport participants experience stressful situations, such as a demanding practice or crucial competition, their history of stressors, personality characteristics, and coping resources contribute interactively or in isolation to the stress response" (p. 6). Williams and Andersen proposed that stress responsivity and injury risk were influenced by the history of stressors, coping resources, and personality factors of the athlete.

History of stressors includes life event stress, daily hassles, and past injury history. Among the potentially relevant personality characteristics, Andersen and Williams (1988) proposed hardiness, locus of control, sense of coherence, competitive trait anxiety, and achievement motivation. Coping resources include general coping behaviours, social support, stress management, mental skills, and medication. In the original model, Andersen and Williams proposed that an

athlete who had a history of many stressors, personality characteristics that exacerbate stress, and few coping resources, when faced with a stressful situation, would be likely to perceive the situation to be more stressful and have a more substantial stress response than an individual with an opposite profile. Williams and Andersen (1998) suggested that psychosocial factors, such as personality and coping resources, might buffer the effects of the history of stressors and even directly influence the stress response.

Responsivity to the stressful situation would be reflected by higher levels of physiological symptoms (e.g., tense muscles) and attentional disruptions, which would increase the probability of injuries. Andersen and Williams (1988) considered the stress response to be a bidirectional relationship between the person's cognitive appraisal(s) of a potentially stressful situation and the physiological and attentional changes during stress. This stress response, the central core of the model, is that when an athlete perceives a potentially stressful athletic situation (e.g., competition, practice) as demanding, if the demands exceed perceived resources, then negative appraisal of the consequences may influence the stress response. If the stress response is extreme, the athlete may have a higher injury risk.

Research on Factors in the Stress-Injury Model

Although some research has demonstrated no significant relationship between psychosocial factors and injury, numerous studies have supported the stress-injury model, which provides a theoretical framework for the prediction and prevention of injury in sport. It is important to address the research that has tested the model in sport, in order to apply the model to the different context of dance.

This section considers the research on various aspects of psychosocial variables and injury in chronological order for each section of Williams and Andersen's (1998) model. The studies are summarised in Table 2.1.

Table 2.1

Research on Psychosocial Variables and Sports Injury

Studies	Participants	Design	Psychosocial Measures	Injury Measures	Results
			Life Event Stress		
Holmes (1970)	100 football players	Prospective	SRRS	Time-loss due to injury	Life stress was related to athletic injuries
Bramwell et al. (1975)	82 football players	Prospective	SARRS	Frequency of injury	Positive relationship between life stress and injury
Coddington & Troxell (1980)	114 high school football players	Retrospective	LES-A	NAIRS (severity of injury)	Life stress was related to athletic injuries
Cryan & Alles (1983)	151 football players	Retrospective	SARRS	NAIRS (severity of injury) and frequency of injury	Life stress was related to frequency of injuries No relationship between stress and severity of injuries
Passer & Seese (1983)	104 football players	Prospective	ALES	Time-loss due to injury	Life stress was related to time loss
May et al. (1985)	73 US alpine skiers	Prospective	SARRS/LESA	Health, Injury, and Performance Survey (HIPS)	Life stress was related to athletic injuries
Williams et al. (1986)	179 volleyball players	Prospective	ALES/SARRS	NAIRS	No relationship between life stress and injuries
Hardy & Riehl (1988)	86 track, baseball, softball, tennis athletes	Prospective	ALES	Frequency and severity of injury	No relationship between life stress and injury

Studies	Participants	Design	Psychosocial Measures	Injury Measures	Results
Kerr & Minden (1988)	41 elite female gymnasts	Retrospective	CLER	Gymnasts' Injury Questionnaire History of injury (frequency and severity of injury)	Positive relationship between life stress and severity and frequency of injury
Smith et al. (1992)	425 high school athletes	Prospective	APES/SES SSS/ACSI	Time-loss injury	Negative life stress was related to time-loss due to injury Positive relationship between major negative sport-specific life events and injury time-loss
Petrie (1992)	103 female gymnasts	Prospective	LESCA/SARRS Social Support Questionnaire	NAIRS (severity and frequency of injury)	Negative life stress and low social support were related to minor, total number of injuries and time-loss due to injury
Petrie (1993a)	98 football players	Prospective	LESCA Social Support Inventory	Severity and time-loss injury	Negative life stress and low social support were related to severity and time-loss due to injury Playing status moderated negative life stress and social support
Petrie (1993b)	158 football players	Prospective	LESCA SCAT-A ACSI	Time-loss of injury	Positive life stress was related to time-loss due to injury Stress effect moderated by trait anxiety

Studies	Participants	Design	Psychosocial Measures	Injury Measures	Results
			Daily Hassles		
Blackwell & McCullagh (1990)	105 college football players	Prospective	ALES/DHS SCAT	Severity of injury	ALES was associated with severity of injury No relationship between daily hassles and injury Positive relationship between anxiety and severity of injury
Hanson et al. (1992)	181 university athletes	Prospective	ALES/EPS SCAT/Social Support Coping Resources Internal-External Locus of Control Scale	Colorado Injury Reporting System Severity of injury	ALES negative was associated with severity of injury and ALES positive was associated with frequency of injury Positive relationship among competitive trait anxiety and coping resources and injury
Fawkner et al. (1999)	98 athletes (field hockey, volleyball, triathlon)	Prospective	DHS	Frequency of injury	Minor life events were related to injury
			History of Injury		
Lysens et al. (1986)	99 physical education students	Prospective	LEQ	Severity of injury	No relationship between life stress and severity of injuries
Van Mechelen et al. (1996)	139 young adults group (75 females, 64 males)	Prospective	LEL/EPC AMT	Frequency of injury	Stressful life events and history of injury were found to be predictors of injury

Studies	Participants	Design	Psychosocial Measures	Injury Measures	Results
			Personality		
Pargman and Lunt (1989)	40 college football players	Prospective	Internal-External (I-E) Locus of Control Scale	NAIRS	Positive relationship between external locus of control and severity of injuries
Kolt & Kirkby (1996)	162 female gymnasts	Retrospective	Coddington Life Events Record (LER) CNSIE/ SCAT-C	History of injury	Life stress was related to injury No relationship between trait anxiety and injury
			Coping Resources		
Smith et al. (1990)	451 high school athletes (basketball, wrestling, gymnastics)	Prospective	APES ACSI Social Support	Time-loss injury	Negative life stress was related to time-loss due to injury Coping resources moderated the life stress and injury relationship
Hardy, Richman, and Rosenfeld (1991)	170 (92 females, 78 males) college athletes	Prospective	Social Support	Frequency of injury	Social support and life stress were predictive of injury frequency only among male athletes
			Stress Response		
Andersen (1989)	University students	Prospective	Anxiety Coping behavior Personality traits	N/A	No systematic change in muscle tension with increasing life stress

Studies	Participants	Design	Psychosocial Measures	Injury Measures	Results
Williams, Tonymon, and Andersen (1990)	32 recreational athletes (17 females, 15 males)	Prospective	LES STAI	N/A	Athletes with many major life events and higher state anxiety had more narrowing of peripheral vision compared to athletes with few major life events
Williams, Tonymon, and Andersen (1991)	74 (44 males, 30 females) university students	Prospective	Vulnerability to Stress Questionnaire DHS/LES STAI	N/A	Consistent with the previous study (Williams et al, 1990) No relationship between daily hassles and coping resources
Bhum and Morris (1996)	20 (10 males, 10 females) physical education students	Prospective	ALES ACSI SSQ	N/A	Under stressful situations, both central and peripheral visual attention deteriorated
Williams and Andersen (1997)	201 athletes (120 females, 81 males)	Prospective	LESCA	N/A	Athletes with high negative life event scores experienced greater peripheral narrowing and slower central vision reaction time that athletes who had low life event stress

Studies	Participants	Design	Psychosocial Measures	Injury Measures	Results
Bhum, Morris, and Andersen (1998)	24 (12 males, 12 females) physical education students	Prospective	STAI	N/A	Under stressful situations, both central and peripheral visual attention deteriorated. Autogenic training reduced the degree of deterioration in central and peripheral visual attention
Andersen & Williams (1999)	196 athletes from various sports	Prospective	LESCA SSQ/STAI	Frequency of injury	Negative life stress was related to injury Low social support and high negative life stress increased peripheral narrowing
		Intervention Studies			
De Witt (1980)	12 male basketball players	Prospective	N/A	Severity of injury	Intervention group decreased minor injuries and stress levels
May and Brown (1989)	U. S. Alpine Ski Team	Prospective	N/A	Frequency of injury	Psychological interventions reduced injuries
Davis (1991)	25 swimmers and divers An American football team	Prospective	N/A	Severity of injury	A 52% and 33% reduction in injuries for swimmers and football players respectively

Studies	Participants	Design	Psychosocial Measures	Injury Measures	Results
Kerr and Goss (1996)	24 gymnasts (16 males, 8 females)	Prospective	LES/AES	Frequency of injury Severity of injury	Stress management program was effective both in terms of injury reduction and stress levels
Perna et al. (2003)	34 collegiate rowers	Prospective	LESCA	Frequency of injury and illness	Stress management program based on stress inoculation training was effective in the number of injury and illness days
Kolt and Hume (2004)	20 gymnasts (17 girls, 3 boys)	Prospective	LES/AES	Anatomical location of injury, type of injury, the number of training hours missed or modified due to injury	Stress management program had no effect on training hours lost to injury or on stress

Note. Studies are presented in chronological order within sections reflecting the focus of the research.

History of Stressors

Stress can affect a person's physical, psychological, and behavioural responses. Selye (1983) defined stress as "a nonspecific response of the body to any demand" (p. 2). When a person is under stress, regardless of whether the responses are negative, like fear or anger, or positive, like love and/or joy, the body tries to readjust, moving back to normalcy. Selye also referred to the four basic variations of stress, namely good stress (eustress), bad stress (distress), overstress (hyperstress), and understress (hypostress). Selye proposed that the goal is to balance between hyperstress and hypostress, to maximize eustress, and to minimize distress. Stress can influence performance, as well as injury occurrence, and includes life events, daily hassles, and history of injury.

Life events. Major life events include occurrences, such as the death of a family member, divorce, breakup of a relationship, marriage, change in level of responsibility a dance company, and receiving a dance academy scholarship. Holmes and Rahe (1967) introduced the concept of life event stress and developed the Social Readjustment Rating Scale (SRRS), which was based on the work of Adolph Meyer (Lief, 1948). To generate the items (43 life events), Holmes and Rahe used interview and questionnaire data to develop clusters of types of events. The items included a family constellation (e.g., births and deaths in the family, marriage), occupation, economics, residence, group and peer relationships, education, religion, recreation, and health.

Holmes (1970) conducted the first study of life stress and athletic injuries using the SRRS with approximately 100 American football players for the year prior to the football season. Then he monitored time lost due to injury during the

following football season. Holmes found that players who experienced high life stress were more likely to incur injuries during the season that followed, than players with low and medium life stress.

Bramwell, Masuda, Wagner, and Holmes (1975) developed the Social Athletic Readjustment Rating Scale (SARRS), which is a modified version of the SRRS, to make it more appropriate for intercollegiate athletes, by including events, such as troubles with head coach, change in level of performance, and being dropped from team, and to delete some of the items, such as pregnancy, retirement, son or daughter leaving home, because the items were not suitable for most athletes. The modifications to the SRRS aimed to increase the relevance and credibility of the instrument for athletes. Bramwell et al. conducted a study on the relationship between life stress and injury using SARRS with 82 university football players. They divided the sample into three groups (i.e., low, moderate, high-risk groups), based on Life Change Units (LCU), which measured the magnitude of life change. Bramwell et al. found that players in the low-risk group were injured 30% of the time (LCU = 0-400 for 1 year, 0-700 for 2 years), players in the moderate-risk group were injured for 50% of the season (LCU = 400-800 for 1 year, 700-1200 for 2 years), and players in the high-risk group were injured for 73% of the study duration (LCU > 800 for 1 year, > 1200 for 2 years). These results showed that stress levels were positively correlated with injuries among athletes.

Coddington and Troxell (1980) developed the Life Event Scale for Adolescents (LES-A), which was similar to the SRRS. The LES-A was designed for use with children and adolescents. Coddington and Troxell used the LES-A to

examine the life changes and injury relationship among 114 high school football players. The LES-A consists of three basic scores, namely family events, desirable events, and undesirable events. Coddington and Troxell also analysed the Object Loss Score, which related to the possible or real loss of a person close to them. They revealed that players who experienced Object Loss were five times more likely to be injured than players who did not experience such loss at all. This finding supported the proposition that negative life events and social support were related to injury rates even though Coddington and Troxell did not measure a specific social support scale.

Cryan and Alles (1983) investigated football injury using the SARRS instrument with a large sample size ($N = 151$). They replicated the Bramwell et al. (1975) results, but modified the design of the earlier study by assessing the severity of injuries, using the National Athletic Injury Reporting System (NAIRS). NAIRS reported three different standards. Minor and moderate injuries were those where the athlete returned within 7 days and 8 to 21 days, respectively. Major injury was missing more than 21 days. Cryan and Alles found that players with high levels of stress had more chance of being injured than those who had the opposite profile, as did Bramwell et al. They did not discover a significant relationship between stress and severity of injury.

Some researchers have argued that negative life events (e.g., death of a loved one) might have a different effect than positive life events (e.g., getting a scholarship from school); (Brown, 1972; Mechanic, 1975). To overcome this problem, Sarason, Johnson, and Siegel (1978) developed a new instrument, the Life Experiences Survey (LES), to assess positive and negative life experiences,

as well as total life events. The LES is a 57-item self-report measure. Responses are made on a 7-point Likert scale, ranging from -3 (*extremely negative*) to +3 (*extremely positive*). The LES has been used to measure life stress in general and student populations. Sarason et al. found that negative life events scores were significantly related to the stress-related dependent measures, rather than positive life change.

Passer and Seese (1983) modified the LES to increase its appropriateness for all male student-athletes. The modified LES was named the Athletic Life Experiences Survey (ALES), which contained 70 items. Passer and Seese also examined the role of moderator variables, such as anxiety (general trait anxiety and competitive trait anxiety) and locus of control within the relationship between stress and injury. They found that injured players had experienced greater negative life change and higher object loss scores than noninjured players. There was no significant effect of the moderator variables on the stress-injury relationship.

May, Veach, Reed, and Griffey (1985) examined predictive correlations between psychological variables and health, injury, and performance patterns of US elite alpine skiers of both genders (52% male, 48% female). Seventy-three participants completed psychological scales (SARRS and LESA) to assess life events and the Health, Injury, and Performance Survey (HIPS; May, Veach, Southard, & Herring, 1985) to measure frequency and duration of specific illnesses or injuries during the past year, and performance during that time period. May et al. found that athletes who experienced high life stress had more health problems, such as ear, nose, and throat (ENT) infections and, in general, scores on

the life event measures were positively correlated to consumption of nonprescribed substances, such as tobacco and drugs. In addition, life events had a positive relationship with duration of ENT and sleep problems, headaches, and musculoskeletal leg injuries. May et al. also found a significant relationship between stress and injury in the noncontact sport. All the previous research had examined contact sport, particularly American football.

Williams, Tonymon, and Wadsworth (1986) also conducted a nonfootball study with volleyball players of both genders, examining the relationship between life stress and injury occurrence. The participants were 179 (111 female and 68 male) NCAA Division I intercollegiate volleyball players from 15 universities. The participants completed the ALES and SARRS to measure life stress, the coping resource section (CR) of the Stress Audit Questionnaire (Miller & Smith, 1982) to evaluate coping resources, and NAIRS to assess severity of injury. The players filled out the life stress scales before the beginning of the season and athletic trainers recorded their injuries during the volleyball season. Williams et al. found that there was no significant relationship between life change stress and injury occurrence. They showed, however, that coping resources was the best predictor of injury occurrence. Williams et al. assumed that this result might be related to different stress levels, because, in general, volleyball players showed much lower levels of stress than football players in previous studies. Another possible explanation is that the frequency of injury is much lower in a noncontact sport like volleyball than in football**.** This would be consistent with the May et al. (1985) finding of a significant stress-injury relationship in the noncontact sport of skiing, where injury risk is much higher than in volleyball.

Lysens, Auweele, and Ostyn (1986) investigated the possible relationship between life change events and injuries with 99 physical education students (66 male and 33 female). Lysens et al. assessed life stress with a 74-item Life Event Questionnaire (LEQ), which was modified from the SARRS, in order to make some items more appropriate for physical education students. Physicians recorded severity of injuries, which were divided into three categories: minor (absence from practice for less than l week), moderate (absence from practice for more than 1 week, but less than 1 month), and major (absence from practice for more than 1 month). An injury was defined as any injury, occurring during the sports practice sessions, and causing at least three days exemption from sports practice. Lysens et al. found no significant relationship between life stress and the severity of acute or overuse injury occurrence. The omission of injuries that had effects of less than 3 days exclusion from practice might have influenced the results of this study.

Compas, Davis, Forsythe, and Wagner (1987) developed a measure of major and minor stressful events for adolescents, the Adolescent Perceived Events Scale (APES). This instrument has 197 items. The APES was developed from a large number of specific life experiences (e.g., getting bad grades or progress reports, having bad classes or teachers, death of a family member, parent getting remarried) that were generated from a wide age range of adolescents. Participants indicate whether they have experienced each event in the last six months and, for events that they have experienced, they circle whether it was a good (positive) or bad (negative) thing at the time. Participants also decide whether the event was a major event (having a large effect on their life or having led to changes in their health or well-being, or their relations with other people) or a day-to-day event

(perhaps once, twice, or more times during a month, not having long-term effects).

Hardy and Riehl (1988) examined the relationship between life stress and athletic injury among male and female participants in noncontact sports (i.e., baseball, softball, tennis, and track). The participants were 86 athletes, who completed ALES (Passer & Seese, 1983) before the start of the season. The frequency and severity of injury were recorded for all practices and contests. Hardy and Riehl found that frequency of injury and Total Life Change (TLC) were correlated for females, and Object Loss (OL) was correlated with injury for track athletes. None of the stress measures predicted severity of injury in the specific sports. These findings suggest that both gender and sport types could influence the life stress-injury relationship.

In another investigation of a noncontact sport, Kerr and Minden (1988) examined whether psychosocial variables (i.e., trait anxiety, locus of control, self-concept, and stressful life events) were related to injury occurrence. Kerr and Minden conducted a retrospective study with 41 female, elite gymnasts, whose ages ranged from 11 to 19 years. Kerr and Minden used the Coddington Life Event Record (CLER; Coddington, 1972), which was designed for the high school age group, to assess life stressors and a Gymnasts' Injury Questionnaire (GIR), which was designed for their study, to record injury. The gymnasts were asked to report injuries that had occurred over the past two years (frequency of injury), to describe each injury and its occurrence, to explain the time of the injury in relation to the next competition, to recount the number of days that the injury interfered with regular training (severity of injury), and to report what they

perceived to be the causes of each injury. Kerr and Minden found that those gymnasts who experienced higher numbers of life stressors were likely to experience more severe and more frequent injuries than those with an opposite profile. Because the study was retrospective, the results should be considered with caution. Kerr and Minden suggested that prospective and longitudinal designs should be conducted to explain the stress-injury relationship.

Blackwell and McCullagh (1990) examined the relationship between psychosocial factors and athletic injury in 105 Division I, male university football players. To assess life stressors, Blackwell and McCullagh used the Athletic Life Event Scale (ALES; Passer & Seese, 1983). To measure minor life stressors, at the end of the season, athletes completed the Daily Hassles Scale (DHS; Kanner, Coyne, Schaefer, & Lazarus, 1981), which assessed minor daily irritations, such as class assignments and minor problems with girlfriend. To assess competitive trait anxiety, Blackwell and McCullagh used the Sport Competition Anxiety Test (SCAT; Martens, 1977), which measures individual differences in the tendency to perceive competitive situations as threatening. The ALES and SCAT were completed before the football season began. Athletic trainers recorded injuries, which were distinguished as mild (required treatment, but no modification of activity), moderate (required treatment and some modification of activity), and severe (required some period of nonparticipation). Blackwell and McCullagh found that injured players had higher scores on the ALES than uninjured players, but there was no relationship between minor events and injury. Studies that measured daily hassles only once are considered to be weak, because minor events could vary dramatically throughout the competitive season. Blackwell and

McCullagh also found that high anxious players had a higher incidence of severe injuries than low anxious players.

Smith, Smoll, and Ptacek (1990) examined conjunctive effects of two moderators (social support and coping skills) on life stress and injury outcomes. Smith et al. gathered 451 high school athletes from a variety of sports, including individual, team, contact, and noncontact sports. Smith et al. employed a modified version of the Adolescent Perceived Events Scale (APES; Compas et al., 1987) to assess life stress (i.e., minor, major, positive, negative), a social support scale (Cauce, Felner, & Primavera, 1982), and the Athletic Coping Skills Inventory (ACSI; Smith, Smoll, & Schutz, 1988). Athletes' injuries were measured in terms of the total number of days missed due to injury (time loss) over the course of the season. Smith et al. found that coping resources moderated the life stress and injury relationship, but only for major negative events. When athletes were divided into four groups (low-low, low-high, high-low, high-high) for upper and lower thirds of the social support and coping skills distributions, athletes who had low social support and few coping skills exhibited a significant stress-injury relationship, accounting for 22% of the injury variance. Also, major negative life stress accounted for up to 30% of the injury variance. Although limited research has examined this issue, the studies have shown that psychological coping skills moderated the life stress-injury relationship (Blackwell & McCullagh, 1990; Smith, Smoll, & Ptacek, 1990). Some researchers, however, found no relationship between psychological coping skills and injury occurrences (Lavallee & Flint, 1996; Rider & Hicks, 1995; Van Mechelen et al., 1996). Williams (2001) made the criticism that different design and statistics, including small sample sizes,

were the main reasons for the different results, compared with the Smith et al. findings, even though these researchers used the same questionnaire, as did Smith et al., except for Van Mechelen et al. (1996).

Another study of the same design and method was conducted to measure life stress and injury by Smith, Ptacek, and Smoll (1992). The participants were 425 high school athletes from basketball, wrestling, and gymnastics and both genders participated in this study. Smith et al. employed the APES to assess life stress, the Sport Experiences Survey (SES), which was designed for this study to measure sport-specific events (e.g., "problems with the head coach", "being moved to a higher playing status,"), the Sensation-Seeking Scale (SSS; Zuckerman, 1979), the ACSI (Smith, Smoll, & Ptacek, 1990) and the Mental Health Inventory (Veit & Ware, 1983), and injury expectancies (injury probability and time-loss). The coaches recorded injury data (total number of days missed because of injury) on a daily basis. Smith, Ptacek, et al. divided the sample into two groups with high (n = 91) and low (n = 79) sensation seekers. Smith, Ptacek et al. found that a positive relationship between major negative sport-specific life events and injury time-loss only occurred for athletes, who were low in sensation seeking.

Hanson, McCullagh, and Tonymon (1992) investigated how multiple psychosocial factors predicted injury among 181 (123 males, 58 females) NCAA Division I and II university track and field athletes from 4 universities. Before the season, they measured life stress, using the Athletic Life Experience Survey (ALES), which assesses positive, negative, and total life stress and minor life events. Hanson et al. used the Sport Competition Anxiety Test (SCAT) to measure

competitive trait anxiety, the Internal-External Locus of Control Scale (Rotter, 1966) to assess locus of control, Neeman and Harter's (1986) Social Support ("People in My Life") Inventory, and Miller and Smith's (1982) coping resources scale (a modified version of the Coping Resource Section of the Stress Audit Questionnaire). Athletic trainers at each university recorded the number of days an athlete missed practice or had to modify activities during the season (18 weeks), using the Colorado Injury Reporting System (CIRS). Hanson et al. found that athletes with high negative life stress scores experienced more severe injuries, and athletes with high positive life stress scores had more frequent injuries than athletes with low negative and positive life stress scores. Generally, score on negative aspects of life stress was more strongly related to frequency and severity of injury than was positive life stress (Blackwell & McCullagh, 1990; May, Veach, Reed et al., 1985). The results of this research did not support the relationship between minor life events and frequency of injury. As Blackwell and McCullagh did, Hanson et al. measured daily hassles only on one occasion, at the start of season. Once again, daily hassles need to be measured frequently from the start to the end of the season to reflect their levels at the time of injury. Hanson et al. also found that there was a relationship between competitive trait anxiety and severity of injury, but competitive trait anxiety was a weak predictor variable. Furthermore, Hanson et al. found that coping resources distinguished between those athletes who became injured and those who did not. Groups with high severity and frequency of injury had significantly fewer coping resources than the other groups.

Petrie (1992) investigated the life stress and injury relationship and the role of social support with 103 female collegiate gymnasts from NCAA Division I-A teams. To assess life stress and severity of injury, Petrie used the Life Events Survey for Collegiate Athletes (LESCA), SARRS, and the National Athletic Injury/Illness Reporting System (NAIRS). To assess the effects of social support using the Social Support Questionnaire (Sarason, Levine, Basham, & Sarason, 1983), Petrie divided the sample into thirds, based on their social-support scores, to measure high- and low- social support satisfaction. The gymnasts completed the LESCA, SARRS, and SSQ during the first week of practice and the staff recorded the number of days missed due to injury and the total number of injuries during the season. Petrie found that higher levels of negative life stress were related to minor injuries, total number of injuries, and time loss because of injury. Petrie also found that for gymnasts, who had low social support and negative life stress, these variables accounted for 14%, 11%, and 18% of the variance in minor, severe, and total injuries, respectively. Petrie proposed that the moderating effects of social support, depending on the level of support, might have influenced the gymnasts' perceptions of the life events they experienced. In highly stressful situations, such as practice or competition, gymnasts with higher levels of support might have appraised the demands of such situations as less stressful than gymnasts with low levels of social support, leading to lower incidence of injury in athletes with high levels of social support.

In a subsequent study, Petrie (1993a) investigated whether playing status (i.e., starter vs nonstarter) and social support moderated the effects of the life stress and injury relationship in 98 football players. The participants completed

the LESCA, which assessed life stress and the Social Support Inventory (Brown, Alpert, Lent, Hunt, & Brady, 1988), which measured social support, during the first team meeting of the season's training camp. The athletic assistant head trainer collected injury data, including severity and time loss (the total number of days absent from practice/competition due to injury) of injury and games missed (the total number of games in which the athlete was unable to participate due to injury) throughout the season. Petrie found that starting football players with low social support had a positive relationship between negative life stress and injury outcomes (the number of severe injuries, days absent due to injury, and games missed), whereas those with high social support had a negative relationship between these variables. Nonstarting football players, however, had no significant relationship between these factors (i.e., life stress and social support) and injury outcomes. Petrie concluded that playing status moderated the utility of negative life stress and social support as predictors of injury outcomes. These findings provide additional support for the conclusion from previous studies (Hardy, Richman, & Rosenfeld, 1991; Petrie, 1992; Smith, Smoll, & Ptacek, 1990) that social support is a moderator of the life stress-injury relationship.

In another study, Petrie (1993b) also examined whether playing status (starter vs nonstarter football players), coping skills, and competitive trait anxiety moderated the life stress and injury relationship in 158 football players. Petrie used the Life Events Survey for Collegiate Athletes (LESCA; Petrie, 1992), the Sport Competition Anxiety Test-Adult (SCAT-A), in which some items were dropped to reduce response bias from the original SCAT, and the Athletic Coping Skills Inventory (ACSI; Smith et al., 1988). Time loss was the injury measure,

operationalised as the total number of days unable to participate in practice or competition because of injury. Petrie found that competitive trait anxiety moderated the effects of positive life stress. For example, higher levels of positive life stress and competitive trait anxiety were related to an increase in the number of days missed due to injury. Petrie also found that starting football players with higher levels of positive life stress had more days missed due to injury. This result also provided support for the Hanson et al. (1992) study that found positive life stress could be related to injury outcome. Petrie suggested that positive life events (e.g., receiving an athletic scholarship, major change in level of responsibility on team) might also produce considerable stress because of pressure to do better. These changes are likely to lead to negative cognitive appraisals of athletic situations, and thus injuries are likely to increase. Coping skills did not moderate any stress and injury relationship in this study.

Daily hassles. Daily hassles are the many minor problems of daily life, such as transient health problems, heavy workload, domestic affairs, financial straits, political issues, or personal relations. Lazarus and Folkman (1984) suggested that all the minor hassles can be as harmful and threatening to the well-being of individuals as major life events. Some researchers have examined the daily hassles and injury relationship at only one time, either at the start (Hanson et al., 1992) or near the end of the season (Blackwell & McCullagh, 1990).

As reported earlier, Blackwell and McCullagh (1990) and Hanson, McCullagh, and Tonymon (1992) did not support the relationship between minor life events and frequency of injury, because of measuring the daily hassles-injury relationship at only one time, either at the start (Hanson et al., 1992) or near the

end of the season (Blackwell & McCullagh, 1990). Fawkner, McMurray, and Summers (1999) criticised this approach, because daily hassles fluctuate from day to day, so a measure of hassles at one time would not be expected to relate to injuries over a period of time, such as a competition season. To consider this methodological weakness, Fawkner et al. examined the relationship between daily hassles and athletic injuries, with a measure of minor stressful events administered on a weekly basis repeatedly over the course of a competitive season. The participants consisted of 98 athletes of both genders, from field hockey, volleyball, and triathlon. The athletes completed the Daily Hassles Scale (DeLongis, Folkman, & Lazarus, 1988), to assess minor life events, and coaches monitored athletes' injuries on a weekly basis during either training or competition. Fawkner et al. found that a high rate of injury occurred among athletes, who had increased minor life events for the week prior to injury. Fawkner et al. suggested that research should employ measures of both major and minor life events, assessing them with a repeated measures design, to test for a link between stress and injury.

History of injury. According to Williams and Andersen's (1998) model, history of injury also is included in the history of stressors. They assumed that athletes whose recovery from prior injuries was not adequate and athletes' who had negative experiences throughout the injury and recovery process might experience a considerable stress response, in situations where there is a risk of injury, increasing the probability of reinjury.

Lysens et al. (1984) reported that physical education students who had a previous history of injury were at high risk of suffering injury again. If an athlete

with a prior history of injury has not completely recovered physically, the risk for reinjury might be classified more appropriately as a physical vulnerability to injury factor, rather than a psychological risk factor. Even though athletes may be physically recovered, they might still be anxious about reinjury and that anxiety can lead to a stress response and greater likelihood of reinjury. This situation would constitute a psychological vulnerability factor.

Van Mechelen et al. (1996) investigated the combined effect of selected subject-related risk factors, including psychological, psychosocial, physiological, and anthropometrical factors (i.e., body mass index, maximal oxygen uptake, neuromotor performance, muscle strength balance of the lower extremities, previous injury, sporting time, and selected psychological and psychosocial factors) in a prospective study. The participants were 139 (75 females, 64 males) general young adults, aged 27-29 years. Van Mechelen et al. used the Life Events List (LEL; Sarason et al., 1978), the Everyday Problem Checklist (EPC; Vingerhoets, Jeninga, & Menges, 1989), the Achievement Motivation Test (AMT; Hermans, 1976), which includes subscales measuring achievement motivation (i.e., the need to achieve and the will to reach achievements), facilitating anxiety (i.e., a fear of failure leading to higher achievements, especially in unstructured task situations), and debilitating anxiety (i.e., a fear of failure leading to lower achievements, especially in unstructured task situations) questionnaires to measure psychological factors. The participants reported injury incidence rate, including location of the injury, affected anatomical structure, nature of the injury in terms of a medical diagnosis, recurrent character of the injury, and the length of time that the person was experiencing from complaints before reporting the injury.

Van Mechelen et al. reported that stressful life events, previous injury, and exposure time (i.e., total sporting time, competition time, training time, contact sporting time, noncontact sporting time, and unorganised sporting time) were strong predictors of sport injuries. Van Mechelen et al., however, pointed out that a weakness of this study was that no distinction was made between the recurrence of an old injury and the occurrence of a new injury to another part of the body sustained in an injured participant. Another weakness of the Van Mechelen et al. study is that they selected a general adults group as participants, rather than actual athletes. It is possible that motivation could be influenced by the characteristics of participants. Achievement motivation is likely to be higher in competitive athletes than in the general population.

In summary, numerous stress-injury studies have supported the stress-injury model (Williams & Andersen, 1998), since Holmes conducted the first study of stress and injury in football players. The most frequently repeated finding is that negative life events are associated with increased risk of injuries in athletes (Andersen & Williams, 1999; Petrie, 1992, 1993b; Smith et al., 1992; Smith, Smoll, & Ptacek, 1990). Many of the previous studies examined contact sports like football and high risk sports like gymnastics and skiing, and showed that athletes, who experienced high levels of life stress, were more likely to experience injury occurrence than athletes who experienced low levels of life stress (Blackwell & McCullagh, 1990; Bramwell et al., 1975; Coddington & Troxell, 1980; Kerr & Minden, 1988; Passer & Seese, 1983; Petrie, 1992, 1993a, 1993b). Relationships between minor life events (daily hassles) and injury have not shown consistent results, due to methodological problems particularly the approach of

measuring daily hassles only once, either before the start of the season or at the end of the season (Blackwell & McCullagh, 1990; Hanson et al., 1992). The study by Fawkner et al. (1999) suggests that daily hassles should be measured frequently, for example, on a weekly basis, and hassles should be related to injuries incurred during the following week, because minor life events are changing continuously.

The different measures used to assess injury may have contributed to the varied results. Many researchers used the NAIRS, which records severity of injury. The NAIRS classifies injuries that disturbed athletes' training only by the amount of time-loss due to injury. When athletes have minor injuries, they might ignore them and practice or compete, because of different personality or pain tolerance levels. The measurement of injury severity might have added some confusion to examination of the stress-injury relationship.

Personality

In the original stress-injury model, Andersen & Williams (1988) proposed six personality variables, hardiness, sense of coherence, achievement motivation, locus of control, trait anxiety, and sensation seeking. They presented these as examples of personality characteristics for which the basis for a link to injury could readily be argued. This aspect of the model was open to any personality characteristics that might emerge from research. Researchers, however, have not investigated hardiness and sense of coherence and only one study has examined achievement motivation (Williams, 2001). A few researchers have focused on locus of control and competitive trait anxiety. In a study cited in an earlier section,

Van Mechelen et al. (1996) found that achievement motivation was not the predictor of risk to injury incidence.

Cox (2002) defined locus of control as referring to "people's belief about whether they are personally responsible for what happens to them" (p. 52). Athletes with internal locus of control tend to perceive that what happens to them is due to their behaviours (e.g., ability, effort), whereas those with external locus of control believe that their outcomes can be attributed to outside factors (e.g., luck, fate, under the control of powerful others). Researchers have examined whether locus of control predicts injury. Pargman and Lunt (1989) examined the relationship between locus of control and severity of injury in a sample of 40 freshman college football players for 1 year. Pargman and Lunt used Rotter's (1966) Internal-External (I-E) Locus of Control Scale, which measures internal-external beliefs across a wide range of situations, and the National Athletic Injury/Illness Reporting System (NAIRS), which assesses severity of injury. Pargman and Lunt reported that external locus of control showed a significant positive correlation with severity of injuries. In contrast, Kolt and Kirkby (1996) examined whether psychological factors, such as life stress, anxiety, and locus of control, predicted injury. The sample consisted of 162 female gymnasts, ranging in age from 9 to 18 years. The gymnasts completed the Children's Nowicki-Strickland Internal-External Control Scale (CNSIE), which accesses locus of control in children, and the Sport Competition Anxiety Test for Children (SCAT-C), to measure competitive trait anxiety, respectively. The participants also completed the Coddington Life Events Record (LER), which assesses the degree of life change experienced by children, and they also reported the participants'

history of injury over the previous 12 months. Kolt and Kirkby divided the sample into two groups, elite gymnasts and nonelite gymnasts. They found that locus of control (more internal locus of control) significantly predicted injury in the 47 elite gymnasts, but nonelite gymnasts showed no relationship between locus of control and injury occurrence. Life stress was a significant predictor of injury and there was no relationship between trait anxiety and injury in the whole sample. A weakness of the Kolt and Kirkby study is its retrospective design. It is possible that retrospective studies do not have any predictive value, due to memory recall problems. Another weakness of their study relates to some of the instruments. Andersen and Williams (1988) and Hanson, McCullagh, and Tonymon (1992) suggested that researchers should use sport-specific tools for measuring personality factors (e.g., locus of control, competitive trait anxiety) to predict injury. In general, there seems to be no established relationship between locus of control (external vs internal) and injury occurrence, thus future research is needed to confirm this relationship.

Martens (1977) defined competitive trait anxiety as a tendency to perceive competitive situations as threatening and to respond to these situations with feelings of apprehension or tension. Blackwell and McCullagh (1990) and Hanson et al. (1992), in studies presented earlier, found that there was a relationship between competitive trait anxiety and severity of injury. In another study, Petrie (1993a) found that competitive trait anxiety moderated the effects of positive life stress.

A few studies have shown that athletes with high external locus of control or competitive trait anxiety incurred more severe and frequent injuries (Blackwell &

McCullagh, 1990; Hanson et al., 1992; Pargman & Lunt, 1989; Petrie, 1993a). Unfortunately, except for one study by Petrie (1993a), previous studies either did not use statistics or did not apply designs that permitted testing whether personality variables might interact with history of stressors or history of injury to influence injury occurrence (Williams & Andersen, 1998). When researchers measure competitive trait anxiety, the Sport Anxiety Scale (Smith, Smoll, & Schutz, 1990), which involves subscales measuring cognitive and somatic trait anxiety, and concentration disruption, is the preferred measure. The SAS should be used to examine how trait anxiety is related to cognitive appraisal and attentional/physiological disruptions, when an athlete is in a stressful competitive situation (Williams, 2001). Andersen and Williams (1988) proposed six personality factors as suggestions for initial research on the role of personality in the stress and injury model. Williams (2001) emphasized that more research is needed on the relationship between other personality variables (e.g., sensation seeking, mood states, aggression, anger, dominance, defensive pessimism, self-concept) and injury vulnerability.

Coping Resources

The stress-injury model includes coping resources, such as social support, coping skills, stress management, and general coping behaviours. General coping behaviours include sleep patterns, nutritional habits, and taking time for oneself (Williams & Andersen, 1998). Coping has been defined by Lazarus and Folkman (1984) as "constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (p. 141). Coping refers to efforts to manage stressful

demands, regardless of the success of those efforts. A lack of coping resources may be associated with high levels of stress and injury occurrence.

Shumaker and Brownell (1984) defined social support as "an exchange of resources between at least two individuals perceived by the provider or the recipient to be intended to enhance the well-being of the recipient" (p. 13). The functions of social support are to moderate or buffer the impact of stress (Hardy et al., 1991). According to the model, social support influences injury outcome directly (Byrd, 1993; Hardy et al., 1990; Hardy, Prentice, Kirsanoff, Richman, & Rosenfeld, 1987) or moderates life stress (Hardy et al., 1991; Patterson et al., 1998; Petrie, 1992, 1993b; Smith, Smoll, & Ptacek, 1990). When social support acts as moderator, it influences injuries indirectly. The extent to which athletes have access to social support, as well as the degree to which they take advantage of available social support, can be seen as use of a coping resource. Some researchers have found that athletes who had high levels of social support had lower incidence of injuries and those who had low levels of social support suffered more injuries (Byrd, 1993; Hardy et al., 1990). Coddington and Troxell (1980) found that injured football players had more experience of Object Loss (the possible or real loss of a person close to them) than noninjured players, even though Coddington and Troxell did not measure a specific social support scale.

Hardy, Richman, and Rosenfeld (1991) examined the role of social support in the life stress and injury relationship with 170 (92 females, 78 males) college athletes, including a variety of sports. Hardy et al. found that social support and life stress were predictive of injury frequency only among male college athletes. Interestingly, when male athletes had high social support (i.e., shared social

reality support), they experienced negative effects, such as distraction from their performance, increase in the injury risk, and increase in performance motivation/arousal. There was, however, no relationship between social support and injury frequency among female athletes.

Some findings provide additional support for the conclusion from previous studies (Hardy et al., 1991; Petrie, 1992; Smith, Smoll, & Ptacek, 1990) that social support is a moderator of the life stress-injury relationship. Recently, Andersen and Williams (1999) also found that low levels of social support might influence the stress response (leading to greater peripheral narrowing) thus, increasing the risk of injury. At this time, it must be concluded that social support might directly affect injury outcome, moderate the life stress-injury relationship, or do both (Williams & Andersen, 1998).

A study that examined conjunctive effects of two moderators (social support and coping skills) on life stress and injury outcomes is Smith et al.'s (1990) research, which was described earlier. With respect to moderators, Smith et al. found that coping resources moderated the life stress and injury relationship, but only for major negative events.

The operationalisation of coping skills in sport research has most often employed the Athletic Coping Skills Inventory-28 (Smith, Schutz, Smoll, & Ptacek, 1995). It comprises seven sub-scales: (a) Coping With Adversity; (b) Peaking Under Pressure; (c) Goal Setting/Mental Preparation; (d) Concentration; (e) Freedom From Worry; (f) Confidence and Achievement Motivation; and (g) Coachability, which together provide a broad picture of how the person copes with their sport. The ACSI-28 has been used in several studies to measure

individual differences in psychological coping skills within a sport context (Petrie, 1993a; Smith et al., 1992; Smith, Smoll, & Ptacek, 1990). Studies that have examined the relationship between coping skills and injury have not produced consistent results. This may be because few studies have considered coping skills as a possible moderator. Petrie & Perna (2004) suggested that researchers should consider measuring coping skills in terms of the number of resources a person has or by including consideration of the handling of the stressful situation a person is facing. They also suggested that further research should examine both coping skills and social support and extend the measurement of coping skills. The ACSI-28 is a well-established inventory based on the multidimensional measurement of coping skills, and has potential to be used as a specific measure of psychological skills.

Stress Response

There has been little research examining the mechanisms, that explain the bidirectional relationship between the person's cognitive appraisal of potentially stressful athletic situations and the proposed physiological and attentional changes. Andersen and Williams (1988) hypothesized that when athletes face situations they perceive to be stressful, they are likely to experience increased muscle tension because of simultaneous contraction of agonist and antagonist muscle groups in response to stressors, narrowing of the visual field, due to a blocking of adaptive responses from preoccupation with stressful events, and increased distractibility, leading to greater risk of injuries.

Muscle tension. Only one study (Andersen, 1989) has examined the relationship between psychosocial factors and physiological changes (i.e., muscle

tension) under low and high stress conditions. Andersen found that during the high versus low stress condition, there were no differences among individuals. Andersen (1989) postulated that the result might relate to the sample, which was a general population (university students) sample, rather than a high-risk athlete population.

Attention. Williams, Tonymon, and Andersen (1990) employed a laboratory dual-task paradigm to examine state anxiety and peripheral narrowing, during a stressful situation, for 32 recreational athletes (17 females, 15 males), who enrolled in physical activity classes ranging from various team sports to individual sports, with high or low levels of life events stress. Williams et al. used the Life Experiences Survey (Sarason et al., 1978), which assesses positive life events (PLE), negative life events (NLE), and total life events (TLE) and the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970), which measures how the participants feel at the moment they are completing the questionnaire. Williams et al. also used the Stroop Color-Word Test to increase stress. They found that athletes with many major life events and higher state anxiety had more narrowing of peripheral vision under the high stressful condition compared to athletes with few major life events.

In a second study, Williams, Tonymon, and Andersen (1991) used the same design and measurement, but also measured coping resources (e.g., social support or general coping behaviours), using the Vulnerability to Stress Questionnaire, a subscale of the Stress Audit Questionnaire (Miller & Smith, 1982) and daily hassles using the Daily Hassles Scale (DHS; Kanner et al., 1981). The participants were 74 (44 males, 30 females) university students. Williams et al. reported that

participants with high levels of negative life stress had greater peripheral narrowing, during a stressful situation, than those with low levels of negative life stress. This result was consistent with the previous study (Williams et al., 1990). Williams et al. (1991) also investigated whether the effect of coping resources and daily hassles influenced peripheral narrowing and state anxiety. They found that there was no significant interaction effect between daily hassles and coping resources, but social support and coping behaviours (coping resources) might have moderated the stress reactivity of people with high levels of history of stressors.

Williams and Andersen (1997) investigated both peripheral narrowing and disruptions in the central field of vision with intercollegiate athletes (120 females, 81 males) from two National Collegiate Athletic Association (NCAA) Division I universities. The athletes participated in various sports. The participants completed the Life Events Survey for Collegiate Athletes (LESCA), which measured life events. Williams and Andersen used a Topcon Goldman Perimeter, model SPB-11, to measure peripheral and central vision, during performance of baseline and demanding tasks (Stroop colour-word test). Williams and Andersen found that athletes who had high negative life event scores experienced greater peripheral narrowing and slower central vision reaction time than athletes who had low life event stress, during performance of the demanding tasks.

To test part of the model of stress and injury, Bhum and Morris (1996) examined the effects of stress on visual attention reaction time. The participants were 20 (10 males, 10 females) physical education students. The participants completed the Athletic Life Experience Survey (Passer & Seese, 1983). To test

central and peripheral visual reaction time, there were four conditions, baseline, noise, physical activity, and physical activity/noise condition. Participants sat on a bicycle ergometer wearing headphones, through which white noise was played in the noise conditions and pedalled the bicycle only in the physical activity and physical activity/noise condition. Participants maintained a work rate of 40% of capacity, determined by the Physical Working Capacity test (Astrand & Rodahl, 1977). Participants responded to 72 stimuli on the central task and 48 stimuli on the peripheral task, where presentation to the left and right visual fields was balanced. Bhum and Morris found that when participants were placed under increased levels of stress, both central and peripheral visual attention deteriorated. Bhum, Morris, and Andersen (1998) replicated the deficit of central and peripheral visual attention under stressful conditions in 24 (12 males, 12 females) physical education students. In this study, Bhum et al. used a recording of sports crowd noise along with physical activity to increase ecological validity. Bhum et al. also examined autogenic training (AT) as an anxiety management intervention. After the pretest, they divided the sample into two groups. One group practised autogenic training, while the other group acted as the control. Bhum et al. found that AT was effective in reducing the state anxiety levels of the participants and the deficits in central and peripheral visual attention were also ameliorated. Bhum et al., however, did not monitor injury.

In the studies of stress and attention reported here, no researchers have examined the relationship between stress reactivity and injury. Recently, however, Andersen and Williams (1999) investigated whether peripheral narrowing, central field detection failures, slower reaction times, and decreased perceptual sensitivity

translated into an increased risk of injury. They measured changes during the stressful condition and examined the psychosocial factors-injury relationship in 196 (117 females, 79 males) National Collegiate Athletic Association (NCAA) Division I university athletes from various sports. Andersen and Williams designed a laboratory task to induce stress and to stimulate the peripheral and central vision processes under stressful conditions (performing a Stroop Colour-Word Test simultaneously with each of the vision tasks, while listening to a loud, distracting tape). Before starting the study, which commenced early in the season, all athletes completed the Life Events Survey for Collegiate Athletes (LESCA; Petrie, 1992) to assess life events, including positive, negative, and total stress, Social Support Questionnaire (SSQ; Sarason et al., 1978), and the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970) Athletic trainers reported injury outcomes on a weekly basis and recorded numbers of injuries incurred over the course of the season. Andersen and Williams found that those collegiate athletes with more negative life events and greater peripheral narrowing, during the stressful conditions of the laboratory task incurred more injuries than those with the opposite profile.

Andersen and Williams (1999) suggested that when researchers measure perceptual change, it is only possible to assess this within the laboratory setting, such as on a stationary bicycle, under conditions of loud noise. Because it is not possible to assess perceptual change during sport competitions, researchers should devise stressful situations in the laboratory that are more like the stress induced in sport competition. Further, Andersen and Williams proposed that the mechanisms underlying the relationship between stress and injury should be examined and that

researchers should undertake studies in which interventions are designed to decrease the incidence and risk of injury. From the multiple regression analyses, negative life stress was an important predictor of the number of injury events and positive life events score was not related to injury outcomes. These results are consistent with much of previous research, in which negative life events are associated with injury occurrence (Petrie, 1992, 1993b; Smith et al., 1992; Smith, Smoll, & Ptacek, 1990). Andersen and Williams also found that for athletes who had low social support (bottom 33%), high negative life stress, and increased peripheral narrowing, these variables accounted for 26% of injury variance. These results indicated that low levels of social support might influence the stress response (leading to greater peripheral narrowing) thus, increasing the risk of injury.

There is, thus, limited research examining the effects of stress on attention or muscle tension. The studies reported have shown connections between stressors and increased muscle tension or narrowed attention, but to date, little research has been conducted to link tension and attention changes to each other and directly to the incidence of injury.

Recently, Petrie and Perna (2004) expanded upon the Andersen and Williams' (1988) model of the stress response, which Petrie and Perna defined, more broadly, as a bidirectional relationship between cognitive appraisals and physiological and attentional changes. Petrie and Perna suggested that examination of an individual's stress response should consider independent effects of affective (e.g., anxiety, depression, and anger), cognitive (e.g., disruptions in attention and concentration, and the experience of racing thoughts

and unwanted thoughts), behavioural (e.g., disruptions to sleep and interference with self-regulatory behaviour), and physiological (e.g., autonomic nervous system, sympatho-adrenal medulla, and hypothalamic-pituitary-adrenal-cortex) systems. Further, they proposed that stress responses are influenced by intense and prolonged exercise and include adverse health outcomes (e.g., viral infection, physical symptoms, and training maladaptation) in athletes.

Interventions

In Williams and Andersen's (1998) model of stress and injury, intervention can change cognitive appraisal of potentially stressful situations and deal with physiological/attentional aspects of the stress response which may lead to injury. Little research has examined psychological intervention programs for preventing sports injuries.

De Witt (1980) investigated whether a training program reduced stress and improved performance in 12 male basketball players. De Witt found that minor injuries and stress levels decreased in the intervention group, which was provided with biofeedback and a cognitive training program (i.e., mental rehearsal, cognitive restructuring techniques). This study, however, focused on whether the training programs helped athletes reduce the levels of stress and improve performance. De Witt did not report objective injury data.

May and Brown (1989) reported on interventions based on their delivery of psychological services (such as relaxation training, mental rehearsal, goal setting, imagery, counselling) with the U. S. Alpine Ski Team. They included athletes, coaches, administrators, ski company representatives, and family members and divided their services into individual, pair, and group sessions. May and Brown

reported that psychological interventions reduced injuries and increased self-confidence and self-control. Unfortunately, no other details of the measures of psychosocial variables or injuries were reported, nor were there the standards of control usually applied to research.

Davis (1991) investigated the effect of psychological programs (progressive relaxation combined with imagery rehearsal) on injury with two different sports (swimming and American football) in a 7-month prospective study. Davis reported a 52% reduction in injuries for swimmers and a 33% reduction in injuries for football players, when they used relaxation and imagery skills. Davis suggested that when researchers employ intervention studies, they should consider methodology problems, such as communication with medical authorities for recording minor injuries and other health problems before, during, or after collecting data. A weakness of this study is that there was no control group.

Kerr and Goss (1996) examined the effect of stress inoculation training (SIT) on injury in 24 gymnasts (16 males, 8 females). Kerr and Goss monitored levels of stress and injury for eight months, during which the gymnasts practiced SIT. The participants, who competed nationally and internationally, recorded frequency and duration of injuries with self-reported measurement and completed the Life Experiences Survey (Sarason et al., 1978), which assessed general life stressors and the Athletic Experiences Survey (AES), which was designed for this study and measured athletic stress. Kerr and Goss randomly divided the gymnasts into SIT and control groups, according to sex, age, and performance. The SIT group received thought control, imagery, relaxation, and simulations, in a stress management program. Kerr and Goss found that each gymnast had at least one

injury during the 8-month period and most of the injuries were chronic or overuse. These injuries interfered with the gymnasts' training and they spent time injured. Kerr and Goss reported that the SIT group spent less time injured than the control group, but the difference was not statistically significant. Moreover, the SIT group had significantly lower levels of negative stress than the control group from mid-season to peak-season. Kerr and Goss concluded that the stress management program helped the gymnasts to cope with negative stress. Commenting on the report by Kerr and Goss that the injury data were not statistically significant between SIT and control groups, Andersen and Stoové (1998) proposed that effect size is a more sensitive measure than statistical significance of effects that are of practical significance for the influence of treatments on psychological and health outcomes. Andersen and Stoové found that the Kerr and Goss injury data had a .67 effect size, which is in the medium to high effect size range. Thus, it can be concluded that the Kerr and Goss stress management program was effective, both in terms of injury reduction and for lowering the levels of stress. The Kerr and Goss supported the stress-injury model implicitly.

Cupal (1998) reviewed and critiqued intervention research in terms of prevention of and rehabilitation from sport injuries. Cupal stated that a major advantage of cognitive appraisal models over stage models of injury is that researchers and practitioners using cognitive appraisal apply interventions to sport injury based on understanding individual differences in emotional reactions to injury. Further, she expressed concern that psychological injury intervention research has been limited to the discovery of the relationship between emotional factors and physiological outcomes, rather than the development of theoretical

models. Cupal noted that although there has been little preventive intervention research on injuries in sport, all the intervention research that has been reported has produced positive outcomes, such as the reduction of stress and injuries, or improvement of mood. Cupal pointed out several methodological problems with the research, including a lack of control groups or placebo-control groups, absence of preintervention group equivalence (randomisation of participant assignment), nonstandardized treatment measures, nonblind examiners, lack of statistical significance testing (effect size, homogeneous population). For future studies, she suggested that using placebo groups, prospective longitudinal designs, appropriate statistical analyses, and larger sample sizes represented essential groundwork to control for the influence of extraneous variables.

In a recent randomised controlled trial, Perna, Antoni, Baum, Gordon, and Schneiderman (2003) examined the efficacy of cognitive behavioural stress management (CBSM) intervention to reduce frequency of injury and illness in 34 collegiate rowers (20 females, 14 males). The participants completed the Life-Event Scale for College Athletes (LESCA; Petrie, 1992) to assess life events that served as a control variable. Perna et al. randomly divided participants into two groups (i.e., CBSM and control group) and health care providers recorded the frequency of medical visits and the number of days injured or ill until the end of the season. The CBSM group received a structured, 7-session CBSM intervention, based on stress-inoculation training (SIT) over 4 weeks and the control group undertook a 2-hr, group-administered stress management education session to produce an efficacy expectation in the control group. Perna et al. found that

athletes in the CBSM group experienced significant reductions in the number of injury and illness days compared with athletes in the control group.

In another recent study, Kolt, Hume, Smith and Williams (2004) examined the potential role of stress-management interventions to reduce injury risk among 20 gymnasts (17 girls, 3 boys). The participants completed the Life Experiences Survey (LES; Sarason et al., 1978) and Athletic Experiences Survey (AES; Kerr & Goss, 1996) at baseline, 3 months, 6 months (end of intervention), and 9 months (3 months after completion of intervention) and self-reported injury details (e.g., anatomical location of injury, type of injury, the number of training and competition hours the gymnast had to miss or modify because of injury) over the 9 months. Kolt et al. divided participants into two groups (i.e., stress-management group and placebo). The stress-management group (n = 10) received a 12-session stress-management program, which focused on cognitive behavioural techniques over 24 weeks. The placebo group (n = 10) attended 12-session programs, which were 9 lectures on nutrition and 3 anthropometric measurement sessions over 24 weeks. Kolt et al. found that the stress-management group reported 25 injuries (4.8 injuries per 1,000 hours of training) and the control group had 32 injuries (5.7 injuries per 1,000 hours of training). The stress-management group and the control group, however, did not differ significantly on either stress (positive or negative general stress and gymnastic-related stress) or injuries (training hours lost to injury). Kolt et al. suggested that although the stress-management program had no effect on injury or stress, the sample size was small and such interventions should be examined using large sample sizes in future research.

A number of guidelines have been introduced for psychological interventions to enhance performance in sport. Intervention for the prevention of injury, however, has been limited, even though researchers are aware that psychosocial factors play a role in injury occurrence. Psychosocial intervention research needs to target injury reduction, based on research that identifies specific psychosocial variables related to injury occurrence, with well-defined instruments.

Research on Psychological Factors and Dance Injury

Many researchers have investigated the factors that might contribute to injury in dance, but much of the early research primarily considered physical factors, such as pathogenesis (Hardaker, Erickson, & Myers, 1986), epidemiological and anatomical characteristics (Garrick & Requa, 1993), overuse (Ryan & Stephens, 1989), and environmental factors (Teitz, 1991). Intensive study of these physical factors, however, has not led to reduction in the incidence of dance injury. One prospective study showed that 97% (38 of 39 dancers) of dancers experienced at least one injury over an 8-month period (Kerr et al., 1992). It is important to develop and increase our knowledge of possible psychological factors in the complex injury process. Dance psychology has developed as an area of scholarly activity within the last few years (Mainwaring, Krasnow, & Kerr, 2001) and some researchers have found that psychosocial factors play a role in explaining the causes for injury (Hamilton et al., 1989; Krasnow et al., 1999; Liederbach & Compagno, 2001; Liederbach, Gleim, & Nicholas, 1994; Mainwaring, Kerr, & Krasnow, 1993; Patterson et al., 1998; Smith, Ptacek, & Patterson, 2000).

Psychosocial Factors in Dance Injury

Arnheim (1980) stated that psychological factors, such as accident-proneness, tension, and staleness were as important to dancers as physical conditioning. Arnheim speculated that for accident-proneness, injuries were caused by trying to attempt advanced techniques beyond the dancer's ability levels and unprepared conditioning (e.g., inadequate warm-up) at the beginning of classes. Further, Arnheim proposed that injuries might be induced when a dancer with mental and physical fatigue ignored what the body was saying at the end of classes. Muscular tension is also associated with injury occurrence. Overanxious dancers can have high levels of muscular tension unnecessarily. This muscular tension may lead dancers to be less flexible and to show increased heart rate and blood pressure. Arnheim proposed that tense dancers were more likely susceptible to injury, because of increased muscular excitability. Arnheim also suggested that dancers who are in a stale period are susceptible to injury, because their staleness may be associated with a loss of appetite, digestive problems, weight loss, and feelings of fatigue. Hamilton et al. (1989) also suggested that psychological factors might be expected to play a role with respect to dance injuries, because dance has many similarities with professional sports. Some studies have examined the relationship between psychosocial factors and injury in dance, using quantitative research methods. Psychological factors, including personality, perfectionism, performance anxiety, mood, stress, and social support, have been examined.

Hamilton et al. (1989) explored psychosocial factors, such as personality, occupational stresses, and injury among 29 professional ballet dancers (14

females, 15 males), who had achieved either soloist or principal status in ballet companies. Hamilton et al. employed the Adult Personality Inventory (Krug, 1984), which examines seven personality variables (i.e., extraverted, adjusted, tough-minded, independent, disciplined, creative, enterprising), and gives scores on eight interpersonal styles (i.e., caring, adaptive, withdrawn, submissive, hostile, rebellious, sociable, assertive) and six career/life-style scores (practical, scientific, aesthetic, social, competitive, structured). The participants completed the Occupational Environment Scales (Osipow & Spokane, 1983), the API, and a history of injury questionnaire. The history of injury survey was characterized by the severity of each injury and major and minor injuries, overuse syndromes, and stress fractures. Hamilton et al. found that dancers who had experienced a larger number of injuries were more enterprising than dancers who were not injured often. Hamilton et al. also found that there was no relationship between occupational stress and injuries. Hamilton et al. assumed that principals and soloists had high levels of coping skills to deal with occupational stress in their profession.

Again, Hamilton, Kella, and Hamilton (1995) examined personality profiles, using the same questionnaire (Adult Personality Inventory) among 48 (25 males, 23 females) performing artists (29 dancers, 19 musicians). Both groups of male performers were less extraverted, adjusted, tough-minded, and disciplined than the general, male population. Both types of performers, however, were more aesthetic and less structured than population norms. Hamilton et al. found that male ballet dancers reported mood problems. These dancers were more depressed, anxious, and irritable than the general population. Hamilton et al. assumed that ballet is

considered to be a “feminine” profession and the role of male dancers allows only for occasional moments of technical display. Both male dancers and musicians also had problems with personal relationships and were more concerned about their physical health (e.g., weight changes, substance abuse, disruptions of sleeping pattern) than female performers. Unfortunately, Hamilton et al. did not examine the relationship between personality and injury rates.

Hamilton (1999) stated that when dancers start dancing before adolescence, they tend to have a single-minded character, which includes being introverted, perfectionistic, and achievement-oriented toward learning techniques, compared with their nondancing peers. In particular, Hamilton suggested that dancers who are high achievers, tend to have more injuries, because they push themselves to exceed their physical limitations. There is little research evidence on this issue.

The impact of mood is a contributor to dance injuries. Liederbach, Gleim, and Nicholas (1994) examined psychological changes and the incidence of injury among 12 professional ballet dancers (6 men, 6 women) during a 5-week performance season. They used the Profile of Mood States (McNair, Lorr, & Droppleman, 1971) to measure psychological mood and analysed their data for time of onset of injury. The POMS has six affective mood state categories: tension/anxiety, depression/dejection, anger/hostility, vigor/activity, fatigue/inertia, and confusion/bewilderment. The dancers completed the POMS every week for the 5 weeks of the performance season. Liederbach et al. found that fatigue/inertia and vigor/activity changed significantly by the end of 4 weeks: Fatigue/inertia increased and vigor/activity decreased. Further, the incidence of injury was increased 33% after 3 weeks and 66% at the end of 4 weeks.

Liederbach et al. found that psychological mood influenced the incidence of injury.

Patterson et al. (1998) examined whether psychosocial factors, such as life stress and social support, influenced injuries in ballet dancers in an 8-month prospective study. Patterson et al. measured life stress, using the Perceived Events Scale (Compas et al., 1987), which assesses negative, positive, and total life stress, social support (Smith, Smoll, & Ptacek, 1990), and injury variance (frequency). Patterson et al. found that both minor and total negative life events were significantly related to injury. Particularly, they revealed that high levels of social support moderated the stress-injury relationship, but that a significant stress-injury relationship was found for dancers, who reported low social support in their lives. They noted that the effect in their study was due to moderation of stress by social support, not a direct effect of social support on injury. Patterson et al. emphasized that the combination of high life stress and low social support increased the injury risk. They proposed that researchers need to identify several psychosocial factors that are associated with injury vulnerability. They stated that dancers, like athletes, often seem to experience injuries as much from psychological factors as physical causes. Encarnacion, Meyers, Ryan, and Pease (2000) reported that ballet performers exhibited lower coping and cognitive skills and higher catastrophising responses than athletes (Bartholomew, Edwards, Brewer, Van Raalte, & Linder, 1998; Tallman, Meyers, Skelly, LeUnes, & Bourgeois, 1998). Liederbach and Compagno (2001) also mentioned that stress and coping ability might be related to injury occurrence based on self-reported dieting behaviours and eating attitudes.

In another recent study, carried out in Canada, that involved both dance and artistic gymnastics (a sport with some similarity to dance), Krasnow et al. (1999) examined the relationship among stress, perfectionism, and injury in 65 participants (30 artistic gymnasts, 19 modern dancers, 16 ballet dancers). The participants were females between 12 and 18 years of age, who began their dance or gymnastics training before the age of six and had been training for 10 years or more. Krasnow et al. modified the Life Experience Survey (Sarason et al., 1978), which assesses stressors (negative, positive, and total) for dancers and gymnasts and employed the Multidimensional Perfectionism Scale (Frost, Marten, Lahart, & Rosenblate, 1990), which has five dimensions of perfectionism (i.e., personal standards, concern over mistakes, parental expectation, doubts about actions, and parental criticism). Krasnow et al. found that there were significant positive correlations between injury and both total and negative life stress among dancers. Dancers had higher levels of total stress than gymnasts. Krasnow et al. also found that modern dancers showed a positive correlation between parental expectation and number of injuries and, for ballet dancers, there was a trend for parental expectation and concern over mistakes to be linked to higher incidence of injuries. Krasnow et al. suggested that dance researchers should gather more information about the relationship between psychological factors and injury, to help find ways to reduce the occurrence of injury.

In general, everyone has experienced anxiety under special circumstances, such as speaking in front of people, waiting for interviews, or taking an exam. Generally, performance anxiety is considered a routine element of performance among performing artists (Hays, 2002). Nonetheless, Hamilton (1997) found that

performance anxiety was a serious problem for dancers. She reported that 40% of dancers experienced symptoms. Sometimes, the most advanced dancers experienced nausea and vomiting (Arnheim, 1980). Professional dancers tend to forget their anxiety more quickly or experience lower levels of fear than less experienced dancers, which helps the professionals to perform effectively on the stage (Arnheim, 1980; Hamilton, 1997). Hamilton pointed out two factors that contribute to performance anxiety: humiliation and serious injury. When teachers humiliated dancers in class, the dancers had more symptoms of stage fright (including excessive fear), mental anxiety, physical anxiety, and constant alarm than dancers who had not experienced such humiliation (Hamilton, 1997). Moreover, when teachers expected dancers, who had serious injuries, to keep working, the dancers reported more performance anxiety (Hamilton, 1997). Smith, Ptacek, and Patterson (2000) examined the relationship between performance anxiety and injury among 46 ballet dancers in an 8-month prospective study. To measure performance anxiety, they employed the modified Sport Anxiety Scale (SAS), which has three subscales, measuring somatic anxiety, worry, and concentration disruption. Smith et al. found that the SAS (i.e., somatic anxiety, worry, and concentration disruption) scales showed significant moderator effects, enhancing a positive relation between minor stressors and subsequent injury time loss.

Recently, Liederbach and Compagno (2001) studied how personal patterns influenced injuries. They examined injury reports, including workload exposure, floor surface, costume, temperature, dieting behaviour, and menstrual status over a 2-year period among 644 dancers from university, professional ballet

companies, and hospital-based outpatient orthopaedic clinics that specialized in dance injuries. Liederbach and Compagno found that fatigue significantly contributed to higher levels of injury occurrence. They also revealed that injured dancers had significantly higher scores on a number of variables, including body dissatisfaction, drive for thinness, bulimic tendencies, and perfectionism, than noninjured dancers. They suggested that changes in mood or diet might contribute to increased incidence of injuries.

Previous research has demonstrated a significant relationship between psychological stress and dance injury (Liederbach et al., 1994; Mainwaring et al., 1993). Professional ballet dancers have busy daily schedules and practice hours are increased markedly in intensity during a performance season. Some women dancers presented with secondary amenorrhea, which raised stress during their performance seasons, and there was a significant relationship between increased stress and the incidence of injury among professional ballet dancers (Liederbach, Gleim, & Nicholas, 1992). Mainwaring, Kerr, and Krasnow (1993) reported a significant correlation between psychological stress and total time loss due to injuries for dancers. They emphasized that psychological factors should be considered in connection with the injury process in dance.

Dancers may be exposed to a high risk of anorexia or bulimia nervosa. Dance, in particular, ballet, demands ultra-slim body shape, regardless of cultural differences in typical body build (Hamilton & Hamilton, 1994). Dancers must be thinner to maintain/survive in their career (Hamilton, 1996). This demand leads to a high incidence of menstrual dysfunction, such as delayed menarche, amenorrhea, and oligomenorrhea (Cohen, Kim, May, & Ertel, 1982). Ballet

dancers with low body weight have been shown to experience increased frequency of eating disorders and injury risk (Benson, Gillien, Bourdet, & Loosli, 1988). Recently, Liederbach and Compagno (2001) found that among a sample of 644 dancers, injured dancers had higher scores on body dissatisfaction, drive for thinness, bulimic tendencies, and perfectionism, using the Eating Disorders Inventory-2 (Garner, 1991), than noninjured dancers.

In dance, some researchers have tried to explore aspects of the psychosocial factors and injury relationship across a number of domains. Recently, there have been controlled studies on stress, social support, and anxiety and injury relationships. The previous research has given a broad idea, but the research has not explained the relationship between psychosocial factors and injury. Much research is still needed to identify individuals at high risk of injury and explain various avenues/mechanisms by which psychosocial factors influence injury occurrence in dance. In addition, surprisingly, no psychosocial intervention research, which is aimed at reducing the risk of injury, has been reported, although psychological factors have been shown to impact on injury outcome. There is vast potential for research to discover the roles of psychosocial factors through the combination of qualitative and quantitative research methods and research on the reduction of injury risk, using well-designed intervention programs. That is to say, the qualitative method identifies the stressors and the ways of coping specific to that context, as well as confirming the general information in the quantitative research. The interviews provided specific information to design the targeted intervention program, which was developed to help dancers to deal with particular stressors that were revealed in the interviews.

Issues for Application of the Stress-Injury Model to Dance

In sport, over the last three decades, many researchers have investigated psychosocial factors and injury. This research has shown that a range of psychological variables influence sports injury vulnerability. The stress-injury model proposed by Williams and Andersen (1998) has provided a framework for intervention to reduce the incidence of sports injuries. Although the high prevalence of injuries in dance that have physical causes has been examined, there is little research related to the influence of psychosocial factors on injury in dance. In addition, early studies of psychosocial factors and injury in dance have offered no theoretical base to explain which factors might contribute to injury.

Aside from the empirical studies by Hamilton et al. (1989), Krasnow et al. (1999), Mainwaring et al. (1993), Patterson et al. (1998), and Smith et al. (2000), few studies have examined variables, such as daily hassles, life events, history of injury, performance anxiety, muscle tension, attention, coping skills, and social support, all of which are predicted by the psychosocial stress-injury model in sport to be related to injury outcome. Furthermore, there is no research on psychological interventions for reducing injuries in dance and intervention research on sport injuries is still limited.

Thus, this thesis will test the application of the model of psychosocial antecedents of injury to dance. Following examination of major psychosocial factors that predict injury among dancers, the thesis will examine the effects of psychosocial interventions that aim to reduce or moderate stress and, thus, minimize the incidence of dance injuries. In dance, no research has been

conducted that has examined the impact of psychological interventions for injury reduction, although dancers experience many injuries.

The aims of this thesis are: firstly, to examine whether psychosocial factors, predict dance injuries (frequency and duration), based on the psychosocial stress-injury model (Williams & Andersen, 1998) in sport, using a prospective research design; secondly, to identify the major sources of stress associated with practice and performance in dance and to explore the coping strategies used by performing dancers, based on a qualitative research method; and, finally, to examine the effects of two psychosocial interventions designed to reduce injury among dancers, based on the findings from Studies 1 and 2 integrated into the psychosocial stress-injury model.

CHAPTER 3: PSYCHOSOCIAL FACTORS RELATED TO INJURY

Introduction

As reported in the literature review, ballet dancers frequently overuse various body parts when they learn and perform dance techniques. Most dancers invest a great deal of effort in their preparation and they often incur injuries, both in practice and during performance. Dance is not seasonal, so dancers practice and perform all year round, with most dancers experiencing injuries during their career.

Patterson et al. (1998) found that psychosocial factors, such as life stress and social support, influenced injuries in ballet dancers. Particularly, they revealed that high levels of social support moderated the stress-injury relationship, and that a significant stress-injury relationship was found for dancers who reported low social support in their lives. Patterson et al. emphasized that researchers need to identify several psychosocial factors that are associated with injury vulnerability. They stated that dancers, like athletes, often seem to experience injuries as much from psychological factors as physical causes. Mainwaring, Kerr, and Krasnow (1993) also reported that there was a significant correlation between psychological stress and total time loss due to injuries for dancers. They emphasized that psychological factors should be considered in connection with the injury process in dance. Moreover, Krasnow et al. (1999)

suggested that it is important to differentiate between positive and negative stressors in role specific activities. Also, Smith, Ptacek, and Patterson (2000) reported that dancers who had higher performance-related somatic anxiety tended to lose more time due to injuries.

The development of the stress and injury model (Williams & Andersen, 1998) in sport has enhanced the understanding of factors that increase the incidence of injuries, and there is potential for application of the model to injuries in dance. Elements of the model, however, need to be tested in the context of dance. Therefore, the purpose of this study was to identify whether psychosocial factors, based on the stress-injury model in sport (Williams & Andersen, 1998), could predict dance injuries (frequency and duration), using a prospective research design. Specifically, it was hypothesized that dancers with high life events stress, high dance specific stress, low coping skills, and low social support would have greater frequency and duration of injury than dancers with the opposite profile.

Method

Participants

The participants were 105 Korean dancers (101 females, 4 males). They were professional ballet dancers (n = 27) with a mean age of 27.81 years (SD = 3.32), university ballet students (n = 19) with a mean age of 21.32 years (SD = 2.16), and high school students specializing in ballet (n = 59) with a mean age of 16.81 years (SD = 2.99). The mean age of the whole sample was 20.46 years (SD = 5.50). The dancers had been training a mean of 6.82 years (SD = 5.02) and participated in regular practice and performance.

Measures

Adolescent Perceived Events Scale (APES; Compas, Davis, Forsythe, & Wagner, 1987). The APES is a measure of life event stress. The questionnaire contains 197 items, referring to events that cover a wide range of life domains. For each item, participants indicate whether the event has occurred in the past six months. If so, they report whether the event was a positive or negative one, and whether they consider it to be a major life event that had long-term consequences for them or a minor ("day to day") event that did not (a daily hassle). By summing all the items given a positive rating, a total positive stress impact score is derived. This can be divided into major and minor positive events scores, based on the person's subjective report. Similarly, by summing all the items given a negative rating, a total negative stress impact score is determined. Again, this can be divided into major and minor events. Such positive, negative, major, and minor impact scores are considered to be the most sensitive indices of how life events have affected the individual psychologically (Compas et al., 1987; Zautra, Guarnacchia, Reich, & Dohrenwend, 1988). Compas et al. reported that test-retest reliability coefficients over two weeks ranged from .77 to .85 for the number of events reported, from .74 to .89 for weighted negative events, and from .78 to .84 for weighted positive events. Concurrent validity of participants' appraisals was examined by Compas et al. for the desirability, impact, and frequency of events that had occurred in the three months prior to completion of the APES. They compared participants' appraisals with appraisals made by college roommates. The percentage of agreement for ratings of desirability, impact, and frequency was 87%, 90%, and 91% respectively (see Appendix B).

Sport Experiences Survey (SES; Smith, Ptacek, & Smoll, 1992). To measure dance stress, a modified version of Smith, Ptacek, and Smoll's (1992) scale was used. This measure was designed for assessing sport specific stress. The SES is composed of both positive and negative sport-specific events (e.g., "problems with the head coach", "period of excellent performance", "strong criticism from coach", "new strategies or routines"). A 50-item SES was rated on the same positive-negative and major-minor dimensions as those used on the APES. For the purpose of this study, the number of reported negative, positive, minor, and major events was summed separately. Smith, Ptacek, and Smoll's (1992) article did not report reliability and validity. To apply this measure to dance, references to "coach" were replaced by the term "director" and other sport-related terms, such as "game" and "playing time" were replaced by the terms "performance" and "practicing time." (see Appendix B)

Sport Anxiety Scale (SAS; Smith, Smoll, & Schutz, 1990). The SAS is a measure of the intensity of trait anxiety in sport. The SAS, which has been used widely in sport psychology research, is a 21-item questionnaire, containing three sub-scales of trait anxiety (A-trait): somatic anxiety (e.g., my body feels tight), cognitive anxiety or worry (e.g., I am concerned about choking under pressure), and concentration disruption (e.g., my mind wanders during sport competition), which have nine, seven, and five items respectively. The response scale ranges from 1 (*not at all*) to 4 (*very much so*). Giacobbi and Weinberg (2000) reported that Cronbach's alphas for the SAS were .90 for the somatic anxiety sub-scale, and .91 and .78 for the cognitive anxiety and concentration disruption sub-scales, respectively. Convergent validity was supported in that high school athletes'

responses to the SAS correlated with their responses to the Sport Competition Anxiety Test (Martens, 1977) (particularly for the somatic scale), and to a lesser extent with their responses to Spielberger's State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970). To apply this measure to dance, references to "competition" were replaced by the term "performance." (see Appendix B)

Athletic Coping Skills Inventory-28 (ACSI-28; Smith, Schutz, Smoll, & Ptacek, 1995). The ACSI is a measure of coping skills. The ACSI-28 contains 28 items representing seven sub-scales: (a) coping with adversity, (b) peaking under pressure, (c) goal setting/mental preparation, (d) concentration, (e) freedom from worry, (f) confidence and achievement motivation, and (g) coachability. The response scale ranges from 0 (*almost never*) to 3 (*almost always*). Smith et al. reported that Cronbach's alpha coefficients ranged from .62 (concentration) to .78 (peaking under pressure). A total (personal coping resources) scale alpha of .86 was reported. One-week test-retest reliability coefficients ranged from .47 (coachability) to .87 (peaking under pressure). The median test-retest reliability coefficient was .82. Convergent validity was supported in that total scores on the ACSI-28 were positively correlated with scores on the Self-Control Schedule (Rosenbaum, 1980), a measure of cognitive behavioural skills. Freedom from worry also correlated negatively -.59 with the worry factor of the Sport Anxiety Scale (Smith, Smoll, & Schutz, 1990), but scores on the freedom from worry subscale did not correlate with responses to the somatic or concentration disruption factors of the SAS. Thus, there is support for both the convergent and discriminant validity of this subscale. To apply the ACSI-28 in dance, this

questionnaire was modified to refer to dance practice and performance (see Appendix B).

Social Support. To measure social support, a scale was adapted from that used by Patterson et al. (1998) in previous stress and injury research on ballet dancers. The original measure was a social support scale used in sport injury research (Smith, Smoll, & Ptacek, 1990). The ballet social support scale measured the perceived amount of caring and emotional support available from one's social network. Participants rated how helpful each of 20 individuals (e.g., parents, best friend, spouse, dance instructor) and groups (e.g., dance colleagues, church group, stage crew) were in terms of providing them with caring and emotional support when needed. Each social network element was rated on a 5-point Likert scale ranging from 1 (*not at all helpful*) to 5 (*very helpful*) for help and guidance on a scale. The social support index is the sum of the individual item scores. Smith, Smoll, and Ptacek reported a one-week test-retest reliability coefficient of .87 for emotional support and .88 for help and guidance. A measure of validity was not reported (see Appendix B).

History of injury. To measure injury, 10 months after completing the other measures participants were asked about the details of injury experienced during that period, such as whether they had an injury, how often injuries occurred (frequency), whether they had recovered from the injury, and how many days practice were missed or had to be modified because of injury (duration). I collected the injury data via mail-out. An injury was defined as any medical problem resulting from dance participation that restricted subsequent practice and performance for at least one day beyond the day the injury occurred. In particular,

quantitative measures of frequency and duration of injuries were recorded (see Appendix B).

Procedures

Translation Procedures. I translated the questionnaires from English to Korean. A person who was fluent in both the Korean and English languages, and was not a sport psychologist, translated the questionnaires back from Korean to English. The translated version was then sent back and I then checked wording and content accuracy of the English back-translation against the original questionnaires. I met with the back-translator to revise and polish item translations, until consensus was reached.

General Procedures. I gained access through the director of a ballet institute that taught students from 5 to 19 years old, the head of Gwangju City Ballet Company (GCBC), and the head of the dance department at Chosun University. After permission was granted, I visited the dance institute, GCBC, and the University to collect the psychosocial data. Before any surveys were completed, I explained what the research involved and requested voluntary participation of dancers in the study. Participants then completed standard consent forms (see Appendix A). Moreover, the participants were assured that they were free to withdraw at any time without jeopardizing themselves in any way.

The participants then completed modified versions of the Adolescent Perceived Events Scale (APES) and Sport Experiences Survey (SES) that address life stress and dance stress respectively, the Sport Anxiety Scale (SAS), the Athletic Coping Skills Inventory-28 (ACSI-28), and the social support for dance measure. Ten months after completing the psychosocial measures, each

participant completed the history of injury scale, devised for this research, which addressed frequency and duration of injuries throughout that 10-month period. I excluded 22 participants whose questionnaires were incomplete. Once participants had completed all the measures, they were debriefed and thanked for their participation.

Analysis

One-way Analysis of Variance (ANOVA) was conducted to compare injury (frequency and duration, respectively) differences among the three groups (professional ballet dancers, university students, and ballet institute students). Tukey HSD post hoc test was calculated and effect size (Cohen's *d*) was determined to examine the magnitude of injury change. Cohen's convention for effect size for η^2 is that .14 is considered to indicate a large effect (Aaron & Aaron, 1999).

Pearson's correlation coefficients were calculated to examine which psychosocial variables were correlated with frequency and duration of injury, so that these variables could be included in regression analyses. A standard regression analysis was carried out to examine the relationship between the noteworthy psychosocial variables and frequency of injury, and a separate regression was calculated for noteworthy psychosocial variables and duration of injury.

Results

Cronbach's alphas for the translated version of the Sport Anxiety Scale (SAS) were .82 for the somatic anxiety sub-scale, and .76 and .72 for the worry and concentration disruption sub-scales, respectively. For the Korean version of

the Athletic Coping Skills Inventory-28 (ACSI-28) alphas were ranged from .40 (peaking under pressure) to .65 (coachability). This translated version of the ACSI-28 had low internal consistency, and thus one should interpret the results with caution. For future studies, because this translated version of the ACSI-28 questionnaire was modified to refer to dance practice and performance, researchers may wish to develop and test the validity and reliability of the scale for dancers.

Injury Statistics

Among 105 participants, 39 (37.1%) individuals reported that they had experienced at least one injury during the course of the study (M = .79, SD = 1.23). Injury frequency for professional ballet dancers (M = 1.41, SD = 1.45), university students (M = 1.00, SD = 1.20), and ballet institute students (M = .44, SD = .99) differed substantially. Professional ballet dancers and university students experienced injuries more frequently than ballet institute students. One-way Analysis of Variance (ANOVA) revealed statistically significant differences for frequency of injury F (2, 102) = 6.82, p <.002. Tukey HSD post hoc tests indicated that professional ballet dancers differed from high school students. The effect size (η^2) was .12 a medium to large effect and the power was .91. However, the group sizes were unequal, so this result should be interpreted cautiously.

Statistics for the duration of injury (total number of days missed or modified) indicated that the professional ballet dancers (M = 22.15, SD = 59.44), the university students (M = 8.63, SD = 20.43), and the ballet institute students (M = 2.15, SD = 7.29) experienced injuries that lasted for different durations. The results indicated that professional ballet dancers missed regular practice and

performance because of injuries more than university and ballet institute students. One-way ANOVA showed a significant difference for duration of injury F (2, 102) = 3.69, p <.02. Tukey HSD post hoc tests revealed that professional ballet dancers had injuries that stopped or modified them from practicing and performing for significantly longer than high school students. The effect size (η^2) was .07, a medium effect and the power was .67. Once again, however, the group sizes were unequal, so this result should be interpreted cautiously.

Associations Between Psychosocial Factors and Injury

Correlations between psychosocial factors and injury are presented in Table 3.1.

Table 3.1

The Correlation of Psychosocial Factors and Frequency and Duration of Injury

Measure	Subscale	Injury	
		Frequency	Duration
Life Stress	Positive	-.11	-.04
	Negative	-.10	.21*
	Minor	-.05	.17
	Major	-.10	-.04
Dance Stress	Positive	-.14	-.04
	Negative	.01	.26**
	Minor	-.00	.19
	Major	-.10	.02
Anxiety	Somatic	-.05	.07
	Worry	-.14	.06
	Concentration Disruption	-.19	.05
Social Support	Social Support	-.08	.07
ACSI-28	Coping with adversity	-.19	-.12
	Peaking under pressure	-.21*	.03
	Goal setting/Mental preparation	-.34**	-.17
	Concentration	.13	.06
	Freedom from worry	-.31**	-.32**
	Confidence & achievement motivation	-.39**	-.21*
	Coachability	-.01	.02

Note. N=105; * $p < .05$, ** $p < .01$ (2-tailed).

From these correlations, I picked psychosocial variables having significant correlations with frequency and duration of injury to include in two regression

analyses. One regression analysis was conducted for frequency of injury and another was carried out for duration of injury. From the correlation matrix, I chose four variables (i.e., peaking under pressure, goal setting/mental preparation, freedom from worry, confidence and achievement motivation) to predict frequency of injury. The regression analysis for frequency of injury is presented in Table 3.2.

Table 3.2

Summary of Regression Analysis for Variables Predicting Frequency and Duration of Injury (N = 105)

Variable	B	SE B	β
Frequency of Injury			
Peaking under pressure	.00	.06	.00
Goal setting/ Mental preparation	-.09	.06	-.16
Freedom from worry	-.10	.05	-.20*
Confidence & achievement motivation	-.13	.06	-.25*
Duration of Injury			
Negative dance stress	.54	.29	.25*
Negative life stress	-.02	.10	-.03
Freedom from worry	-1.10	.45	-.24*
Confidence & achievement motivation	-.77	.49	-.15

Note. $R^2 = .21$ for frequency of injury; $R^2 = .17$ for duration of injury. * $p < .05$.

That analysis identified freedom from worry ($p < .05$) and confidence ($p < .05$) as significant predictors, accounting for 21% of the variance in frequency of injury. For duration of injury, I selected four variables (i.e., negative dance stress, negative life stress, freedom from worry, confidence and achievement motivation) from the correlation matrix. The regression analysis, presented in Table 3.2,

identified freedom from worry ($p < .05$) and negative dance stress ($p < .05$) as significant predictors accounting for 17% of the variance in duration of injury.

Discussion

The present study revealed that professional ballet dancers had more injuries and required more time to overcome them compared with university students and ballet institute students. These results are consistent with previous research. Hamilton, Hamilton, Meltzer, Marshall, and Molnar (1989) reported that older dancers (≥ 30 years old) had more injuries and spent longer periods disabled than younger dancers. They found that dancers' age was one of the contributors to incidence of injuries. During their careers, professional dancers may confront the issues of overuse, emotional demands, and the requirement of performing advanced techniques. The daily practice of professional ballet dancers is extensive, involving extremely demanding schedules and a high intensity during the performance season. Hamilton (1997) also found that professional dancers had significantly higher rates of chronic injuries than dance students. Overtraining may lead to increases in tension, fatigue, illness, emotional stress, and injury. Another problem is that physical and emotional stress has been shown to induce secondary amenorrhea in women dancers during their performance seasons (Cohen, Kim, May, & Ertel, 1982), which can also increase injury risk.

The correlations between psychosocial factors and injury showed that coping skills were moderately correlated with frequency of injury. In particular, peaking under pressure, goal setting/mental preparation, freedom from worry, and confidence and achievement motivation subscales were related to injury frequency. For duration of injury, negative life stress and negative dance stress

had significant correlations, with higher stress being related to longer recovery times. This result is consistent with Passer and Seese's (1983) finding that players, who sustained a significant time-loss injury, had experienced greater negative life changes in the previous 12 months than those with few negative life changes.

From the regression results, freedom from worry, confidence and achievement motivation, and negative dance stress accounted for 17 - 21% of the variance in injury duration and frequency. Smith et al. (2000) found that psychosocial variables accounted for as much as 18% of injury variance. Andersen and Williams (1999) reported that within psychosocial factors, such as life events stress, social support, perceptual changes, and changes in reaction time during stress, negative life events stress was the only significant predictor of injury (an athlete missing or modifying at least one day of practice or competition because of injuries) among their sample of 196 collegiate athletes, participating in 10 sports. Both negative life events and peripheral narrowing, however, were significant predictors of injury among participants who scored in the bottom third of social support. Based on our results, I suggest that coping was the most important factor related to frequency of injury in these Korean ballet dancers. Hanson, McCullagh, and Tonymon (1992) found that coping resources distinguished between those who became injured and those who did not. Groups with high severity and frequency of injuries had significantly fewer coping resources than the other groups in sport. Smith, Smoll, and Ptacek (1990) reported that psychological coping skills moderated the relationship between life stress and injury in adolescents in sport. They found that athletes who had low coping skills showed a significant stress and injury relationship. Petrie (1993a) also revealed

that for psychosocial variables predicting time loss, positive life stress, coping skills, and competitive trait anxiety accounted for 60% of the injury variance among starters compared with nonstarters, in team sport. In dance, there is no study that has used multiple psychosocial factors to predict injury. The results of the present study partially supported Williams and Andersen's (1998) model of psychosocial stress and injury, for the hypothesis concerning psychosocial factors and injury, because the variables of life stress, dance stress, and low coping skills were related to injury outcome as predicted. Low social support was not related to injury in this study. Previous research examined the moderating effects of social support with respect to the deleterious effects of negative life stress. Several studies have shown that high levels of social support can moderate the negative effects of high life stress (Andersen & Williams, 1999; Patterson et al., 1998; Petrie, 1992). The present study, however, did not examine moderating effects, because of limitations of sample sizes. It is possible that life stress was not directly related to injury in the regressions calculated in Study 1, because levels of social support were generally quite low among the Korean ballet dancers studied in this thesis.

Strengths and Limitations

The present study employed a prospective design, because the period for which injuries were reported was after the time the dancers completed the psychosocial questionnaires. There is, however, a possibility that a life event occurred within that 10-month period that could have affected injury. It should be noted that the measurement of injuries was retrospective. That is, at the end of a 10-month period, the dancers recalled their injuries during that period. Because of

retrospective injury data collection, there is also a possibility that dancers could have exaggerated their injury data to account for poor performance over this time. This is not highly probable, however, because performance was not a focus of this study, in fact it was never referred to or measured during the study. Also, it assumes that the dancers who got injured more frequently or for longer durations performed badly and there is no evidence that this was the case. Early studies on the relationship between psychosocial factors and injury in sport typically used retrospective surveys. This confounds effects of psychosocial variables on injury with effects of injury on psychosocial variables (Kolt & Kirkby, 1999). Kolt and Kirkby (1999) found that there was no difference in the proportion of injury types and anatomical locations between the retrospective and prospective surveys, but the retrospective survey had lower injury rates compared with the prospective method, using the same sample.

Most dance research focuses on stress, social support, personality, self-esteem, and anxiety as possible psychological correlates of dance injuries in univariate studies (Hamilton et. al., 1989; Mainwaring et al., 1993; Patterson et al., 1998). The present study examined potentially important psychosocial factors, such as stress, social support, anxiety, and coping skills together, as predictor variables of injury risk. I expected that stress was one of the main predictors to the incidence of injury, based on previous research (Mainwaring et al., 1993; Patterson et al., 1998). The findings of this study, however, indicated that a number of coping skills scales were the main predictors of frequency of injuries, but for the time spent being injured, freedom from worry and negative dance stress were the best predictors. Means and standard deviations for a number of the

coping skills scales indicated that many of the Korean ballet dancers who participated in Study 1, did not possess adequate resources to cope with the stress that they experienced. This was supported in Study 2, where the 20 dancers interviewed, often reported dysfunctional responses to the stressors that were identified in that study. In general, Korean dancers' coping skills were less developed than those of the western athletes who have been studied in the past. This difference might explain why coping skills emerged as the key area in which to intervene in Study 3 in this thesis. It is important to note that other psychosocial variables, such as personality, attention, and motivation could also be explored as possible moderating variables in the stress and injury relationship.

One limitation of this study is that, to measure life stress, I employed the Adolescent Perceived Events Scale (APES), among three different levels of dance, namely professional, university, and high school levels. The APES has 197 specific life events generated from the reported experiences of a large US high school sample. This questionnaire was designed to measure life stress in adolescents, thus, some items may not be as relevant to university students and professional ballet dancers as they were for high school students, who constituted more than half the sample. Participants might also have been bored when completing the large number of items. Moreover, I employed a literal translation technique to reduce the possibility of construct and method biases (Geisinger, 1994). Thus, it is possible that the Korean participants produced biased responses, as well as errors, because of cultural differences. To minimize the risk of this kind of error, researchers should develop life and dance stress measures for specific dance situations and consider the length, as well as cultural issues.

Another limitation of this study is that I examined only ballet dancers. Krasnow et al. (1999) found that there was a different relationship between stress and injury among different kinds of dancers. According to their study, modern dancers showed a significant correlation between injury and negative and total (negative plus positive) stress. On the other hand, ballet dancers showed no significant relationships between any of the stress and injury variables. It is worth making the distinction between different kinds of dance, because every dance form has unique characteristics. For example, ballet dancers have the great physical demands of dancing on their toes in toe shoes whereas modern dancers typically perform without shoes.

Future Studies

The results of this prospective study of psychosocial factors associated with the frequency and duration of injury in dancers suggest that interventions that focus on developing coping skills could be particularly helpful for Korean ballet dancers. A variety of approaches using coping strategies (e.g., relaxation techniques, imagery, self-talk, confidence training, goal setting) may be useful both for enhancing performance and reducing injury. I recommend that intervention studies to reduce negative stress and worry and to enhance confidence and achievement motivation are needed to examine whether such interventions reduce the risk of injury in dancers in a range of contexts and cultures. For example, positive self-talk and guided imagery could be used to focus on confidence and achievement motivation. Dancers could practice statements about their skills and commitments that enhance their confidence. Similarly, dancers could practice guided imagery in which they experience

successful preparation for, and performance of, dance roles, watched by a large, admiring audience, experiencing the positive emotions associated with successful management of the situation. Researchers could develop and test intervention programs of this kind to see whether they enhance coping skills and reduce injury risk.

CHAPTER 4: SOURCES OF STRESS AND COPING STRATEGIES OF KOREAN PROFESSIONAL BALLET DANCERS

Introduction

To achieve high levels of performance, dancers must willingly submit to limitless practice and frequent pain, plus the attainment and maintenance of a particular body type (Hamilton et al., 1989). Elite dancers also consider self-satisfaction, peer approval, and dance directors' tributes to be important (Hamilton et al., 1989). Some elite dancers, particularly in ballet, even undergo cosmetic surgery, such as jaw, nose, or ear reconstruction, breast alterations, or silicone arch (of the foot) enhancement to more closely approach the physical ideals of the dance (Sandri, 1993). For the elite ballet dancer, the qualities that fuel the individual's continual drive toward physical perfection can also lead to high levels of stress that persist for a prolonged period of time. Such sustained stress can affect performance, motivation, susceptibility to injury and illness, and overall physical and psychological well-being (Hamilton et al., 1989).

The first study in this thesis showed that there were several psychosocial variables related to injury in Korean ballet dancers. For dancers who experienced injuries, it appeared that low coping skills, especially in the areas of peaking under pressure, freedom from worry, confidence and achievement motivation, and goal setting/mental preparation, played a substantial role in injury frequency and/or duration. In addition, negative dance stress certainly was a noteworthy concern that showed a significant correlation with duration of injuries. Overall, the results of the prospective study showed that negative dance stress and low levels of coping skills were significant factors in the prediction of dance injury.

Interventions involving these variables are likely to help dancers to reduce the incidence of injury. The specific sources of stress for Korean ballet dancers are not evident in the data collected in the first study, however. Nor does that data provide details of the ways in which dancers currently cope that could inform the design of interventions to enhance coping skills. There is a need, therefore, to examine what specific sources of stress Korean ballet dancers experience during practice and performance and the coping strategies that they use to deal with that stress. In-depth examination of these issues can be achieved by using qualitative research methods to acquire rich information about stress and coping.

From the literature, it is evident that much research has been conducted on stress and coping factors in sport (Hardy et al., 1990; Petrie, 1993b; Smith, Smoll, & Ptacek, 1990), but there has been little research on what factors are related to sources of stress and coping in dance (a performance activity with many similarities to elite sport). Recently, two studies in dance have examined psychosocial variables, such as stress and social support, using self-report questionnaires (Krasnow et al., 1999; Patterson et al., 1998), but no in-depth studies of stress and coping in dancers have been conducted. In the examination of psychosocial factors associated with stress in dance, it is important to understand the principal causes of stress and the main ways dancers attempt to cope with those stressors.

Patterson et al. (1998) found that high levels of social support moderated stress levels in 46 (31 females and 15 males) ballet dancers in the USA. Patterson et al. suggested that life stress and social support were potentially important contributors to physical well-being in dancers. In another recent study, carried out

in Canada, that involved both dance and artistic gymnastics (a sport with some similarity to dance), Krasnow et al. (1999) examined the relationship between stress and perfectionism in 16 ballet dancers, 19 modern dancers, and 30 gymnasts. The participants were females between 12 and 18 years of age, who began their dance or gymnastics training before the age of six and had been training for 10 years or more. Krasnow et al. modified the Life Experience Survey (Sarason et al., 1978), which assesses stressors (negative, positive, and total) for dancers and gymnasts, and also used the Multidimensional Perfectionism Scale (Frost et al., 1990), which has five subscales (i.e., personal standards, concern over mistakes, parental expectation, doubts about actions, parental criticism). Krasnow et al. found that there were differences between modern dancers and artistic gymnasts on total and negative life stress, along with concern over mistakes. There was a significant correlation between negative stress and doubts about actions for modern dancers. The ballet dance group, however, showed significant positive correlations between total stress and parental expectations. Importantly, ballet and modern dancers had higher levels of total stress than gymnasts. Examination of the sources of stress that dancers experience, and the coping strategies dancers use to manage their stress, may help in the development of interventions to reduce stress that are appropriate to dance.

Most of the previous studies in dance were conducted in Western countries, using quantitative research methods. It is also important to understand cultural differences in sources of stress and coping strategies. Because of differences between cultures, dancers from different countries may experience different stressors and develop alternative coping skills. South Korea is a conservative and

strongly Confucian society, which emphasizes devotion to the family, hierarchical authority, and vertical relationships (Korean Cultural Service in New York, 1979). During the Choson dynasty (1392-1910), Korea was the most "Confucianized" state in Asia surpassing Japan, Vietnam, and perhaps even China (Armstrong, 2002). Confucianism also appears in ritual dance. Ballet in Korea has been developed since the National Dance Company was established in 1962. Since its establishment in 1962, the National Dance Company has introduced classical ballet works, such as Swan Lake, Giselle, and the Nutcracker. In 1984, the Universal Ballet Company was formed in Korea and has developed the Russian style of ballet in Korea, reflecting the influence of Russian artistic directors, choreographers, and dancers. Based on the "Koreanization" of Western and Russian ballet knowledge and experience, the Korean ballet culture is unique. For example, Korean ballet choreographers have introduced Korean legends, such as Shim Chung, Hwangjini, and Love of Chunhyang, into the Western art form (KOREA.net, n.d.). The Koreanization of creative ballet pieces, on the basis of a mix of Korean-inspired elements, such as indigenous Korean themes, traditional dance movements, and Korean costumes, along with the Western form of ballet (conventional ballet movement vocabulary and pointe shoes) has made this ballet form familiar to Korean audiences. It has been the predominant style of performance from the 80s to the present (KOREA.net, n.d.; Van Zile, 2001). Because the Korean culture and the sub-culture of ballet in Korea are different from those of Western cultures, where the previous research on ballet has been conducted, it is even more important to examine in-depth the stress experiences and coping strategies of Korean elite ballet dancers.

The purposes of this study were to investigate the major sources of stress, perceived by Korean professional ballet dancers, in the dance environment, and to explore the main ways in which dancers cope with the stress associated with practice and performance. The examination of coping strategies used by dancers was included to better understand how dancers typically deal with specific stressors in dance. The stress and coping of dancers was also placed within the Korean culture generally, and the Korean ballet culture, specifically.

Method

Participants

The participants for this study were female, professional, ballet dancers (N = 20), aged 25 to 32 (mean age = 28.25; SD = 2.05). They all came from the same dance company. Participants had trained in ballet for over nine years (mean training period = 9.90; SD = 3.55) and had been training as professional dancers for over five years (mean professional careers = 5.10; SD = 2.55). All the dancers participated in regular practice and performance. To meet our definition of elite, first, the dancers were professional ballet dancers, who practiced six hours a day six days a week, and performed frequently (at least fourteen performances every year). Second, the dancers graduated as dance majors from 4-year courses at universities. All participants were volunteers, who also participated in Study 1.

Measures

I employed a semi-structured interview technique, starting with general questions about the dancers' background in terms of dance history (e.g., age, training duration, length of professional career). The interview became increasingly focused, to the point of inquiring about specific sources of stress and

coping strategies. First, I asked about sources of stress. Typical questions were: (a) What have been the most stressful situations when you practiced or performed? (b) can you tell me more about the situations? (c) what are other stressors for you in the dance environment? Then I asked how the dancer coped with specific stressors. Standard questions were: (a) What were the strategies you used to cope with these particular stressors? (b) how effective has that approach been for you? (c) what are the other methods you use to cope?

Procedure

To gain access, I contacted the head of a Korean professional ballet company and explained the purpose of the research. After gaining permission to ask for volunteers, I visited the ballet company. I explained the focus of the interview to the dancers and followed standard consent procedures for those who volunteered (see Appendix C). The interviews were audio-taped and all data were kept confidential. I interviewed dancers individually during breaks in practice. At the beginning of each interview, I tried to create a relaxed atmosphere. I requested a brief description of the participant's dance history to help them feel comfortable talking and to encourage them to describe their thoughts and feelings. It took about 25-30 minutes to identify the main stress sources and the coping strategies that each dancer used for dealing with stress. Finally, I debriefed the dancers.

Analysis

I used inductive content analysis to categorize the sources of stress and repeated the analysis for coping strategies (Park, 2000; Scanlan, Stein, & Ravizza, 1991). The audio-taped material was converted into verbatim transcripts in Korean. Three researchers, who work in the dance area, read and reread the

participants' responses, reading each transcript two or three times until they felt they understood the dancers' concerns. Then, based on their categorisations and mine, I categorized transcripts into first-order themes each reflecting a single issue and into interpretable and meaningful categories that emerged directly from the participants' own words. I grouped statements that reflected similar issues into higher-order themes (sources of stress) or second-order themes and third-order themes (coping strategies). Then, I clustered these themes together to identify general dimensions. Next, three investigators checked the themes and general dimensions and we all discussed the grouping of themes into dimensions until consensus was reached about the categorisation. Finally, three investigators who were fluent in English and Korean translated the themes into words or phrases that best represented their content in English and consulted, so that consensus was reached, on the English interpretations.

Results

Sources of Stress

I identified 28 first-order themes extracted from verbatim transcriptions. I organized these themes into nine higher-order themes. Finally, these nine higher-order themes were further combined into four general dimensions. The four general dimensions of sources of stress are: (a) physical factors, (b) psychological factors, (c) interpersonal factors, and (d) situational factors. These results are illustrated in Table 4.1.

Table 4.1

Sources of Stress of Korean Ballet Dancers

First Order Themes	Higher Order Themes	General Dimensions
The stress of maintaining a particular body type The stress of maintaining low body weight Reducing my weight	Physical Appearance	Physical Factors
The condition of my body (not being flexible enough) Being out of condition Menstrual period Feeling unwell Having an injury Too much sleep Overusing my body Tiredness Getting exhausted	Poor Physical Condition	
Desire for promotion Desire for self-satisfaction Being unable to dance my own way Not satisfied with my movements during practice and performance	Desire	Psychological Factors
Hitting a slump A bad mood Becoming too relaxed	Slump	
Timid personality	Personality	
Relationship with a dance director When a dance director pointed out my mistakes repeatedly in front of colleagues When a dance director hurt my pride with insulting remarks When a dance director pointed out mistakes and yelled (I cannot say "You are wrong I didn't make mistakes").	Relationship with a dance director	Interpersonal Factors
Relationship with colleagues	Relationship with other dancers	
Performance Audition for promotion	Performance Demands	Situational Factors
Difficulties of finance	Finance	

I describe the general dimensions in the following sections. I present the themes within the corresponding general dimension sections.

Physical Factors

The physical factors dimension reflected stress related to dancers' physical appearance and condition. I found that it contained the major sources of stress that were reported most often by these dancers. Thirteen dancers (65%) mentioned this dimension. The physical factors dimension contained two higher-order themes, labelled physical appearance and poor physical condition, which were comprised of 12 first-order themes.

Physical appearance. The higher-order theme of physical appearance was defined as pursuit of an ultra-lean physique to display in front of audiences. Physical appearance was the most frequently referred to higher order theme in the sources of stress. A statement that reflected the view of many participants was:

> I have been under so much stress because of weight. It is very important to maintain my weight as a ballerina. Whenever I eat something, I am always worried about my weight, since I started dancing. (Dancer 13)

In general, professional ballet companies do not employ overweight dancers. Ballet companies select dancers who look good and are able to handle advanced techniques, intense schedules, and numerous performances (Hamilton, 1998). An overweight dancer may have problems with control when doing ballet techniques, such as rising on pointe (Stephens, 1989), and in the case of females, a dance partner may not be able to lift her properly during practice and performance. Professional ballet dancers at high levels in ballet companies, at national and international levels are more likely to be excessively lean than nonprofessional

dancers. Moreover, dancers should meet professional expectations of body shape by aesthetic considerations and body image. Despite ultraleanness of body shape for both male and female dancers, dancers often consider themselves as overweight and tend to use extreme methods to diet (Stephens, 1989).

Poor physical condition. The higher-order theme of poor physical condition was defined as experiencing physical fatigue and lack of physical condition that resulted from intensive practice or performance. Similarly, this higher order theme can be evidenced in the following quotation regarding fear of reinjury:

> I had an injury, knee and foot, when I was in my final year in Uni. So I couldn't dance for a while. Last year, I started to dance as an elite dancer. But I have a lot of stress because of fear of recurrence of knee injury since then. (Dancer 9)

Having an injury is problematic for professional dancers, because dancers perceive that dance directors, choreographers, or ballet companies expect them to practice and perform continually through the injury (Mainwaring et al., 2001). Most dancers continue to dance despite injuries, in particular when performances are scheduled. When a dancer stops dancing because of injury, peers have to change their positions to perform the disabled dancer's roles, which means an increase in their workload. Another dancer was concerned with physical fatigue:

> When I practice too much and feel very tired, I get stressed out and don't want to talk to anybody at all. (Dancer 17)

Fatigue is no doubt due to the long hours of practice and performance. Professional ballet dancers in this company practice six hours a day six days per week, and practice even more than that when a performance is coming up. Ballet

dancers, thus, have busy schedules for rehearsal and performance, a situation that may also cause overuse injuries.

Psychological Factors

The psychological factors dimension of stress in these Korean ballet dancers contained psychological characteristics that created additional demands, which translated into stress. This dimension was interpreted from themes present in 60% of the interviews, represented in three higher-order themes.

Desire. Desire was defined as wanting to achieve high levels of practice and/or performance. This higher-order theme was the most frequently referred to within the general dimension of psychological factors (45%). Because the places for dancers, who eventually become principals and soloists in ballet companies, have been limited, dancers may find that the frustrated desire to achieve these goals is stressful. Typical of this category was a dancer's comment that:

> Because I belong to this dance company, I have a lot of stress linked to dance. I want to be a principal dancer. But my techniques are not enough to perform as a principal dancer. That's why I try to practice movements whenever I have time. (Dancer 15)

Dancers, who want to promote their positions, practice more to achieve high standards for advanced techniques and show that they are more than capable of handling additional responsibilities, such as replacing other injured dancers, learning new techniques quickly, and performing more demanding roles in order to gain the director's attention. Some dancers, however, struggle to achieve their goals as a professional, because variations in kinaesthetic abilities and anatomical structures can affect technical development (Hamilton, 1998). In addition,

seniority does not guarantee their position. Both desire and frustration about progress towards goals can be stressful in order to handle that stress. This stress may lead to physical and psychological problems (e.g., injury, distress).

Slump. Slump was defined as experiencing an extended period of poor practice or performance. Slumps typically were associated with reduced motivation and loss of confidence. This higher-order theme was the second most frequently referred to within this dimension, mentioned by 15% of the dancers. An example that expresses this was:

> People are not the same every day. When I hit a slump, I was depressed. Even though I had a happy event, I was in a bad temper. I tried to practice my best, but it was hard to concentrate on dancing. In this situation, stress was building up so much. (Dancer 9)

The causes of slumps can be physical, technical, equipment-related, and psychological (Taylor & Taylor, 1995). In particular, negative perceptions about performance are significant factors that lead to and prolong a slump (Taylor & Taylor, 1995). Dancers, sometimes, exaggerate their performances negatively or perceive them inappropriately and judge themselves to be poor performers. In addition, these professional dancers have grown up in the dance environment. Most dancers in this company had trained for over five years as professional ballet dancers. Dancers found that their lives became repetitive, with a cycle of practice, gruelling rehearsals, and regular performances, then more practice. Fatigue, illness, and injury due to overpracticing or overperforming are also common causes of slumps. When a dancer enters a slump, the loss of confidence,

motivation, and concentration associated with poor performance, often lead to a build-up of stress, which is difficult to handle (Taylor & Taylor, 1995).

Personality. Personality was defined as distinctive qualities, behavioural, emotional, and mental traits of a person. This higher-order theme was evidenced in the following quotation:

> I think that I have a problem with my personality. When something happened, I couldn't ignore it, even if it is a trivial matter. When I got home, I always thought again and again and again. Some people paid no attention to what was going on, but I couldn't ignore these things. It made me tired and stressed out. (Dancer 20)

Dancers, like people in general, have varying personalities. The dancer just quoted is an introverted individual, and she is hesitant, reflective, cautious, and inward looking (Pervin, 1993). There is a danger that people who are introverted can experience stress caused by small matters and generally are more sensitive than extroverted people (Rauch, 2003). Other personality characteristics such as obsessiveness, perfectionism, and the need for control could also increase the tendency for a person to experience situations as stressful. There is some evidence to suggest that young dancers are more introverted, perfectionistic, and achievement-oriented than members of the general population of the same age (Hamilton, 1999).

Interpersonal Factors

This dimension refers to ways in which social structures and processes create demands that are perceived as stressful. In the context of this dance company, two kinds of interpersonal factor typically affected dancers. There were

relationships with peers and interactions with a dance director. The interpersonal dimension was interpreted from themes present in 45% of the interviews represented in five first-order themes. These themes were then organized into two higher-order themes. Relationship with a dance director was the most often reported main stressor within this dimension (45% of the dancers). Relationship with other dancers was also cited by 25% of the dancers.

Relationship with a dance director. Relationship with a dance director was often experienced as discord between oneself and a director. The main source of disharmony was when dancers perceived that they were receiving negative performance feedback. For example, one dancer talked about the stress in this theme in the following quotation:

> When I practiced for regular performance, a director asked me to dance this way. I followed what the director said, but the next day she asked me to dance in a different way. Sometimes, she changed her mind. If I said 'you told me something different yesterday', she thought that I was back-talking. So I just did as I was told, just like a robot. She pointed out and yelled at my mistakes in front of the other dancers. If I made mistakes, I agreed with it, but when I did not make mistakes, I could not say anything about it. So these things make me stressed. (Dancer 18)

Dancers often felt that dance directors used their position of authority to require that the dancers performed in the style performed by that dance director. In particular, the strong Confucianist ethos in Korean society means that dancers, typically, cannot argue with dance directors. As the previous quotation exemplifies, dancers sometimes perceived the dance director to be inconsistent in

their instructions. Because they could not question the dance director, dancers had to perform one way on a particular occasion and then change to another style of performance on the next occasion, when the dance director appeared to change her/his mind. This changing was stressful for the dancers. Related to this, there was frustration for dancers when dance directors criticized their performance on grounds that the dancer believed were unfair, such as unclear requirements, irresistible authority. Although dance directors generally have a good knowledge of basic ballet technique, they are not always correct, because there are various modern ballet styles, such as Russian, Cecchetti, Bournonville, and Balanchine style. Of course, dancers need to have useful feedback, criticism, and praise from dance directors. When dancers felt they had been unjustly criticized or humiliated by a dance director in front of other dancers, however, they often experienced persistent self-blame, more injuries, symptoms of stage fright (e.g., a sense of dread, trembling, stomachache, concentration disruption), and emotional stress (Hamilton, 1998). Some harassed dancers reported that they failed to achieve their career goals, due to self-sabotage (e.g., overwork, substance abuse, avoiding auditions); (Hamilton, 1998). Another reason for putting up with abusive authority is that dancers are afraid of the consequences of dissent, such as failing to be recontracted or not getting cast, if they do not obey the commands of dance directors.

Relationship with other dancers. The dancers' relationship with other dancers was also a source of stress for them. Five dancers mentioned this higher-order theme as one of the sources of stress they experienced. In particular, dancers had difficulties in dealing with keeping their position among colleagues. All ballet

companies are hierarchical to some extent. Ballet companies have dancers who occupy various roles, such as principals, soloists, and corps, that carry with them differing status. These roles are exacerbated in the Korean context because of the strict, hierarchical aspect of Confucianism. At the same time, in a performance context like dance, everyone is striving to be the best they can. Thus, the senior dancers often experience stress associated with maintenance of their positions, whereas those more junior can perceive that their development is not being recognized, also causing stress. A typical example of this theme was the following quotation:

> As a professional ballet dancer, I have to live a group life. I see the other dancers every day. I am a senior in this company, and if I have no abilities to do advanced techniques, it makes me shameful. I have unpleasant relationships with the other peer dancers, because of caring what they are talking about. (Dancer 16)

Not all those dancers who are employed by professional companies are suited to the demands of the profession. For example, some might find it difficult to master the advanced techniques, despite prolonged periods of practice. Professional ballet dancers also consider peer approval to be important (Hamilton et al., 1989). The dance world is very competitive. Examples are competition for roles and promotions and even being the thinnest dancer in the class or company (Hamilton, 1998). Even though the dancers had good relationships with one another, if one person received better roles than the others, then the dancers might start to think about the friend as the enemy because of jealousy. Sometimes, the other dancers

formed a clique against a successful dancer. This situation leads to the dancers feeling pressure to get along with others to manage this interpersonal stress.

Situational Factors

The situational factors dimension involved experiencing stress from external factors, which, typically, were uncontrollable situations. Two higher-order themes comprised this dimension: performance demands (10%) and finance (5%).

Performance demands. The higher-order theme of performance demands stress often involved a lack of confidence in one's physical and/or mental abilities to deal with performance and promotion auditions. Despite their long hours of practice, it was common for dancers to perceive that they were not adequately prepared for a performance or for an audition. The perception of inadequate preparation might be influenced by the practice requirements set by dance directors, which left limited time for dancers to work on their performance/audition pieces, leading them to experience stress, due to the imbalance of performance demands and preparation resources. This higher-order theme was reflected in comments such as the following:

> When performance and audition are coming, I get tense until these things are finished. Psychologically, I have a lot of pressure because of it. Then my body feels like not flexible enough to perform. I don't know why. Performance itself is stress. (Dancer 14)

There is often just one ballet company per region, and only a few dancers can be employed within the company. The competition for the limited performance opportunities is extremely harsh. Dancers may feel stress because of the demands of competing for employment and dancing roles with this one company.

Finance. This theme involved stress in struggling to meet one's financial responsibilities. An example of this theme was:

> I dance with my husband. We have financial difficulties, because our salary is not enough to pay for everything we need. So I have to find another part-time job to earn extra money. Um…. Most of all, financial problems make me stress out. (Dancer 1)

This low income is problematic because dancers have short careers at the professional level. In addition, as noted in the quotation, where a dancer's partner is also a professional dancer, there is further strain on the finances of the couple.

Coping Strategies

The dancers used coping strategies to deal with the stresses they experienced during practice and performance. During the interviews, the dancers identified many coping strategies ($N = 28$). These first-order strategies were then organized into 12 second-order themes, seven third-order themes, and three general dimensions, namely physical relaxation, psychological strategies, and behavioural strategies. These three general dimensions of coping strategies are illustrated in Table 4.2. I describe the three general dimensions of coping strategies in the following sections and provide more details of themes.

Table 4.2

Coping Strategies of Korean Ballet Dancers for Dealing with Stress

1st Order Themes	2nd Order Themes	3rd Order Themes	General Dimensions
Taking a sauna after practicing or after a performance Relaxing at home Sleeping deeply	Physical Relaxation	Physical Relaxation	Physical Relaxation
Screaming and crying	Catharsis	Individual Cognitive and Emotional Strategies	Psychological Strategies
Praying Reading a Bible	Religious Activities		
Positive thoughts about a stressful situation	Positive Thoughts		
Trying to avoid the stressful situation Trying to reject relevant thoughts Trying to remain quiet without thinking	Active Avoidance	Avoidance Strategies	
Overeating	Eating Behaviour	Dysfunctional Behaviour	Behavioural Strategies
Drinking alcohol	Substance Use		
Talking with colleagues	Peer Interaction	Social Interaction	
Talking with friends who don't dance Talking with mother Talking with boyfriend	Sharing Issues with Family and Friends		
Reading a book Going to karaoke Going shopping Watching a movie Listening to music (calming) Listening to music (energizing) Going on a trip with boyfriend Walking in the street	Hobby Activities	Hobby Activities	
Watching the best ballet company Analysing my performance on video	Observation and Analysis	Dance Related Behaviour	
Practice as stress management Dance another kind of dance	Dance Activities		

Physical Relaxation

This dimension was defined as relieving tension or stress with activities that are refreshing for the body. The dimension of physical relaxation for coping was derived from three first-order themes. The dancers frequently took saunas to relax physically, especially after practicing or performing. The dancers felt a lot of stress during practice, from sources like the fear of injury, a tight schedule when they had regular performances, and comparison with peers. After practice, they took saunas together and chatted about what happened that day or general things. Some dancers took saunas to help them to maintain or lose weight. The dancers, however, took saunas as coping strategies to deal with stress, rather than weight control. Korea is well known for its communal bathing culture, so the sauna (Mokyoktang) facilities are located in almost every small village. Recently, some saunas have developed various facilities, such as steam rooms, boiling hot pools, ice baths, masseuses, and even dining facilities. A dancer demonstrated the use of this method in the following statement:

> After practicing or performance, I am so tired. Then, I usually take a sauna with peers. I sweat all over my body in a sauna parlour for a long time. During taking a sauna, I have a chat with peers about what happened today. After that, I can recover from fatigue and stress. This coping strategy is very effective to reduce anxiety and stress for me. (Dancer 3)

Psychological Strategies

This dimension of psychological strategies represented dancers' efforts to control their thoughts and emotional states. These psychological strategies consisted of cognitive techniques, such as positive thoughts to cope with the

stressful situations, active avoidance to stop thinking unwanted thoughts, mental relaxation to calm down, praying, and reading a Bible.

Individual cognitive and emotional strategies. Individual cognitive and emotional strategies involved using knowledge about ways to manage stress for coping. This third-order theme was comprised of three lower-order themes: (a) Catharsis, which was defined as a technique used to ease tension and anxiety caused by overwhelming feelings ("I cried whenever I had stress and screamed for one hour at home."); (Dancer 7), (b) religious activities ("I have a religion. I am a Christian. I prayed and read a Bible. It made me comfortable and peaceful."); (Dancer 6), and (c) positive thoughts, which was providing encouragement and support for oneself or thinking positively (" whenever I am faced with stressful situations or difficult problems, I try to think positively. Dance depends on the state of emotion. If the problem doesn't work out, it influences dance performance and mood. That's why, I think that the effective way to get rid of stress is positive thinking."). (Dancer 10)

Avoidance strategies. Avoidance strategies were defined as intending to escape and rejecting thoughts that were related to the stressful situation. An example that expresses this was:

> When I was under stress, I tried to avoid the stressful situation. If I thought about it again and again, it would influence how I dance. So I tried to reject all related thoughts and sleep. Next day, I felt better. (Dancer 2)

Behavioural Strategies

This dimension reflected dancers' efforts to cope with particular sources of stress associated with practice and performance through various behaviours that

the dancers believed would reduce the stress they felt. It involved dancers refreshing themselves with overt behavioural responses. This dimension was the most frequently referred to of all coping general dimensions. Behavioural strategies included four third-order themes, labelled dysfunctional behaviour, social interaction, hobby activities, and dance-related behaviour. Most dancers used dysfunctional behaviour for coping.

Dysfunctional behaviour. Dysfunctional behaviour involved responding to the stress experienced from dance by undertaking activities that had a negative impact on the main goals that the dancer was striving to achieve. Such behaviours might have a positive short-term effect, but were likely to increase stress in the longer term. Examples of dysfunctional behaviours were eating a lot of food or taking substances to decrease stress levels. This theme was derived from two second-order themes: (a) eating behaviour; and (b) substance use. A major source of stress for dancers is the need to maintain a certain body type or weight, but one of the coping strategies most widely used to deal with stress is overeating. A dancer referred to the use of overeating as a coping strategy in this way:

> I've been under so much stress related to keeping my weight down, since I started dancing. It is very important to sustain low weight as a professional ballet dancer. Whenever I eat something, I always worry about fat. But at the same time, to cope with stress I also have eaten too much. After that, I've wanted to vomit all food I have eaten. I felt I had bulimia. (Dancer 19)

Such dysfunctional eating behaviour is widespread among ballet dancers in a range of countries (Stephens, 1989). Some dancers self-medicate with laxatives and others have employed self-induced vomiting as a way to ameliorate the

effects of overeating (Stephens, 1989) to maintain low body weight. I found that more than 50% of the dancers in the Korean ballet company I studied adopted unhealthy practices in an effort to cope with the stress they experienced from their lives as dancers. Similarly, this third-order theme can be evidenced in the following quotation regarding the way dancers used alcohol as a coping strategy:

> To cope with stress, I drank a lot. When I over-drank, I started blaming myself because of fear of increasing in weight. (Dancer 9)

Here, the dysfunctional consequences of the dancer's behaviour are evident. Although drinking alcohol might have provided temporary relief from stress, it lead to increased stress once the palliative effect had worn off.

Social interaction. Social interaction was defined as the dancers' effort to seek out technical, emotional, and informational support to reduce stress or to moderate the stress by sharing it with colleagues, family, and friends. This third-order theme was referred to frequently within the dimension of behavioural strategies and was derived from two second-order themes: (a) peer interaction; and (b) sharing issues with family and friends. Talking to colleagues was the most frequently reported technique within first-order themes. Peer dancers could understand one another, because they had similar experiences and functioned in a common environment. Dancers could exchange their experiences and information on how to cope with stress. This coping strategy was extracted from comments, such as the following:

> When I got stressed out, I usually talked with colleagues. Talking is a good way to reduce stress. I talked with a friend who was working with me. She always understood me because she had a similar situation to mine. She gave

> me ideas to cope with stress. Sometimes, I had a narrow view of the situation, but during talking with her, she provided me with chances to consider it again and gave answers. (Dancer 2)

Some dancers preferred to talk with friends, who were not involved in the dance environment, because they did not want to talk about the sources of stress that arose from this environment, with other dancers from the company. In addition, spending time with people who had nothing to do with dance could be an effective way to escape the stressors of the dance environment for a while. Dancers could turn their attention to other matters with family and friends. A dancer demonstrated the use of this method in the following statement:

> I like to talk with my boyfriend. While talking with him, I can see a different world, and I can forget the stressors that I had in the company. Usually, I can feel free and easy with him. (Dancer 12)

Hobby activities. Hobby activities were doing interesting things with the aim to relax and enjoy. An example that expressed this was:

> When I have been stressed out, I usually go to karaoke with my boyfriend or friends. I sing energizing songs loudly without any stressful thinking for an hour or two hours. (Dancer 9)

Karaoke (Noraebang) is very popular in Korea. Karaoke facilities are found everywhere, even in small, rural towns. Thus, it is easy to access a microphone in a room or bar in front of friends or a large group of strangers. Although karaoke facilities do not serve any liquor in Korea, people often sing at the top of their voices in order to help reduce stress. The dancer just quoted likes singing a song and heads to a karaoke room to deal with stress.

Dance-related behaviour. Dance-related behaviour was defined as focusing on activities related to dance as stress management. Two ways in which dancers focused on dance were through observation and analysis of elite dancers in comparison to their own movements, and dancing as stress management or doing different kinds of dance: (a) Observation and analysis were watching one's own performance and comparing it with the performance of dancers from the best ballet companies on video. The dancer could analyse mistakes or weaknesses by observing the elite dancers' movements (" When I had stress that was associated with dance, I usually went home straight away and I watched video of elite dancers' movements, comparing that with my weakness. After monitoring, I practiced to correct my mistakes.") (Dancer 1); and (b) other dance activities were using dancing as stress management. Interestingly, some dancers changed their dance styles (e.g., sports dance, jazz dance) by dancing to different kinds of music and tried to escape from the routine by meeting other people from the general population (" I learned sports dance. When I listen to music and dance, I feel much better. I think this is because I feel free. During sports dance, I don't need to wear pointe shoes and just enjoy the music and movement.") (Dancer 13). Some dancers practiced harder than usual, until they had exhausted themselves, as a way to cope with the stress. Although dancers reported that this strategy was effective for stress management, this method of coping seems to be a dysfunctional strategy, because physical fatigue or overuse is one of contributors to risk of dance injuries (Kadel & Teitz, 1992; Liederbach & Compagno, 2001). One dancer stated, " In my case, I practiced harder than usual. When I was not satisfied with my movement, I couldn't take a rest. I practiced and practiced until I had no

energy. It did not matter how long, I just worked out. After that, I could get rid of stress". (Dancer 1)

Discussion

Overall, I identified that these Korean, professional, ballet dancers experienced a lot of stress, which had a number of sources, mainly in dance practice and performance environments. Because of pursuing advanced techniques and careers, dancers have been found to experience a variety of sources of occupational stress (Hamilton & Hamilton, 1994). In the present study, the dancers experienced stress from physical, psychological, and interpersonal, as well as situational, factors. The source of stress most cited by dancers was body condition (e.g., maintaining particular body type, keeping low body weight, having an injury), consistent with research on ballet dancers in Western cultures. In particular, the ideal female body in Western ballet is typically long, lean, and linear, requiring maintenance of extremely low weight (Hamilton, Brooks-Gunn, Warren, & Hamilton, 1988). Many dancers were concerned about maintaining body shape, and they had difficulty controlling their weight and body shape to meet the expectations of ballet directors. To perform in front of audiences as a professional ballet dancer, dancers must meet the rigid requirements of the thin body standards set by professional ballet companies. This demand or desire for an ideal body shape and thinness is probably a significant contributor to the high levels of abnormal eating behaviour reported both for professional and student dancers (Yannakoulia, Sitara, & Matalas, 2002). The desire for the ultra-slim body shape seems to be a universal wish for ballet dancers, regardless of the culture in which they perform (Hamilton & Hamilton, 1994).

Dancers mentioned that the dance director's criticism was a major source of stress. Often, according to the dancers in the present study, such criticisms were made publicly about a specific dancer, even using insults. Typically, dancers reported that their relationship with the dance director was difficult, because Korea is a Confucian society, which prohibits disrespectful comments or any form of challenge of those in authority. Korean ballet is imported from Western art. When importing ballet, perhaps Korea also imported the Western traditional ballet culture, which typically includes an authoritarian role for dance directors. This authority role fits quite well into Korean culture. Korea probably has the strongest Confucian heritage of the Asian cultures (Armstrong, 2002), thus, the autocratic behaviour of those in authority, and the limitations that dancers have to respond to criticism, might be even greater than those to be found in Western ballet. Thus, comparison of stress levels in dancers from several hierarchical societies, such as Korea and Japan, and more egalitarian societies, such as the USA, Australia, and the UK, would be interesting in this respect. Such research should include a variety of dance styles.

Relationship with peers was also one of the most commonly cited sources of stress. Because of maintaining and promoting their positions, dancers had a sense of being in competition with other dancers in the company. The sources of stress identified in this study strongly demonstrated that the stressors affecting elite dancers are influenced by the requirements of the ballet culture and dancers' experiences in professional ballet, in many cases amplified by the entire dance environment.

Comparison of Korean dancers and athletes is of interest. Park (2000) found that only 5% of the coping of Korean national athletes related to dysfunctional behaviour, whereas 65% of dancers in this study used a range of dysfunctional behaviours to cope with stress. The substantial amount of dysfunctional coping is likely to create stress or, at best, not to reduce it. In addition, Korean athletes used mental training (e.g., imagery training, meditation, self-talk, positive thoughts, goal setting) for some of their main coping strategies. Only two of the dancers in this study (10%) mentioned mental training techniques for stress management. Both dancers referred to use of positive thoughts. Perhaps directors or significant people who work in the dance area do not realize, or have no information about, the potential usefulness of mental training. Future research should investigate how dancers in Korea understand mental training (e.g., relaxation techniques, imagery, goal setting, self-talk) and how positive psychological strategies can be applied by dancers, instead of using dysfunctional coping strategies.

The present study showed that coping strategies, like physical relaxation, were widespread in dance in Korea. Many dancers used physical relaxation techniques, such as taking a sauna after practicing or following a performance, similar to Korean athletes (Park, 2000). In Korea, most people take a bath and sauna regularly to keep their bodies refreshed and relaxed. In a study of Western athletes, however, Gould, Eklund, and Jackson (1993) found that they more often employed relaxation exercises, such as breathing control, music, or relaxation tapes, as relaxation techniques.

Methodological Issues

This study is unique in examining sources of stress and coping strategies in Korean, professional ballet dancers. In the literature, I could not identify any studies of stress and coping in dance that used such qualitative methods, even in Western countries. This is the first research in Korea that interviewed professional ballet dancers to gather rich and useful information from interviews, but there are some limitations of the present study.

The limitation of this study is that participants were all female dancers. There might be different sources of stress and coping strategies for males. In particular, male, professional, ballet dancers may have a heavy burden imposed by the need to take care of their families, as husbands and fathers, while earning small income as dancers. Usually, female ballet dancers in Korea do not have the same expectation that they will support their families. On the other hand, Hamilton (1998) found that 50% of male dancers (among around 1,000 dancers), who read Dance Magazine, described themselves as homosexual or bisexual, compared with 2% of the female dancers in Western countries. Korean, gay male, ballet dancers may experience additional stress (fear of being "outed"). Moreover, many families force their children, regardless of gender, to marry after a certain age (UTOPIA, n.d.). In this conservative society, being openly gay or bisexual is difficult.

Implications for Practice

In this examination of Korean professional ballet dancers, I found that many female dancers experienced a lot of stress. I also showed that their coping strategies were often dysfunctional; sometimes they could even increase the stress

they experienced. Effective interventions to enhance coping strategies should be developed to assist dancers, especially those who use dysfunctional behaviours (e.g., overeating, drinking alcohol) to deal with stress. To design coping skills interventions, researchers and practitioners need to understand what kinds of stress dancers experience and how they cope with particular sources of stress associated with the dance environment. There is no psychological intervention research that has examined ways of reducing the level of stress and enhancing coping skills in dance. It is surprising that dancers in this study had no information about psychological intervention programs, even mental training. This may be because dance directors and teachers do not mention, or have never heard about, this kind of supportive training, although it is common in sport in Korea. Hays (2002) stated that, although dancers in the USA are familiar with mental skills techniques, performers may not have learned how to use such techniques or may not have understood how effective they can be in reducing stress associated with practice and performance. Based on the results of this study, identifying and implementing training in strategies to cope with stress related to dance could be very helpful for dancers.

Future Research

Cross-cultural comparison studies are needed in different dance contexts and cultures. It is important to compare the stress and coping strategies employed by Asian dancers with those of dancers from Western countries, because it would be beneficial to discover which sources of stress are most influential in dancers' lives generally, and apply culturally specific interventions designed to deal with those stressors. Of particular note in the present context was the stress caused by

the critical comments of dance directors. Dancers found it difficult to cope with this powerful type of stress. The relationship with significant others in dance companies is a general source of stress among dancers. Hamilton, Kella, and Hamilton (1995) found that ballet dancers in the USA experienced substantial occupational stress due to conflicting demands and loyalties with their directors. Those dancers complained of ambiguous criteria for evaluating their professional performance. Cross-cultural comparison studies will help to identify cultural differences in coping strategies, as well as the use of effective and dysfunctional coping strategies. It would also be valuable to identify universal stressors and coping strategies, that is, those that are commonly used in a variety of cultures.

Based on the results of qualitative studies, researchers should develop quantitative instruments that measure stress and coping skills of dancers. Coping resources were shown to be an important factor predicting injury or moderating the life stress-injury relationship (Hanson et al., 1992; Patterson et al., 1998; Petrie, 1993b; Smith, Smoll, & Ptacek, 1990). To date, most researchers who have been interested in dance have used questionnaires from sport and modified them for dance practice and performance (Patterson et al., 1998; Smith et al., 2000). Even though sport is similar to dance in terms of requiring high levels of physical skills and often extreme effort, dance is a performing art, and takes place in a different culture. The subjective aspect of judgment in dance performance is probably a large factor in dancers' stress. Comparisons with aesthetic sports, such as figure skating, diving, and gymnastics in the manner of the study by Krasnow et al. (1999) could be informative in this respect.

The information would also be useful for advising dance directors and teachers about dealing with particular sources of stress associated with the dance environment. Such knowledge would also be valuable to discover which strategies are most effective in reducing stress in professional ballet dancers in general. Research is also needed to examine some coping strategies, such as relaxation techniques, self-talk, and imagery, within dance situations, so improvement in coping skills and reduction in stress levels could be monitored and compared with specific coping strategies.

This study was the first to examine stress and coping in elite dancers, using interviews. The research showed that Korean dancers experienced a lot of stress, in particular associated with demands as professional ballerinas to maintain low body weight. To help prevent eating disorders, dance directors and teachers should educate professional ballet dancers about nutritional requirements to support long practice and intensive performance, and the ways to lose or maintain their fat, using healthy food. Ballet dancers used a variety of coping strategies, some of which were dysfunctional. These dysfunctional strategies (e.g., overeating, drinking alcohol) cannot reduce stress levels permanently although they may have a temporary relieving effect. These findings support the need for research on stress and coping in dance in various contexts, leading to the development of interventions to help dancers cope with the stress associated with their professional lives. It is important to carry out intervention research to examine whether stress can be reduced, coping skills can be increased, and, importantly, whether the incidence of injuries can be reduced. The in-depth

information that has emerged from this study provides a sound basis for devising interventions to assist Korean elite ballet dancers.

CHAPTER 5: PSYCHOLOGICAL INTERVENTION PROGRAMS FOR REDUCTION OF INJURY IN BALLET DANCERS

Introduction

The stress-injury model proposed by Williams and Andersen (1998) has provided a framework for intervention to reduce the incidence of sports injuries. Little research has examined psychological intervention programs for preventing sports injuries. De Witt (1980) found that minor injuries decreased in American basketball and football players, who participated in a stress reduction training program. Davis (1991) also reported a 52% reduction in injuries for swimmers and a 33% reduction in injuries for football players, when they used relaxation and imagery skills. Kerr and Goss (1996) found that Meichenbaum's (1985) Stress Inoculation Training reduced injury incidence. Further, Bhum, Morris, and Andersen (1998) found that eight weeks of Autogenic Training reduced stress levels and moderated decrements in central and peripheral visual attention that were caused by a combination of physical and psychological stress. This result is consistent with Williams and Andersen's (1998) proposition that stress causes narrowing of attention, which makes the individual more prone to injury. There was, however, no examination of injury incidence in the study by Bhum et al. In dance, no research has been conducted that examined psychological interventions for injury reduction, although injuries are common.

From the first study, the results showed that low levels of coping skills were associated with injury frequency and duration of injury, with dancers who had low levels of coping skills being injured more often and for longer periods of time. In particular, peaking under pressure, goal setting/mental preparation, freedom from

worry, and confidence and achievement motivation subscales of the Athletic Coping Skills Inventory-28 (Smith et al., 1995) were related to injury frequency. For duration of injury, freedom from worry, confidence and achievement motivation, negative life stress and negative dance stress were associated with longer recovery times.

The second study in this thesis demonstrated that Korean ballet dancers had a lot of stress and used various coping strategies including dysfunctional strategies. In particular, the dance director's criticism was one of major sources of stress. Such criticisms, including insults, were made publicly about a specific dancer among the professional ballet dancers interviewed in that study. Typically, dancers reported that their relationship with the dance director was difficult, because the Korean culture prohibits disrespectful comments or any form of challenge to those in authority. Based on the evidence from the two studies, the development of coping skills appears to be an important area for intervention with Korean ballet dancers. At the same time, negative life and dance stress need to be addressed.

The purpose of this study was to examine the effects of two interventions on coping skills of ballet dancers who reported low levels of coping skills and to investigate the impact of the interventions on the frequency and duration of injury. Studies 1 and 2 found negative life and dance stress and specific aspects of coping, identified by the subscales of the ACSI-28, to be problematic. Autogenic Training (AT) was chosen as an intervention to address life stress and peaking under pressure, and a broad-based coping skills intervention, including AT, imagery, and self-talk, aimed at managing peaking under pressure, coachability,

coping with adversity, concentration, and confidence and achievement motivation. In the broad-based coping skills intervention package, it was proposed that practice of the AT technique would produce a level of relaxation that would help participants to apply the self-talk and imagery techniques effectively, as well as reducing stress directly. Thus, the sequence of AT followed by self-talk and imagery was employed. Examining interventions also represents a further test of aspects of the stress-injury model and provides information that is useful for practitioners.

Method

Participants

Participants were 35 female dancers, aged 14 to 19 years, who specialized in ballet. They trained at the two dance institutes in Korea. Participants were assigned to one of three conditions: autogenic training (AT); (n = 12), broad-based coping skills (AT, self-talk, and imagery); (n = 11), and a control condition (n = 12). Participants from one dance institute were randomly assigned to the AT or broad-based coping skill intervention and participants from the other dance institute were assigned to the control condition. This was done to minimize the effect of control participants knowing that they were in that condition. I selected participants with relatively low levels of coping skills, based on ACSI-28 pretest scores. I included only dancers with a score of 67 or less on the ACSI-28, which represented those in the lowest quartile of coping skills scores from descriptive data gathered in the Study 1 with a similar sample. Participants were also free from injury at the start of the study.

Measures

Athletic Coping Skills Inventory-28 (ACSI-28; Smith, Schutz, Smoll, & Ptacek, 1995). The ACSI is a measure of coping skills, and contains 28 items representing seven sub-scales: (a) coping with adversity, (b) peaking under pressure, (c) goal setting/mental preparation, (d) concentration, (e) freedom from worry, (f) confidence and achievement motivation, and (g) coachability. The response scale ranges from 0 (*almost never*) to 3 (*almost always*). Smith et al. reported that Cronbach's alpha coefficients ranged from .62 (concentration) to .78 (peaking under pressure). A total (personal coping resources) scale alpha of .86 was reported. One-week test-retest reliability coefficients ranged from .47 (coachability) to .87 (peaking under pressure). The median test-retest reliability coefficient was .82. Convergent validity was supported in that total scores on the ACSI-28 were positively correlated with scores on the Self-Control Schedule (Rosenbaum, 1980), a measure of cognitive behavioural skills. Freedom from worry also correlated negatively -.59 with the worry factor of the Sport Anxiety Scale (Smith, Smoll, & Schutz, 1990). To apply the ACSI-28 in dance, this questionnaire was modified to refer to dance practice and performance. I translated the modified ACSI-28 into Korean and the Korean version has been used successfully in the Study 1 of dancers.

History of Injury. I translated an injury survey into Korean that had been used it successfully in the Study 1. The survey asked participants about the details of their injury experience within the past 12 months, such as whether they had an injury, how often injuries occurred (frequency), whether they had recovered from the injury, and how many days practice were missed or had to be modified

because of injury (duration). An injury was defined as any medical problem resulting from dance participation that restricted subsequent practice and performance for at least one day beyond the day the injury occurred.

Injury. Training staff (physiotherapists) in the two dance institutes recorded injury frequency (how many times a person got injured) and duration (how long each injury lasted) of all participants every day, using an injury report form that was developed for this study. I briefed these biomedically trained staff about the definition of an injury and instructed them on completion of the report form. They recorded the date, nature of injury, and whether the dancer practiced normally, undertook modified practice, or did not practice (see Appendix H). I did not inform the trainers who belonged to which research condition, in order to ensure that they were blind to this information, so it could not bias their judgement or report of dancers' injury data.

Adherence Diary

Autogenic training (AT). To log the practice of AT, during the 12 weeks of practice, following training in the AT intervention phase, participants were asked to maintain a diary. Each diary entry included information regarding the date, the duration of the AT session, and what time the session was performed (e.g., before going to bed, after practicing dance); (see Appendix J).

Broad-based coping skills. In addition to their AT sessions, participants in the broad-based coping skills condition were also asked to log self-talk and imagery during the 12-week practice phase. The diary entries consisted of the date, the frequency of the AT, self-talk, and imagery, the types of self-talk and imagery (concentration, confidence and achievement motivation, coachability,

and coping with adversity), and what time the participant conducted the session (see Appendix L and N).

Control. Participants were asked to log their dancing in regular practice and performance for 12 weeks without any intervention (see Appendix O).

Interventions

This study included three conditions, namely the control, autogenic training (AT), and broad-based coping skills interventions. Content of the interventions was based on results of the Studies 1 and 2 with ballet dancers. Dancers interviewed about sources of stress emphasized body condition and their relationship with directors and other dancers as major factors that were associated with stress. Dancers particularly talked about the stress imposed by the dance director. The dance director often criticized dancers, who felt they could not defend themselves. I considered this stressor to be similar to coachability, one of the subscales in the ACSI-28, which reflects the way in which performers interact with their coachers/teachers. In particular, coachability relates to the performers' capacity to listen to their teacher and use instructions and feedback constructively. Coachability not only showed up as a significant predictor of injury frequency in Study 1, but the Korean ballet dancers frequently reported a strong emotional reaction to the manner in which the dance director interacted with them, suggesting that this made it hard for them to productively use the instruction and feedback the teacher was giving. I found that dancers reported low scores on four areas of coping skills in the ACSI-28. The AT condition addressed one of those areas: peaking under pressure, because it provided a foundation of relaxation, which could help dancers to remain free from or, at least, reduce worry and, thus,

more effectively peak under pressure. The broad-based coping skills intervention addressed all five areas: imagery and self-talk targeted management of the coachability (e.g., I can keep dancing without becoming upset, when a director yells at me), coping with adversity (e.g., I can maintain emotional control no matter what happens), concentration (e.g., I can focus my attention to practice dance without any distractions), confidence and achievement motivation (e.g., I can dance even difficult techniques), with guided imagery scripts focusing all these specific areas, and peaking under pressure.

Autogenic training (AT). AT is a technique of self-hypnosis. AT is based on six stages: (a) heaviness in the extremities, (b) warmth in the extremities, (c) regulation of cardiac activity, (d) regulation of breathing, (e) abdominal warmth, and (f) cooling of the forehead. In this study, a short version of AT was employed, in which all six stages were introduced in Session 1, and the dancers repeated them in the following sessions. An AT session took around 25 minutes to complete all six stages. This version of AT has been used successfully in previous studies (e.g., Bhum et al., 1998); (see Appendix I).

Broad-based coping skills. In addition to the AT technique, the broad-based coping skills intervention included positive self-talk and positive self-imagery. Positive self-talk involved statements that individuals said to themselves about coping with the kinds of stressful situations they typically experienced as professional dancers. Positive self-imagery involved imagery that enhanced self-confidence, coachability, coping with adversity, and concentration, again, specific to the ballet context of the participants. Dancers relaxed and then imagined coping with stressful situations, such as when the dance director criticized the dancer.

Broad-based coping skills intervention sessions were of longer duration than AT sessions, lasting around 40 minutes. The extra 15 minutes was used for practice of positive self-talk and self-imagery, which were important aspects of this intervention (see Appendix K and M).

Procedure

To gain access, I contacted the directors of ballet institutes by telephone. Once permission was given, I visited the institutes and explained the intervention study to dancers. Those individuals who were interested in participating signed informed consent statements. In total, 170 dancers completed the ACSI-28 and history of injury survey. From the one dance institute, I assigned the 30 participants with the lowest coping skills scores to the AT and broad-based coping skills conditions randomly. I assigned low scoring participants (n = 15) from the other dance institute to the control condition. I adopted this approach to minimize the chance that control condition participants would hear about the interventions and this would affect their behaviour. I trained participants in the AT condition and the broad-based coping skills condition three times a week for 12 weeks. During the first AT training session in Week 1, I presented the accelerated version of the whole AT procedure. This was repeated three times a week for 12 weeks. I also taught participants in the broad-based coping skills condition the full AT procedure in the first session of Week 1. Participants repeated this exercise three times a week for 12 weeks. In addition, in Session 1 of Week 1, I taught the broad-based coping skills participants an imagery procedure related to coping with adversity and a self-talk procedure, which also addressed coping with adversity. Participants also practiced these procedure three times a week. For the

broad-based coping skills condition, in Week 4, I introduced another imagery procedure with content related to the development of confidence and achievement motivation and a new self-talk procedure on the same topic. Again, the participants practiced the procedures three times a week for three weeks. In Weeks 7 and 10, I presented participants in the broad-based coping skills intervention with different imagery and self-talk procedures on concentration and coachability, respectively. Participants practiced the concentration procedures three times a week for three weeks, and then they practiced the coachability procedures three times a week for three weeks. When I introduced the interventions in the AT and broad-based coping skills conditions, participants were trained in groups. All participants in both these conditions were asked to practice the interventions individually. For the control condition, participants were asked to maintain their regular practice schedule for 12 weeks. At the end of the 12-week training period, I measured the levels of coping skills again, using the ACSI-28. Then, I asked participants in the AT condition to practice the AT three times a week for another 12 weeks and I asked those in the broad-based coping skills intervention condition to practice three times a week for another 12 weeks. The participants in the control condition continued to undertake their usual practice for another 12 weeks. During the 12-week intervention training period and the following 12-week practice period, training staff recorded injury every day for participants in the three conditions, blind to the dancers' intervention condition. During the 12-week period of AT practice and the broad-based coping skills intervention practice, participants kept a diary, logging practice of the AT technique or the broad-based coping intervention. I also asked control condition

participants to log their activities in regular training for that period. I met the control group on several occasions to administer tests, but not otherwise. Following the 24 weeks of training and practicing, I asked the participants to record their injuries for 24 weeks more using an injury report form, without requiring them to practice the interventions or report on their use. Finally, after 48 weeks, I debriefed participants and thanked them for taking part. Some dancers were excluded from this study, because they stopped learning dance or because they did not complete all the injury data reports.

Analysis

One-way multivariate analysis of variance (MANOVA) was conducted to examine gain scores (post minus pre-intervention scores) on the five ACSI-28 subscales among the three groups (control, AT, broad-based coping skills). In experimental-control, pre-posttest designs, mixed ANOVAs or MANOVAs are often used. These statistics are suboptimal for the analysis of such designs. Mixed ANOVAs/MANOVAs actually underestimate the magnitude of main effects (Huck & McLean, 1975). Huck and McLean have suggested two alternatives: the use of analysis of covariance or using change scores from pretest to posttest. I chose to examine pretest to posttest change scores using one-way MANOVA. I chose not to make Bonferroni corrections for multiple tests of significance, because they can radically increase the probability of Type II errors, especially for studies with relatively low sample sizes. The present study does have a limited sample size, being exploratory, and the focus of the results is not statistical significance, but the magnitude of the effects. Although discriminant function analysis (DFA) should follow from a MANOVA, I conducted univariate tests for

each dependent variable, because the sample size did not meet minimum requirements for a DFA. Although η^2 were calculated for each *F* test, univariate, one-degree of freedom effect sizes (Cohen's *d*) were also calculated for each group comparison for each dependent variable (five ACSI-28 subscales and frequency and duration of injury) to provide more information about the magnitude of the differences. The APA publication manual (APA, 2001) states that "multiple degree-of-freedom effect indicators tend to be less useful than effect indicators that decompose multiple degree-of-freedom tests into meaningful one degree-of-freedom effects" (p. 26). Analysis of covariance (ANCOVA) was conducted to examine injury frequency and duration reduction after the intervention phase, using preintervention injury frequency and duration as the covariates, respectively. One ANCOVA was carried out for frequency of injury and a separate ANCOVA was calculated for injury duration.

Results

Adherence to Interventions

I checked level of adherence to the two coping skills interventions by examining frequency of use reported in adherence diaries, as a percentage of the instruction to practice three times a week. It was predetermined that no dancer whose percentage was below 60% across 12 weeks, which approaches two out of three sessions, would be included in further analyses. All participants achieved an adherence level above 60%. For the AT condition, average adherence was 83% and for the broad-based coping skills condition average adherence was 82%, so no dancers were excluded and adherence rates were comparable.

Effects of Coping Skills Interventions

I examined gain scores (post minus preintervention scores) on the five ACSI-28 subscales that were addressed in the broad-based coping skills intervention (i.e., peaking under pressure, coachability, coping with adversity, confidence and achievement motivation, concentration) for the three conditions, to determine whether the two coping interventions enhanced coping skills. Means and standard deviations for each score (pre and postintervention) for each group are presented in Table 5.1.

Table 5.1

Means and Standard Deviations for Five ACSI-28 Sub-scales for Three Conditions at Pre and Posttest

	Control				AT				BBCS			
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
Sub-scales	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Peaking	8.0	2.1	8.5	1.8	8.0	1.8	10.6	1.6	7.1	1.8	10.5	2.5
Coping	7.0	1.0	9.0	2.0	7.7	1.5	9.1	2.2	6.8	1.5	11.3	2.4
Confidence	9.5	1.6	9.3	2.4	9.3	2.4	10.0	2.1	8.6	2.3	11.7	2.4
Concentration	9.4	1.9	9.7	2.4	9.3	2.1	9.6	2.5	8.4	1.5	11.5	1.5
Coachability	11.8	2.8	11.3	1.9	13.2	2.4	11.4	2.3	11.6	2.1	12.8	1.8

Note. Control (n = 12), Autogenic Training (AT; n = 12),

Broad-Based Coping Skills (BBCS; n = 11)

Peaking = Peaking under pressure, Coping = Coping with adversity

Confidence = Confidence and achievement motivation

A one-way independent groups (control, AT, broad-based coping skills) multivariate analysis of variance (MANOVA) for gain scores on the five ACSI-28

subscales was significant overall, Wilks' lamda = .50, F (10, 58) = 2.23, $p < .05$. An examination of the univariate tests for each dependent variable indicated the following: peaking under pressure, F (2, 32) = 3.71, $p < .05$, $\eta^2 = .19$, coping with adversity, F (2, 32) = 4.92, $p < .01$, $\eta^2 = .24$, concentration, F (2, 32) = 4.60, $p < .05$, $\eta^2 = .22$, confidence and achievement motivation, F (2, 32) = 3.37, $p < .05$, $\eta^2 = .17$, and coachability, F (2, 32) = 2.87, $p = .07$, $\eta^2 = .15$. As predicted, the broad-based coping skills intervention enhanced coping skills more than the AT intervention and the control condition in peaking under pressure, coping with adversity, confidence and achievement motivation, and concentration, with large effect sizes. Coachabilty did not reach significance, but showed a medium to large effect size. To examine the magnitude of effects for differences between the three groups, univariate effect sizes (Cohen's d) were calculated for the ACSI-28 subscales. These are presented in Table 5.2.

Table 5.2

Effect Sizes (Cohen's d) for Differences Among the Groups on ACSI-28 Subscales and Injury

Scales	AT - Control	BBCS - Control	BBCS-AT
ACSI-28 Subscales			
Peaking	1.08	1.09	0.27
Coping	-0.28	1.02	1.21
Confidence	0.28	1.14	0.80
Concentration	0.03	1.22	1.14
Coachability	-0.38	0.60	1.23
Injury			
Frequency	-0.57	-1.21	-0.84
Duration	-0.63	-0.95	-0.52

Note. Control (n = 12), Autogenic Training (AT; n = 12),

Broad-Based Coping Skills (BBCS; *n* = 11)

Peaking = Peaking under pressure

Coping = Coping with adversity

Confidence = Confidence and achievement motivation

Frequency and Duration of Injury

Examination of injury frequency and duration for 48 weeks showed reductions over time. At the beginning of the interventions, however, I excluded dancers who had an injury at the time. Means and standard deviations for frequency and duration of injury for each group are presented in Table 5.3.

Table 5.3

Means and Standard Deviations for Frequency and Duration of Injury for Three Conditions for 48 Weeks

Injury	Control		AT		BBCS	
	M	*SD*	*M*	*SD*	*M*	*SD*
Frequency	2.58	1.98	1.67	1.30	.73	1.01
Duration	6.83	6.58	3.67	3.34	1.91	3.78

Note. Control (*n* = 12), Autogenic Training (AT; *n* = 12),

Broad-Based Coping Skills (BBCS; *n* = 11)

A One-way analysis of covariance (ANCOVA) for frequency of injury, with condition (control, AT, broad-based coping skills) as the independent groups factor, using preintervention frequency of injury as the covariate, did not reach significance, but showed a large effect size, $F\ (2, 32) = 3.23$, $p > .05$, $\eta^2 = .17$. Another one-way ANCOVA for duration of injury, with condition (control, AT, broad-based coping skills) as the independent groups factor, using preintervention duration of injury as the covariate, revealed significant differences among the

three conditions for duration of injury, with a large effect size, F (2, 32) = 3.58, p < .05, η^2 = .19. Tukey HSD post hoc tests indicated that, the average duration of injuries was significantly shorter for the broad-based coping skills condition than the control condition. To examine the magnitude of effects for differences between the three groups, univariate effect sizes (Cohen's *d*) were calculated for the injury variables are also presented in Table 5.2.

Discussion

The present study examined the effectiveness of an AT intervention and a broad-based coping skills intervention for the development of specific coping skills in Korean ballet dancers and the impact of those coping skills interventions on the frequency and duration of injuries. All the improvements in coping skills were in the directions hypothesized. The overall results of this study indicate that the combination of imagery, self-talk, and relaxation was effective in enhancing coping skills and reducing injury frequency and duration. These results are consistent with previous research in sport (Davis, 1991; Kerr & Goss, 1996). Although impressive effect sizes were found in this study, regarding the efficacy of the broad-based coping skills intervention to improve coping skills and reduce injury rates, it is unknown what changes on any of the ACSI-28 subscales mean in terms of behaviour. For example, I do not know what a change in the coachability subscale means in terms of a dancer's relationship with her dance director. Furthermore, I do not know how the intervention program influenced other aspects of the dancers' lives. Thus, although it is valuable to demonstrate the effects of intervention programs, further research should also consider the effects of programs on the quality of people's lives.

This study is the first that I have seen in the literature that has examined the effectiveness of a combination of coping skills interventions with dancers within the framework of the psychosocial stress-injury model (Williams & Andersen, 1998) that was developed in sport. The results of the present study supported the suggestion in Williams and Andersen's (1998) model that interventions that reduce stress and/or increase coping resources will reduce the probability of injury occurrence. The results of this study also shed light on the comparison of single technique interventions with interventions comprising combinations of mental skills. As expected, the mental skills package was more effective than the stand-alone relaxation technique. In sport, there is evidence that a combination of mental skills is advantageous for enhancing performance (Kendall, Hrycaiko, Martin, & Kendall, 1990; Patrick & Hrycaiko, 1998; Thelwell & Greenless, 2001). This finding may arise because relaxation with self-talk and imagery help the athlete produce more positive effects (e.g., relaxed attention, sharper focus on relevant cues) than relaxation alone (Weinberg, Seabourne, & Jackson, 1981). It should also be noted that there was a difference in intervention exposure time between the AT condition and the broad-based coping skills condition. This difference wa sequal to the extra time that participants in the broad-based coping skills condition spent practising imagery and self-talk. These findings support the claim that the use of combined interventions is more effective than single technique interventions for the increase of coping skills and to reduce injury occurrences in Korean ballet performers, who frequently report low levels of coping skills to deal with the stressors in their lives.

Methodological Issues

My selection of coping skills for the broad-based intervention in the present study was based on previous quantitative and qualitative examinations of Korean ballet dancers. Based on previous studies, I had gathered information to design targeted intervention programs. I developed the content of the interventions to address the specific factors that were related to injury reported by Korean ballet dancers. In particular, I designed the self-talk and imagery for coping with dance directors' criticism, and handling auditions and the hassles that surround performance. Although this study was designed based upon the needs of the dancers, it was still a group-based intervention program. In other words, each dancer did not receive the intervention program based upon her unique needs, rather the interventions were based on the strongest concerns raised for by dancers overall. Cupal (1998) recommended that intervention research should be designed depending on individuals' needs and situations.

Nevertheless, I identified three noteworthy limitations in this study: (a) I only included female participants; (b) participants came from different institutes; and (c) I only examined student participants. The first limitation of this study was that I studied only female participants. Hamilton et al. (1989) examined psychological status among 29 dancers who had achieved either soloist or principal status in ballet companies and compared genders (14 females and 15 males). Hamilton et al. used a manual to measure occupational stress, strain, and coping (Osipow & Spokane, 1983). The manual assesses three aspects of stress, which include the Occupational Environment Scales, (measures of role overload, role insufficiency, role ambiguity, role boundary, responsibility, and physical

environment), the Personal Strain Questionnaire, (assesses vocational strain, psychological strain, interpersonal strain, and physical strain), and the Personal Resources Questionnaire, (examines recreation, self-care, social support, and rational/cognitive coping). Hamilton et al. found that male dancers reported significantly more psychological distress than female dancers. In particular, male dancers experienced significantly more pressure associated with environmental factors (erratic work schedules and personal isolation) and self-care. Over 60% of male dancers experienced stress because of their relationships and experienced poor health, fatigue, and overuse of alcohol. When intervention research focuses on mental skills training, such as imagery and positive self-talk, researchers/practitioners should consider gender differences, because males and females can respond differently to various mental skills (Cupal, 1998). Additional research with both genders is needed to identify effective interventions for males and females.

The second limitation of this study was that I assigned the participants to the control group from a different dance institute to the dance institute from which the AT or broad-based coping skills intervention participants came. This distribution method was chosen to minimize the effect that control condition participants would learn about the interventions. If the control condition participants were from the same institute, this could affect behaviour due to an expectancy effect. Participants in the control condition, realizing that others were receiving an intervention, could expect no effect for their condition and responded accordingly. Also it was not easy to find participants who had low levels of coping skills in the numbers required for the three conditions in the same dance institute. It is possible

that differences between the institutes (e.g., different styles of teaching and dancing, dance directors, and practicing times) could have influenced the results. The differences found in coping skills and injury effects between participants in the broad-based coping sills condition and those in the AT condition, who were from the same institute, suggest that this is not a major threat to the results. In addition, there were similar patterns for the AT participants and participants in the control condition for coping skills that I did not expect AT to change.

The third limitation of this study was that all participants were ballet students aged 14 to 19 years, even though previous research has shown that professional ballet dancers had more injuries than ballet students (Hamilton, 1997; Hamilton et al., 1989; Pedersen & Wilmerding, 1998). The main reason why I selected ballet students in this study, is that it is difficult to do intervention studies, involving many weeks of intervention training and practice, with professional dancers, because they frequently travel to perform, limiting the opportunities for intervention sessions and, thus, the level of control preferred for such studies. In Study 1, I found that professional ballet dancers experienced injuries more frequently than university ballet students and high school ballet majors. Hamilton et al. (1989) also reported that older dancers (≥ 30 years old) had more injuries and spent longer periods disabled than younger dancers. Another recent study, Pedersen and Wilmerding (1998) found that professional flamenco dancers had more injuries than student dancers. Some professional dancers had two or more injuries at once, probably due, in part to practicing or performing almost four times longer than student dancers. The daily practice of professional ballet dancers is extensive, involving extremely demanding schedules and a high

intensity during the performance season. Because of physical and emotional demands from companies, professional dancers may experience higher levels of stress from a variety of occupational situations than student dancers.

In addition, I recognize that correlation of change in coping skills scores and change in injury frequency and duration would be a useful way to assess the role of enhanced coping skills in moderating the probability of injury. Because of their different treatments, however, the control, AT, and broad-based intervention groups would have had to be examined in separate correlations. The group sizes in this study were not adequate to calculate meaningful correlations, and such micro-analyses would be of limited value. I recommend that future research should employ larger group sizes and examine correlations between change in coping skills and change in injury occurrence.

Future Research

The results of the present study are promising for research on the stress-injury relationship in dance. In particular, this study points out the potential to reduce the incidence of injury in dance by interventions that reduce stress and increase coping skills. Research on stress and injury in dance is in its infancy, but the present study points to some issues that should be addressed.

One reason for the effectiveness of the interventions in the present study, in particular the broad-based coping skills intervention, could have been the way the interventions were designed on the basis of the previous quantitative (Study 1) and qualitative (Study 2) studies with ballet dancers. Hays (2002) also proposed that the combination of qualitative and quantitative research is needed to understand what performing artists want and need. When coping skills programs

are designed based on target variables that test specific areas, the results have strong positive effects (Smith, 1999). This broad-based coping skills focus on enhancing coping skills that are known to influence practice and performance and such coping skills interventions appeared to help dancers cope more effectively with the demands of the dance environment and reduce injury incidence. Researchers could replicate the design of my sequence of studies, to explore which factors play a central role in the prediction of injury outcomes and to designing interventions to cope with stressful situations. Because these studies were conducted with ballet dancers in the Korean society, which is culturally quite different from Western countries, it is not clear whether these results would apply to the relationship between stress and injury generally. It also would have been another step in the model to examine whether changes in coping skills were associated with changes in stress. Further, it is possible to compare AT with AT, self-talk, and imagery and I addressed what differences there were among the groups. It was not possible, however, to compare whether imagery and self-talk alone would have had the same effect or not. Therefore, future research should examine the relative effectiveness of interventions designed in this way, compared to general stress management and general coping skills packages or the component(s) of the coping skills packages.

Recently, researchers have started to examine the psychological aspects of dance injury (Mainwaring et al., 1993; Patterson et al., 1998; Smith et al., 2000). Previous research has mainly been conducted in Western cultures. That research has found that psychosocial factors, such as stress, social support, and anxiety are important variables related to injury (Mainwaring et al., 1993; Patterson et al.,

1998; Smith et al., 2000). The present study, however, was conducted in Korea. I found that coping skills are the most important factor related to injury outcome in Korean ballet dancers from Study 1. Study 2 found that Korean professional ballet dancers experienced a lot of stress, which had a number of sources, mainly in dance practice and performance environments. Also, dancers lacked coping skills to deal with those stressors. The psychosocial factors that are most closely related to injury in Korean ballet dancers are different from previous research in Western countries. The results of the current study are unclear whether cultural differences are associated with injury occurrence. Although ballet is a Western art form that imposes similar conditions on dancers, such as thin and prepubescent body shape, prolonged practice, turnout, flexibility, and strength, regardless of culture (Hamilton & Hamilton, 1994), there are specific sources of stress that need to be addressed by different coping strategies to those used in Western countries. For example, male, professional, dancers in Korea may have a heavy burden imposed by the need to take care of their families, as husbands and fathers, while earning a small income as dancers. Korean society, even more so than the West operates within a patriarchal system that places large expectations on males. Thus, future research is needed to examine particular stressors and targeted coping strategies in different cultures.

The present study has low power because of drop-out of some participants during the intervention period. The results, however, are significant and all variables have large or medium effect sizes. Nowadays, the value of examining effect sizes, which often have more meaning in practice than statistical significance, is emphasized (Cohen, 1988). Larger sample sizes should be

employed, where possible, to increase the power of studies. Thus, further research with larger samples is needed to generalize the findings for intervention programs.

Implications for Practice

The results of the present study have shown that designed intervention programs are effective among dancers with low levels of coping skills. The results could be informative for directors and teachers in Korea. At minimum, practitioners could start educational programs for dance directors, choreographers, managers, and dancers concerning the importance of knowing about psychosocial factors related to injury risks and how to apply intervention programs to reduce injury occurrence. In particular, Korean ballet dancers and dance directors rarely used mental training to help them cope. Even though many performing artists are familiar with various forms of mental skills training, they may not know how to use such techniques (Hays, 2002). Dancers could learn effective coping skills for dealing with stressful situations, such as practice, performance, audiences, and auditions for promotion and not just think anxiety is a routine element of performance (Hays, 2002). I suggest that it would be valuable to include training in coping skills in the education of students and professional Korean ballet dancers to prepare them for the inevitable stress of practice and performance. If ballet dancers practiced intervention programs regularly, they might be better prepared to deal with the stressful situations they meet and their injury rates might be reduced. Given education to impart greater understanding of the stress caused by the interpersonal manner of and the demands made by dance directors, those leaders and teachers could moderate their behaviour to considerably reduce this source of stress for dancers.

In conclusion, the present study found that interventions to enhance coping among dancers, who had low levels of coping skills, did improve coping skills and they also led to a reduction in injury occurrence. I hope that the findings of the present study stimulate further examination of intervention studies in relation to dance injuries.

CHAPTER 6: GENERAL DISCUSSION

Introduction

The general purpose of this thesis was to examine the stress-injury relationship in the context of dance and develop interventions to reduce injury risk. In this chapter, I draw together the general points from the three studies and consider the interventions designed on the basis of Study 1 and Study 2. Then I consider directions for future research and present some concluding remarks.

Examining Stress and Injury in Dance

Smith and Smoll (2004), who are recognized for their eminence and experience in the stress-injury area, as well as stress and coping generally, suggested that when researchers conduct intervention studies:

> What are needed are controlled outcome studies with well defined and competently administered treatment procedures, dependent variable measures that tap behavioural, physiological, and self-report outcome indices, and appropriate control groups (including attention-placebo control conditions that are as credible as the treatment conditions). (p. 315)

Although the studies here were developed before the advice of Smith and Smoll was written, this thesis exemplifies much of what they proposed for future research. It was a coherent thesis developed from the start to meet several aims. Because there is currently no clear guidance, researchers and practitioners appear to determine interventions based on intuition to help athletes/dancers to reduce injury rate, that is, they include what "seems" to be appropriate. Alternatively, scholars and applied workers base their intervention designs on history, that is, they replicate what has been employed in previous research or practice. More

efficient and effective interventions are likely to emerge, if interventions are designed on the basis of research or assessment of the dancers, who are the target of the research or practice.

Dancers are always concerned about injury, because serious injuries not only disturb their techniques, but they can also influence their limited careers. In order to design the most effective psychosocial interventions, the interventions in this thesis were based on research, which included both quantitative and qualitative methods, to provide information about factors related to the incidence of injury among Korean ballet dancers. To gain specific information about this population, based on the body of theoretical knowledge regarding whether and which psychosocial factors predicted dance injuries, I first conducted a prospective correlational study. I found that coping skills were the main factor that played a prominent role in the prediction of dance injury among ballet dancers in Korea. In particular, freedom from worry, confidence and achievement motivation, and negative dance stress accounted for 17 - 21% of injury variance in duration and frequency. The results of Study 1 showed that negative dance stress could also play a key role in injury prevention and negative life stress was related to dance injuries too.

Of the psychosocial factors studied to date, stress has received the greatest amount of research attention and evidence that it is related to injury occurrence in Western athletes and dancers. To examine the details of stress experiences of Korean ballet dancers through the dancers' own words, I conducted a qualitative, interview-based study. As well as investigating the major sources of stress perceived by Korean professional ballet dancers in the dance environment, I

explored the main ways in which those dancers coped with the stress associated with practice and performance. The in-depth interviews in Study 2 revealed that ballet dancers experienced a lot of stress, in particular associated with the demand, as professional ballerinas, to maintain low body weight. Efforts of losing weight are ubiquitous in dance, particularly in ballet. The perfect body image for ballet is tall, lean, narrow-hipped, and long-limbed (Ryan & Stephens, 1989).

Another stressor for Korean ballet dancers, which emerged strongly from the interviews, was dance directors' attitudes and behaviour toward dancers. Although ballet is a hierarchical profession, directors often used what the dancers perceived to be insulting or humiliating words during practice or rehearsals. Further, dancers complained about experiencing negative feedback from directors, regarding their performances, which were based on inconsistent requirements. Dancers found it particularly stressful when directors changed their mind, reversing their instructions/feedback to dancers on different occasions. Hamilton (1999) reported that dancers who experienced this kind of occupational stress had more performance anxiety and overuse injuries than those who did not report such experience. Moreover, Hamilton found that some directors believed that injury could be cured through practice and performance, so they expected injured dancers to work while injured. In fact, this behaviour can lead to dancers developing chronic injuries (Arnheim, 1980). Interviews, in the present thesis, also showed that the dancers used a range of coping strategies, but many dancers (over 60% of dancers) did not cope well with their circumstances, using dysfunctional behaviours. Therefore, dancers experienced substantial stress,

which the psychosocial stress-injury model suggests produce an additional risk of injury.

The first two studies supported each other in giving a picture of the stress and coping of ballet dancers in Korea. The quantitative study of psychosocial factors and injury (Study 1) and the qualitative study of sources of stress and coping strategies in Korean ballet dancers (Study 2), together provided useful guidance for the development of interventions. The evidence from Studies 1 and 2 in this thesis indicated that these dancers experienced considerable stress and that the development of coping skills to more effectively handle stressful circumstances is an important area for intervention with Korean ballet dancers. This was a noteworthy finding, given that most studies of Western dancers and athletes have focused on stress and social support (Krasnow et al., 1999; Patterson et al., 1998). It is not clear whether this difference is based on cultural differences or is specific to the samples in Studies 1 and 2. The ACSI-28 was valuable in helping to target specific aspects of coping that required particular attention in any intervention. The inductive analysis of the interview data provided guidance on the particular sources of stress that were not coped with well. At the same time, both studies indicated that negative life and dance stress needed to be addressed.

Based on the picture that emerged from Studies 1 and 2, it was clear that interventions should be directed at stress-management, in particular focusing on coping strategies to reduce the effects of stress. Bhum et al. (1999) reported that autogenic training (AT) reduced the effect of a combination of physical and psychological stressors on visual attention. Thus, AT was proposed to be an appropriate intervention to address negative stress, as well as the specific coping

skill deficit in the areas of peaking under pressure and freedom from worry, which were identified as factors for prediction of injury in Study 1. To address these issues, AT should prove useful, but it is only likely to provide a foundation of relaxation, which should help dancers to more effectively peak under pressure and remain free from or, at least, reduce worry.

It was proposed that self-talk and guided imagery, performed in a relaxed state can be used as coping strategies to address the other issues identified by Studies 1 and 2. Positive self-talk can help increase self-esteem and confidence effectively and focus in the present appropriately (Zinsser, Bunker, & Williams, 2001). The self-talk targeted the specific situations that dancers typically perceived to be stressful. For example, dancers practiced statements about their skill and commitment. I designed these statements to enhance the dancers' confidence and to counter common criticisms made by the dance director. Some statements reassured the dancers about performance at auditions.

Imagery can also help improve performance and psychological skills, such as learning skills, solving technique problems, goal setting, enhancing self-confidence and concentration, and developing interpersonal skills (Vealey & Greenleaf, 2001). Imagery of emotion was focused on, to emphasize the relaxed and comfortable state that dancers experienced, as they learnt, buoyed by their self-talk and imagery of their high levels of skill and commitment. The knowledge of specific sources of stress and particular deficits in coping skills informed the development of the interventions, helping in the design of the specific content of the imagery and self-talk scripts.

Based on Studies 1 and 2, the main purpose of the intervention study was to examine the effects of two interventions, designed to enhance coping skills of ballet dancers, who reported low levels of coping skills, on the frequency and duration of injury. The broad-based coping skills intervention addressed confidence and achievement motivation, coachability, coping with adversity, and concentration associated with the goal setting/mental preparation aspect of coping skills, because all the processes involved constituted mental preparation and the specific content of the self-talk and imagery was based on determining appropriate goals. Results indicated that all the improvements in coping skills were in the directions that I intended and for the subscales that I proposed would be improved by each intervention. Importantly, the interventions reduced the frequency and duration of injury. Consistent with the criteria that Smith and Smoll stated, this thesis had well-defined, controlled outcomes, that is, enhanced coping skills and reduced incidence of injury based on Studies 1 and 2. The ACSI-28 helped to focus the intervention on the topics (e.g., confidence and achievement motivation, coachability, coping with adversity, concentration, and peaking under pressure) and the interview material provided guidance on specific content of self-talk and imagery scripts (e.g., handling dance director criticism, enhancing concentration for practice or performance). Participants also recorded their injury occurrence (dependent variable) after the intervention period with self-report outcome indices. In addition, the AT group could be considered to have acted like an attention-placebo control condition, because participants might have thought that AT would be useful and helpful in improving coping skills and reducing injury rates, although, in the form it was used here, it was only intended to be a

relaxation technique. The relaxation function of AT was clearly supported by the results. For coping skills, the AT condition only enhanced scores on the peaking under pressure coping skill scale. Furthermore, AT did not significantly reduce injury frequency or duration. This comparison between AT and the broad-based coping skills intervention is, thus, also consistent with the criteria proposed by Smith and Smoll (2004).

In Study 3, which was the first intervention study on coping skills and injury in the dance literature to date, I aimed to reduce stress and enhance coping and then examined the impact of that intervention on injury occurrence. This is one of only a few intervention studies on the stress-injury relationship across the whole performance area (e.g., dance, gymnastics, sport) and the first that has been based on other studies of the same population that identified the focus for the interventions. Often, researchers or practitioners use general techniques (Davis, 1991; Kerr & Goss, 1996), like stress inoculation training (SIT), which, though broadly effective, can miss critical elements of the content of the intervention techniques needed in a particular situation. In addition, such general techniques, typically, include long periods of training in components that are not needed in some contexts, that is, there can be substantial wasted time and effort. I recommend the approach I have described here, including a combination of quantitative and qualitative research methods, as the basis for designing effective and efficient interventions for dancers.

Overall, the thesis illustrated a coherent approach to the examination of stress and injury in dance. The results of a study using quantitative methods showed that psychosocial factors related to injury existed among dancers and that

lack of coping skills was critical. The interview study helped me to understand dancers' sources of stress and ways of coping. The first and second studies lead to the design of intervention programs, which enhanced coping skills and reduced injury occurrence. The results of the present thesis supported Williams and Andersen's (1998) model of stress-injury and provided useful information for practice. Andersen and Williams (1988) suggested that the model could be applied to the investigation of injury and accident occurrence in general and this thesis showed that their model could be applied to the performance area of dance and to a non-Western culture. Thus, not only does this thesis break new ground in applying a systematic multimethod approach to understand, predict, and reduce injury in dance, it also makes a noteworthy contribution to the whole stress-injury area.

Future Research

The present thesis provides evidence of the application of the stress-injury model in dance, including the first demonstration of dance injury reduction associated with an intervention that targeted key psychosocial variables. Even though the present thesis showed positive results in terms of injury reduction, additional research is needed to determine whether this coping intervention would be useful in other dance populations from different countries. Because these studies were conducted with ballet dancers in the Korean society, it is not clear whether the results can be generalized to the relationship between stress and injury in other Western and Eastern cultures. It is not clear whether coping skills are important in the prediction of injury among Western ballet dancers as well. In addition, because no studies have been conducted to explore the stress experiences

and coping strategies of dancers from Western countries, it is impossible to compare the findings for sources of stress and coping strategies from the present thesis with those for Western dancers. Future research is needed to compare the factors that play a central role in the prediction of injury in the stress-injury model in dancers from different countries.

In addition, a question that remains unanswered is whether intervention programs designed in one dance context can be used with other dance populations. To increase generalization, research is needed to examine whether this effective coping skills intervention program can be applied in many different cultures. Research should use the same questionnaire (ACSI-28) and the same content of imagery and self-talk scripts. For example, the ACSI-28 can measure dancers' perceived abilities in various ways, such as emotional, behavioural, or cognitive coping strategies to deal with stress in their dance environment, whereas the Coping Resource section of the Stress Audit Questionnaire (Miller & Smith, 1982) can assess general coping behaviours and social support. If researchers use different coping instruments to examine the stress-injury relationship, this makes comparison difficult between studies. In addition, Williams (2001) stated that it is not surprising to find different results, despite using the same measurements, if researchers do not consider the differences in design and statistics among studies. Thus, research is needed that not only employs similar designs and statistics with the same measurement tools, but researchers need to consider the translation of instruments and their cultural relevance.

A large amount of previous research on injury in dance has examined mainly classical ballet, rather than other dance styles (e.g., modern dance, jazz,

flamenco, sports dance). Modern dancers also have high levels of injury, ranging from 59% to 97% (Krasnow & Kabbani, 1999) and flamenco dancers sustain a number of injuries (Pedersen & Wilmerding, 1998) as well. Different types of dance forms require distinctly different skills, form, and fundamental physical demands. For example, ballet requires standard foot and body position, which maintains the 180º external rotation of the lower extremities, namely turn-out, whereas modern dance is more free in form. Krasnow and Kabbani (1999) reported that there are some differences between ballet and modern dance, regarding injury sites and rates, nutrition and body composition, and biomechanical mechanisms. It is not clear whether different levels of stress exist between ballet dancers and dancers from other types of dance. Study 2 indicated that professional ballet dancers had many sources of stress and a lot of stress from the dance environment that were connected to the physical and emotional demands from companies. Future research is needed to compare the relationship between stress and injury across different kinds of dance in order to develop effective psychosocial intervention programs.

Using a mixed method approach, the present thesis indicates that not only are coping skills a major problem for Korean ballet dancers (e.g., negative coping such as alcohol consumption), but also interventions to enhance them lead to reduction in injury incidence. The present research is the first to compare the effects of a general relaxation-oriented intervention (AT) with an intervention that was targeted on specific aspects of coping, employing different cognitive-behavioural techniques (AT, imagery, and self-talk) in dance. Researchers need to distinguish the individual impact of specific techniques (e.g., self-talk, imagery,

goal setting) on stress variables and injury incidence, so that even more effective interventions can be developed. For example, imagery programs could be compared with programs targeted at self-talk. It is not clear from Study 3, which intervention (imagery or self talk) is more effective for helping to improve the coping skills of dancers. Although the package of mental skills might lead to more practical benefits (Kendall et al., 1990; Patrick & Hrycaiko, 1998) than a single mental skill, further studies could compare the benefits among dancers of mental skills packages with the efficacy of using a single mental skill intervention. In a practical sense, a preset program will not meet the needs of every dancer. Some dancers may benefit from one intervention much more than another. What is needed are studies where there are individual assessments of dancers and interventions are tailored for the personal needs of each dancer.

Concluding Remarks

Results of the present thesis support the Williams and Andersen (1998) model of stress and injury, extending its application from sport to dance. The primary goal of this research was to reduce injuries using psychosocial interventions and I found that there is potential for interventions to prevent or reduce injuries for dancers. Even though it is impossible for dancers to avoid 100% of injuries, results of the present thesis showed that cognitive-behavioural intervention programs helped reduce injury incidence. This thesis has revealed that dancers can benefit from a range of effective coping skills to deal with the demands of the ballet environment.

There is no doubt that serious injuries not only influence dancers' careers and lives, but also are associated with psychological and emotional sequelae.

Serious injuries also lead to increased financial costs for dancers, their families, and dance companies. The importance of interventions that enhance coping skills, thus helping dancers to manage stress and reduce injury occurrence, was a major outcome of this research. It is hoped that the results reported in this thesis stimulate researchers to examine psychosocial factors in the model of stress and injury (Williams & Andersen, 1998) as they apply to dance and to develop targeted interventions for decreasing or preventing dance injury.

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Appendix A: Consent Form Study 1

Consent Form for Participants in Project on Psychosocial Factors and Ballet Injuries

INFORMATION TO PARTICIPANTS:

I would like to invite you to be a part of a study investigating psychosocial factors and ballet injury. Dancers frequently experience injuries, which produce substantial financial and emotional costs to the individual and the community. Identification of physical factors associated with injuries in dance has not significantly reduced the frequency of dance injuries (Krasnow, Kerr, & Mainwaring, 1994). Psychological factors are likely to play a part, as they have been shown to affect the incidence of injuries in the similar performance context of sport (Williams & Andersen, 1998). This study will identify the major psychosocial factors that predict dance injuries.

CERTIFICATION BY SUBJECT

I, _____ of _____

(name) (address)

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study entitled: **Psychosocial Factors and Ballet Injuries**, being conducted at Victoria University of Technology by **Ms. Young-Eun Noh, Professor Tony Morris, and Associate Professor Mark Andersen.**

I certify that the objectives of the study, together with any risks to me associated with the procedures listed hereunder to be carried out in the study, have been fully explained to me by **Young-Eun Noh** and that I freely consent to participation involving these procedures.

PROCEDURES

As a participant in this study, you will be requested to complete a series of five questionnaires, lasting 30-40 minutes altogether. The questionnaires cover major and minor sources of stress in your life, how anxious you generally feel, how you cope with the stress that you experience, what kinds of support you receive from people around you. After 10-month, you will be asked to complete your previous injuries form. There are no right or wrong answers to these measures; they just reflect your own experience.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardize me in any way.

I have been informed that the information I provide will be kept confidential.

Signed: .....…. Date: .....…….....……..

Witness other than the researcher: .....…….

Any queries about your participation in this project may be directed to the researchers: Ms. Young-Eun Noh 03-9688-4066 and Professor Tony Morris 03-9688-5035. If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MC, Melbourne, 8001 (Telephone no: 03-9688-4710).

Appendix B: Questionnaires for Study 1

History of Injury

The following questionnaire asks people about their injuries in the past year. Read each question and then tick the box that applies to you or fill in the details for every question that applies to you.

1. Gender: ❑ Male ❑ Female

2. Name: _____

3. Age: _____ years _____ months

4. Dance: ❑ Ballet ❑ Modern dance

5. For how many years have you been training in dance?
_____years

6. For how many years have you been performing as professional dancer?
_____years

7. Did you have any injuries last 10 months? (If no, go to question 11)
❑ Yes ❑ No

8. If yes, were these injuries associated with dancing?

(If no, go to question 11)

❑ Yes ❑ No

9. If yes, how many injuries did you have last 10 months?

_____ injuries

10. For each injury, how many days were you unable to practice or perform in the usual way?

Injury No.	Number of missed days
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

11. Do you have any injury now?

❑ Yes ❑ No

Please, add any comments that clarify your answers or provide additional relevant information of your history of injury:

_____

_____

Thank you!

Perceived Event Scale

Code: _____

On the following pages are events that high school students have reported experiencing. As you read the list, please check off by placing a tick on the line in the second column, EVERY one that you have experienced in THE LAST 6 MONTHS. For each event you check off, circle whether it was a GOOD or BAD thing at the time it happened in the third or fourth column.

Next, you are asked to decide whether the event was a MAJOR event or a DAY-TO-DAY one. MAJOR events are things that have had a large effect on your life or have led to changes in your health or well-being, your relations with other people, how you feel about yourself, or other aspects of your life. These events can be either good or bad. DAY-TO-DAY events are things we experience in our day-to-day lives (perhaps once, twice, or more times during a month) that can be either "hassles" or "pleasures". The hassles may irritate, annoy, or upset us at the time, whereas the pleasures make us feel good. DAY-TO-DAY events may arouse strong feelings at the time they occur, but they do not have the long-term effects that the MAJOR events do.

For those events that have occurred in the pat six months, please circle DAY-TO-DAY or MAJOR to indicate what kind of event it was for you in column five or six.

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
1. Writing letters ……..	_____	Good Bad	Day-to-Day Major
2. Getting braces ……..	_____	Good Bad	Day-to-Day Major
3. Wearing braces ……	_____	Good Bad	Day-to-Day Major
4. Driving ……	_____	Good Bad	Day-to-Day Major
5. Falling in love or beginning Relationship with boy/girlfriend……	_____	Good Bad	Day-to-Day Major
6. Talking or sharing feelings with friends...	_____	Good Bad	Day-to-Day Major
7. Getting in trouble or being suspended from school ……	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
8. Getting bad grades or progress reports …..	_____	Good Bad	Day-to-Day Major
9. Dieting or keeping track of weight….	_____	Good Bad	Day-to-Day Major
10. Meeting new people ..	_____	Good Bad	Day-to-Day Major
11. Putting things off ….	_____	Good Bad	Day-to-Day Major
12. Smoking cigarettes …	_____	Good Bad	Day-to-Day Major
13. Getting or losing a pet	_____	Good Bad	Day-to-Day Major
14. Feeling pressured by friends….	_____	Good Bad	Day-to-Day Major
15. Looking for a place to live …….	_____	Good Bad	Day-to-Day Major
16. Getting complimented	_____	Good Bad	Day-to-Day Major
17. Joining the armed forces…….	_____	Good Bad	Day-to-Day Major
18. Getting driver's license or learner's permit ….	_____	Good Bad	Day-to-Day Major
19. Helping other people ..	_____	Good Bad	Day-to-Day Major
20. Getting up in the morning ….	_____	Good Bad	Day-to-Day Major
21. Talking on the phone ...	_____	Good Bad	Day-to-Day Major
22. Marriage or becoming engaged ……..	_____	Good Bad	Day-to-Day Major
23. Being assaulted …….	_____	Good Bad	Day-to-Day Major
24. Hospitalization of a family member or relative ……..	_____	Good Bad	Day-to-Day Major
25. Work hassles (rude customers, unpleasant jobs, etc ……	_____	Good Bad	Day-to-Day Major
26. Worry about school performance …..	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
27. Worry about performance ……	_____	Good Bad	Day-to-Day Major
28. Being around people who are inconsiderate or offensive ……..	_____	Good Bad	Day-to-Day Major
29. Worry about performance in non-dance extra-curricular activities (audiences, arts, etc.) ..	_____	Good Bad	Day-to-Day Major
30. Personal achievement at work (getting a raise, promotion, etc.)…..	_____	Good Bad	Day-to-Day Major
31. Worry about nuclear war ….	_____	Good Bad	Day-to-Day Major
32. Personal hospitalization	_____	Good Bad	Day-to-Day Major
33. Traffic or parking problems …	_____	Good Bad	Day-to-Day Major
34. Restrictions at home (having to be in at a certain time, etc.) …	_____	Good Bad	Day-to-Day Major
35. Good weather ……	_____	Good Bad	Day-to-Day Major
36. Someone showing that they care …	_____	Good Bad	Day-to-Day Major
37. Trouble with the law…	_____	Good Bad	Day-to-Day Major
38. Poor relationship between family members or friends …	_____	Good Bad	Day-to-Day Major
39. Not spending enough time with family members or friends …	_____	Good Bad	Day-to-Day Major
40. Feeling too young ….	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
41. Getting a job ….	_____	Good Bad	Day-to-Day Major
42. Getting mail …..	_____	Good Bad	Day-to-Day Major
43. Getting robbed …..	_____	Good Bad	Day-to-Day Major
44. Wearing contacts …..	_____	Good Bad	Day-to-Day Major
45. Getting divorced …	_____	Good Bad	Day-to-Day Major
46. Family move …..	_____	Good Bad	Day-to-Day Major
47. Having a job …..	_____	Good Bad	Day-to-Day Major
48. Parent loses job …..	_____	Good Bad	Day-to-Day Major
49. Taking medication …	_____	Good Bad	Day-to-Day Major
50. Taking showers …..	_____	Good Bad	Day-to-Day Major
51. Weight change …..	_____	Good Bad	Day-to-Day Major
52. Change in personal appearance ……	_____	Good Bad	Day-to-Day Major
53. Liking someone who doesn't like you ….	_____	Good Bad	Day-to-Day Major
54. Change in personal health or fitness …..	_____	Good Bad	Day-to-Day Major
55. Arrest of a family member ……	_____	Good Bad	Day-to-Day Major
56. Having bad classes or teachers ……	_____	Good Bad	Day-to-Day Major
57. Change in moral or religious beliefs ……	_____	Good Bad	Day-to-Day Major
58. Having a good talk with a teacher or other adult …..	_____	Good Bad	Day-to-Day Major
59. School interfering with other activities …	_____	Good Bad	Day-to-Day Major
60. Buying new clothes ….	_____	Good Bad	Day-to-Day Major
61. End of school year …	_____	Good Bad	Day-to-Day Major
62. Change in eating habits	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
63. Friend getting separated or divorced	_____	Good Bad	Day-to-Day Major
64. Having or taking care of pets ….	_____	Good Bad	Day-to-Day Major
65. Moving away from parents home or living on own….	_____	Good Bad	Day-to-Day Major
66.Parent getting remarried	_____	Good Bad	Day-to-Day Major
67. Losing job (quitting, being made redundant, etc)	_____	Good Bad	Day-to-Day Major
68. Taking care of younger brothers or sisters ….	_____	Good Bad	Day-to-Day Major
69. Change in birth control use …..	_____	Good Bad	Day-to-Day Major
70. Having or making money	_____	Good Bad	Day-to-Day Major
71. Change in alcohol or drug use	_____	Good Bad	Day-to-Day Major
72. Making honor roll or other school achievement	_____	Good Bad	Day-to-Day Major
73. Friend getting married or engaged ….	_____	Good Bad	Day-to-Day Major
74. Having few or no friends …	_____	Good Bad	Day-to-Day Major
75. Having to share a room	_____	Good Bad	Day-to-Day Major
76. Having good classes or teachers …..	_____	Good Bad	Day-to-Day Major
77. Change in relationship with boy/girlfriend….	_____	Good Bad	Day-to-Day Major
78. Change in relationship with family member (s)	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
79. Change in relationship with friend (s) ……	_____	Good Bad	Day-to-Day Major
80. Having plans fall through (not going on a trip, etc)	_____	Good Bad	Day-to-Day Major
81. Change in church attendance ……..	_____	Good Bad	Day-to-Day Major
82. Having braces removed	_____	Good Bad	Day-to-Day Major
83. Having teachers favor other students ….	_____	Good Bad	Day-to-Day Major
84. Doctor's or Dentist's appointments ….	_____	Good Bad	Day-to-Day Major
85. Friend (s) move away or you move away from friends…	_____	Good Bad	Day-to-Day Major
86. Going out ….	_____	Good Bad	Day-to-Day Major
87. Friend/family member recovering from illness or injury …..	_____	Good Bad	Day-to-Day Major
88. Bad weather ……	_____	Good Bad	Day-to-Day Major
89. Applying to or waiting to hear from university	_____	Good Bad	Day-to-Day Major
90. Visiting with relatives	_____	Good Bad	Day-to-Day Major
91. Spending time/ relaxing/ going out with friends	_____	Good Bad	Day-to-Day Major
92. Death of a friend …	_____	Good Bad	Day-to-Day Major
93. Car trouble …..	_____	Good Bad	Day-to-Day Major
94. Death of a relative ….	_____	Good Bad	Day-to-Day Major
95. Abortion (or wife/ girlfriend having an abortion) …	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
96. Death of a family member …	_____	Good Bad	Day-to-Day Major
97. Vacation, trip or summer break …..	_____	Good Bad	Day-to-Day Major
98. Doing poorly on an exam or paper …..	_____	Good Bad	Day-to-Day Major
99. Minor physical ailments or illnesses (headaches, cuts bruises, etc)	_____	Good Bad	Day-to-Day Major
100. Recovering from an accident or illness …..	_____	Good Bad	Day-to-Day Major
101. Brother or sister getting engaged or married	_____	Good Bad	Day-to-Day Major
102. Brother or sister getting separated or divorced	_____	Good Bad	Day-to-Day Major
103. Homework or studying ….	_____	Good Bad	Day-to-Day Major
104. Pressures or expectations by parents	_____	Good Bad	Day-to-Day Major
105. Exercising …..	_____	Good Bad	Day-to-Day Major
106. Hassles, arguments or fights with other students	_____	Good Bad	Day-to-Day Major
107. Major success or failure in dance ….	_____	Good Bad	Day-to-Day Major
108. Major success or failure in non-dance extra-curricular activities (audiences, art, etc.)	_____	Good Bad	Day-to-Day Major
109. Discussions with parents	_____	Good Bad	Day-to-Day Major
110. Hassles with people of the opposite sex …..	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
111. Parents discovering something you didn't want them to know..	_____	Good Bad	Day-to-Day Major
112. Hobbies or activities (watching TV, reading, playing an instrument, etc.)	_____	Good Bad	Day-to-Day Major
113. Friends getting drunk or using drugs ….	_____	Good Bad	Day-to-Day Major
114. Parents getting divorced	_____	Good Bad	Day-to-Day Major
115. Going to church ….	_____	Good Bad	Day-to-Day Major
116. Not getting mail ….	_____	Good Bad	Day-to-Day Major
117. Not attending your high school graduation ..…	_____	Good Bad	Day-to-Day Major
118. Not getting enough sleep	_____	Good Bad	Day-to-Day Major
119. Not getting driver's license or learner's permit	_____	Good Bad	Day-to-Day Major
120. Not getting the courses you want …..	_____	Good Bad	Day-to-Day Major
121. Going to parties, dances or concerts …..	_____	Good Bad	Day-to-Day Major
122. Obligations at home ….	_____	Good Bad	Day-to-Day Major
123. Doing things/ spending time with family members ..	_____	Good Bad	Day-to-Day Major
124. Going to bed/ sleeping ..	_____	Good Bad	Day-to-Day Major
125. Understanding classes/ homework …..	_____	Good Bad	Day-to-Day Major
126. Not getting along with parents or friends ….	_____	Good Bad	Day-to-Day Major
127. Being unemployed …	_____	Good Bad	Day-to-Day Major
128. Menstruation …	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
129. Not having a boyfriend/ girlfriend …	_____	Good Bad	Day-to-Day Major
130. Negative feelings or worry about your appearance	_____	Good Bad	Day-to-Day Major
131. Negative feelings or worry about your personal health or fitness…	_____	Good Bad	Day-to-Day Major
132. Feeling pressed for time ..	_____	Good Bad	Day-to-Day Major
133. Getting a car/ motorcycle/ truck, etc, ……	_____	Good Bad	Day-to-Day Major
134. Getting good grades or progress reports …	_____	Good Bad	Day-to-Day Major
135. Getting ready for school	_____	Good Bad	Day-to-Day Major
136. Getting accepted at one or more university ….	_____	Good Bad	Day-to-Day Major
137. Getting a traffic ticket or parking ticket ….	_____	Good Bad	Day-to-Day Major
138. Waiting in queues, waiting for people, etc …	_____	Good Bad	Day-to-Day Major
139. Getting rejected by or not being able to attend university	_____	Good Bad	Day-to-Day Major
140. Getting punished by parents …	_____	Good Bad	Day-to-Day Major
141. Doing household chores	_____	Good Bad	Day-to-Day Major
142. Receiving a gift ….	_____	Good Bad	Day-to-Day Major
143. Attending school …	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
144. Financial troubles or money worries …	_____	Good Bad	Day-to-Day Major
145. Listening to music …	_____	Good Bad	Day-to-Day Major
146. Being involved in a car accident ….	_____	Good Bad	Day-to-Day Major
147. Returning to live at parents' home…	_____	Good Bad	Day-to-Day Major
148. Something bad happens to a friend….	_____	Good Bad	Day-to-Day Major
149. Attending your high school graduation ….	_____	Good Bad	Day-to-Day Major
150. Returning to school after time off ….	_____	Good Bad	Day-to-Day Major
151. Free time in school …	_____	Good Bad	Day-to-Day Major
152. Being in love or in a relationship …..	_____	Good Bad	Day-to-Day Major
153. Advancing a year in school …	_____	Good Bad	Day-to-Day Major
154. Something good happens to a friend ….	_____	Good Bad	Day-to-Day Major
155. Participation in non-dance extracurricular activities (audiences, arts, etc.)..	_____	Good Bad	Day-to-Day Major
156. Alcohol or drug use of family members or relatives	_____	Good Bad	Day-to-Day Major
157. Problems at work …	_____	Good Bad	Day-to-Day Major
158. Problems or arguments with parents, siblings or family members …	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
159. Problems or arguments with teachers or principal..	_____	Good Bad	Day-to-Day Major
160. Problems with transportation	_____	Good Bad	Day-to-Day Major
161. Changing schools …	_____	Good Bad	Day-to-Day Major
162. Sleeping late ….	_____	Good Bad	Day-to-Day Major
163. Emotional worries (feeling depressed, moody, angry, insecure, etc.) …	_____	Good Bad	Day-to-Day Major
164. Becoming a year older	_____	Good Bad	Day-to-Day Major
165. Spending time alone …	_____	Good Bad	Day-to-Day Major
166. Arguments or problems with boy/girlfriend …	_____	Good Bad	Day-to-Day Major
167. Becoming (or making) pregnant or having a child	_____	Good Bad	Day-to-Day Major
168. Spending time/ talking with boy/girl friend	_____	Good Bad	Day-to-Day Major
169. Becoming financially independent ….	_____	Good Bad	Day-to-Day Major
170. Spending time at home	_____	Good Bad	Day-to-Day Major
171. Becoming more independent	_____	Good Bad	Day-to-Day Major
172. Breaking up with or being rejected by a boy/girlfriend	_____	Good Bad	Day-to-Day Major
173. Arguments or fights between parents ….	_____	Good Bad	Day-to-Day Major
174. Drinking or drug use …	_____	Good Bad	Day-to-Day Major
175. Visiting a parent that doesn't live with you	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
176. Change in participation in non-dance extracurricular activities (audiences, arts, etc.)	_____	Good Bad	Day-to-Day Major
177. Change in sleep habits	_____	Good Bad	Day-to-Day Major
178. Making decisions about career ….	_____	Good Bad	Day-to-Day Major
179. Making a major purchase (stereo, bicycle, etc.)	_____	Good Bad	Day-to-Day Major
180. Change in cigarette use	_____	Good Bad	Day-to-Day Major
181. Friend becoming pregnant or having a child	_____	Good Bad	Day-to-Day Major
182. Family member or relative having emotional problems	_____	Good Bad	Day-to-Day Major
183. Change in privileges or responsibilities at home	_____	Good Bad	Day-to-Day Major
184. Change in health of a family member or relative	_____	Good Bad	Day-to-Day Major
185. Change in health of a friend ….	_____	Good Bad	Day-to-Day Major
186. Change in number of friends (make new friends or lose friends)	_____	Good Bad	Day-to-Day Major
187. People interrupting when you are trying to get work done….	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
188. School or career change or family member (drops out of school, gets job, etc)	_____	Good Bad	Day-to-Day Major
189. People not respecting your privacy or property	_____	Good Bad	Day-to-Day Major
190. Dating or doing things with people of the opposite sex	_____	Good Bad	Day-to-Day Major
191. Friend having emotional problems ….	_____	Good Bad	Day-to-Day Major
192. Trying to quit smoking	_____	Good Bad	Day-to-Day Major
193. Family members, relatives, step-parents move in or out of house	_____	Good Bad	Day-to-Day Major
194.Taking care of daily appearance and hygiene	_____	Good Bad	Day-to-Day Major
195.Family member becoming Pregnant or having a child	_____	Good Bad	Day-to-Day Major
196. Living with only one Parent …….	_____	Good Bad	Day-to-Day Major
197.Fight with or problems with a friend ….	_____	Good Bad	Day-to-Day Major
198. Doing well on an exam or paper …	_____	Good Bad	Day-to-Day Major
199. Holidays ….	_____	Good Bad	Day-to-Day Major

Sport Experiences Survey

The following life experiences relate to your participation in dance during the past 6 months. Please rate them as you have the other life experiences.

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
1. Participation in dance or recreation…..	_____	Good Bad	Day-to-Day Major
2. Major success or failure in dance	_____	Good Bad	Day-to-Day Major
3. Worry about dance performance	_____	Good Bad	Day-to-Day Major
4. Troubles with head dance director	_____	Good Bad	Day-to-Day Major
5. Chang to a new position	_____	Good Bad	Day-to-Day Major
6. Being moved to a higher performance status	_____	Good Bad	Day-to-Day Major
7. Being moved to a lower performance status	_____	Good Bad	Day-to-Day Major
8. Trouble with dance director	_____	Good Bad	Day-to-Day Major
9. Trouble with assistant dance director	_____	Good Bad	Day-to-Day Major
10. Major change in practicing hours or conditions	_____	Good Bad	Day-to-Day Major
11. Major change in responsibility on group	_____	Good Bad	Day-to-Day Major
12. Practicing or performance time lost due to illness	_____	Good Bad	Day-to-Day Major
13. Practicing or performance time lost due to injury	_____	Good Bad	Day-to-Day Major
14. Difficulties with dance director or group doctor	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
15. Academic ineligibility	_____	Good Bad	Day-to-Day Major
16. Increase in practicing time	_____	Good Bad	Day-to-Day Major
17. Decrease in practicing time	_____	Good Bad	Day-to-Day Major
18. Problems in demonstration your true ability	_____	Good Bad	Day-to-Day Major
19. Period of excellent performance	_____	Good Bad	Day-to-Day Major
20. Performance slump	_____	Good Bad	Day-to-Day Major
21. Strong criticism of you by dance director	_____	Good Bad	Day-to-Day Major
22. Praise from dance director for good performance	_____	Good Bad	Day-to-Day Major
23. Making a key play in a performance	_____	Good Bad	Day-to-Day Major
24. Key mistake that results in being poor a performance	_____	Good Bad	Day-to-Day Major
25. Change in dance director staff	_____	Good Bad	Day-to-Day Major
26. Getting to know new dance colleagues	_____	Good Bad	Day-to-Day Major
27. Change in dance company or school rules	_____	Good Bad	Day-to-Day Major
28. Trouble with dance manager	_____	Good Bad	Day-to-Day Major
29. Job or other responsibilities that conflict with practice or performance schedule	_____	Good Bad	Day-to-Day Major
30. Unattractive stage costumes	_____	Good Bad	Day-to-Day Major
31. Quitting a dance company or school	_____	Good Bad	Day-to-Day Major
32. Getting kicked off another dance company or school	_____	Good Bad	Day-to-Day Major

Experience	Happened in last 6 months?	Good or Bad?	"Day-to-Day" or "Major"
33. Loss of a dance colleague	_____	Good Bad	Day-to-Day Major
34. Poor locker room/shower facilities	_____	Good Bad	Day-to-Day Major
35. Student support of dancing	_____	Good Bad	Day-to-Day Major
36. Dancing for championship	_____	Good Bad	Day-to-Day Major
37. Losing a championship	_____	Good Bad	Day-to-Day Major
38. Likeable peers …….	_____	Good Bad	Day-to-Day Major
39. Hard-to-get-along-with peers ……..	_____	Good Bad	Day-to-Day Major
40. Lack of school support for dancing ……	_____	Good Bad	Day-to-Day Major
41. College recruiters …….	_____	Good Bad	Day-to-Day Major
42. Winning a letter …….	_____	Good Bad	Day-to-Day Major
43. Not being awarded a letter.	_____	Good Bad	Day-to-Day Major
44. Parents support for dancing participation.	_____	Good Bad	Day-to-Day Major
45. Teacher favouritism for dancers …..	_____	Good Bad	Day-to-Day Major
46. Teacher discrimination against dancers …….	_____	Good Bad	Day-to-Day Major
47. Poor practice facilities …..	_____	Good Bad	Day-to-Day Major
48. New techniques or routines	_____	Good Bad	Day-to-Day Major
49. Caught breaking a dancing rule …..	_____	Good Bad	Day-to-Day Major
50. Being liked by a teacher or a director …….	_____	Good Bad	Day-to-Day Major

Athletic Coping Skills Inventory-28

Name:_____

Directions:
A number of statements that dancers have used to describe their experiences are given below. Please read each statement carefully and then recall as accurately as possible how often you experience the same thing. There are no right or wrong answers. Do not spend too much time on any one statement.

0 - almost never 1 - sometimes 2 - often 3 - almost always

1. On a daily or weekly basis, I set very specific goals for myself that guide what I do. ( )
2. I get the most out of my talent and skills. ( )
3. When a director or manager tells me how to correct a mistake I've made, I tend to take it personally and feel upset. ( )
4. When I am practicing dance, I can focus my attention and block out distractions. ( )
5. I remain positive and enthusiastic during performance, no matter how badly things are going. ( )
6. I tend to perform better under pressure because I think more clearly. ( )
7. I worry quite a bit about what others think about my performance. ( )
8. I tend to do lots of planning about how to reach my goals. ( )
9. I feel confident that I will perform well. ( )
10. When a director or manager criticizes me, I become upset rather than helped.( )
11. It is easy for me to keep distracting thoughts from interfering with something I am watching or listening to. ( )
12. I put a lot of pressure on myself by worrying how I will perform. ( )
13. I set my own performance goals for each practice. ( )
14. I don't have to be pushed to practice or perform hard; I give 100%. ( )
15. If a director criticizes or yells at me, I correct the mistake without getting upset about it. ( )
16. I handle unexpected situations in my performance very well. ( )
17. When things are going badly, I tell myself to keep calm, and this works for me. ( )
18. The more pressure there is during a performance, the more I enjoy it. ( )
19. While performing, I worry about making mistakes or failing to come through.( )
20. I have my own performance plan worked out in my head long before the performance begins. ( )
21. When I feel myself getting too tense, I can quickly relax my body and calm myself. ( )
22. To me, pressure situations are challenges that I welcome. ( )
23. I think about and imagine what will happen if I fail or screw up. ( )
24. I maintain emotional control no matter how things are going for me. ( )
25. It is easy for me to direct my attention and focus on a single object or person. ( )
26. When I fail to reach my goals, it makes me try even harder. ( )
27. I improve my skills by listening carefully to advice and instruction form directors and managers. ( )
28. I make fewer mistakes when the pressure's on because I concentrate better. ( )

Sport Anxiety Scale

Name : _____

Reactions to Performances

A number of statements which dancers have used to describe their thoughts and feelings before or during performances are listed below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you usually feel prior to or during performance. Some dancers feel they should not admit to feelings of nervousness or worry, but such reactions are actually quite common, even among professional dancers. To help us better understand reactions to performance, we ask you to share your true reactions with us. There are, therefore, no right or wrong answers. Do not spend too much time on any one statement, but choose the answer which best describes how you commonly react.

How you usually feel prior to, or during performance

Statement:		*Not At All*	*Somewhat*	*Moderately So*	*Very Much So*
1.	I feel nervous.	1	2	3	4
2.	During performance I find myself thinking about unrelated things.	1	2	3	4
3.	I have self-doubts.	1	2	3	4
4.	My body feels tense.	1	2	3	4
5.	I am concerned that I may not do as well in performance as I could.	1	2	3	4
6.	My mind wanders during performance.	1	2	3	4
7.	While performing, I often do not pay attention to what's going on.	1	2	3	4
8.	I feel tense in my stomach.	1	2	3	4
9.	Thoughts of doing poorly interfere with my concentration during performance.	1	2	3	4
10.	I am concerned about choking under pressure.	1	2	3	4
11.	My heart races.	1	2	3	4
12.	I feel my stomach sinking.	1	2	3	4
13.	I'm concerned about performing poorly.	1	2	3	4
14.	I have lapses in concentration during performance because of nervousness.	1	2	3	4
15.	I sometimes find myself trembling before or during performance.	1	2	3	4
16.	I'm worried about teaching my goal.	1	2	3	4
17.	My body feels tight.	1	2	3	4
18.	I'm concerned that others will be disappointed with my performance.	1	2	3	4
19.	My stomach gets upset before or during performance.	1	2	3	4
20.	I'm concerned I won't be able to concentrate.	1	2	3	4
21.	My heart pounds before performance	1	2	3	4

SOCIAL NETWORK Code _____

I would like to ask you some questions about the people who are important to you in your DAY-TO-DAY life. These include patents, friends, teachers, artistic directors, other dancers, etc.

1. **Caring and emotional support**

There may be people in your life who provide you with caring and emotional support. These are people you can count on to care about you, regardless of what is happening to you, and who accept you totally, including your good and bad points. They are ready to help and support you when you are upset, and they are genuinely concerned about your feelings and welfare.

Please rate each of the people below in terms of how helpful they would be in providing you with caring and emotional support if you needed it. Circle the appropriate number to indicate your rating, or place an X to indicate people who are not part of your social network.

	Do not have or rarely see	Not at all helpful		Somewhat helpful		Very helpful
1. Father		1	2	3	4	5
2. Mother		1	2	3	4	5
3. Step-father		1	2	3	4	5
4. Step-mother		1	2	3	4	5
5. Brothers, sisters		1	2	3	4	5
6. Other relatives (grandparents, aunts, uncles, cousins, etc.)		1	2	3	4	5
7. Teachers		1	2	3	4	5
8. School counsellor		1	2	3	4	5
9. School Principal or Assistant Principal		1	2	3	4	5
10. Best adult friend		1	2	3	4	5
11. Clergy (priest, church pastor, rabbi)		1	2	3	4	5
12. Best friend		1	2	3	4	5
13. Boyfriend/girlfriend/spouse		1	2	3	4	5
14. Directors of PNB		1	2	3	4	5
15. Ballet mistresses		1	2	3	4	5
16. Closest dance colleague		1	2	3	4	5
17. Other dance colleagues		1	2	3	4	5
18. Company manager		1	2	3	4	5
19. Stage manager		1	2	3	4	5
20. Stage crew		1	2	3	4	5

Appendix C: Consent Form Study 2

Consent Form for Participants in Project on Stress and Coping in Ballet Dancers

INFORMATION TO PARTICIPANTS:

I would like to invite you to be a part of a study investigating stress and coping in ballet dancers. Dancers frequently experience injuries, which produce substantial financial and emotional costs to the individual and the community. Identification of physical factors associated with injuries in dance has not significantly reduced the frequency of dance injuries (Krasnow, Kerr, & Mainwaring, 1994). Psychological factors are likely to play a part, as they have been shown to affect the incidence of injuries in the similar performance context of sport (Williams & Andersen, 1998). This study will identify the major sources of stress ballet dancers experience in dance environment and how they cope with the stress. Finding out what is stressful and how dancers cope will help us to develop ways to assist dancers in their management of the stress of elite level practice and performance.

CERTIFICATION BY SUBJECT

I**,** _____ of _____

(name) (address)

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study entitled: **Stress and Coping in Ballet Dancers**, being conducted at Victoria University of Technology by **Ms. Young-Eun Noh, Professor Tony Morris, and Associate Professor Mark Andersen.**

I certify that the objectives of the study, together with any risks to me associated with the procedures listed hereunder to be carried out in the study, have been fully explained to me by Young-Eun Noh and that I freely consent to participation involving these procedures**.**

PROCEDURES

As a participant in this study, you will be requested to take part in an interview, lasting 30-40 minutes, which gives you the opportunity to talk about sources of stress that you experience and coping skills that you deal with the stress. The interview will focus on the major causes of stress, the ways you handle these stressful experiences and the effectiveness of the ways you cope. Questions will cover topics such as your history of involvement in dance, and stress and coping. The interview will be audio-taped. You will also be requested to complete a series of five questionnaires, lasting 30-40 minutes altogether. The questionnaires cover major and minor sources of stress in your life, how anxious you generally feel, how you cope with the stress that you experience, what kinds of support you receive from people around you, and your previous injuries. There are no right or wrong answers to these measures; they just reflect your own experience. The questionnaires will be completed on a different day from the interview.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardize me in any way.

I have been informed that the information I provide will be kept confidential.

Signed: .....…. Date: .....…….....……..

Witness other than the researcher: .....…….

Any queries about your participation in this project may be directed to the researchers: Ms. Young-Eun Noh 03-9688-4066 and Professor Tony Morris 03-9688-5035. If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MC, Melbourne, 8001 (Telephone no: 03-9688-4710).

Appendix D: Consent Form Study 3 (Screening)

Intervention for Prevention of Dance Injury
Consent Form for Participants Involved in Research

INFORMATION TO PARTICIPANTS

I would like to invite you to be a part of a study investigating how you handle stress and injury in dance. Dancers frequently experience injuries, which produce substantial financial and emotional costs to the individual and the community. Identification of physical factors associated with injuries in dance has not significantly reduced the frequency of dance injuries (Krasnow, Kerr, & Mainwaring, 1994). Psychological factors are likely to play a part, as they have been shown to affect the incidence of injuries in the similar performance context of sport (Williams & Andersen, 1998). In this study, I will measure how you handle stress and your history of injury.

CERTIFICATION BY PARTICIPANT

I, _____ of _____

(name) (address)

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study entitled: **Intervention for Prevention of Dance Injury**, being conducted at Victoria University of Technology by **Ms. Young-Eun Noh, Professor Tony Morris, and Associate Professor Mark Andersen.**

I certify that the objectives of the study, together with any risks to me associated with the procedures listed hereunder to be carried out in the study, have been fully explained to me by **Young-Eun Noh** and that I freely consent to participation involving these procedures.

PROCEDURES

As a participant in this study, you will be requested to complete a 28-item questionnaire on ways you cope with stress (5-10 minutes) and a brief survey of your previous injuries (about 5 minutes).

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed: .....…. Date: .....…….....……..

Witness other than the researcher: .....…….

Any queries about your participation in this project may be directed to the researchers: Ms. Young-Eun Noh 03-9688-4066 and Professor Tony Morris 03-9688-5035. If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MC, Melbourne, 8001 (Telephone no: 03-9688-4710).

Appendix E: Consent Form Study 3 (Broad-Based Coping Skills Group)

Intervention for Prevention of Dance Injury
Consent Form for Participants Involved in Research

INFORMATION TO PARTICIPANTS

I would like to invite you to be a part of a study investigating how you handle stress and injury in dance. Dancers frequently experience injuries, which produce substantial financial and emotional costs to the individual and the community. Identification of physical factors associated with injuries in dance has not significantly reduced the frequency of dance injuries (Krasnow, Kerr, & Mainwaring, 1994). Psychological factors are likely to play a part, as they have been shown to affect the incidence of injuries in the similar performance context of sport (Williams & Andersen, 1998). In this study, I will measure how you handle stress. The study will then monitor injuries for one year.

CERTIFICATION BY PARTICIPANT

I, _____ of _____

(name) (address)

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study entitled: **Intervention for Prevention of Dance Injury**, being conducted at Victoria University of Technology by **Ms. Young-Eun Noh, Professor Tony Morris, and Associate Professor Mark Andersen**.

I certify that the objectives of the study, together with any risks to me associated with the procedures listed hereunder to be carried out in the study, have been fully explained to me by **Young-Eun Noh** and that I freely consent to participation involving the use on me of these procedures.

PROCEDURES

You will take part in an intervention program (Broad-Based Coping Skills), for 48 weeks. The Broad-Based Coping Skills intervention includes telling yourself that you can handle the stress of practicing and performance effectively, picturing yourself handling that stress well, seeing the positive side of stressful situations and doing a relaxation technique (Autogenic Training). You will train three times a week for 12 weeks under instruction. Then, you will be requested to practice the Broad-Based Coping Skills intervention three times a week for another 36 weeks. During the period of the Broad-Based Coping Skills intervention practice, you will keep a diary logging practice of the Broad-Based Coping Skills intervention. During the whole period, I will monitor any injuries you experience that affect your practice and/or performance. After 48 weeks, you will be asked to complete the coping questionnaire.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed: .....…. Date: .....…….....……..

Witness other than the researcher: .....…….

Any queries about your participation in this project may be directed to the researchers: Ms. Young-Eun Noh 03-9688-4066 and Professor Tony Morris 03-9688-5035. If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MC, Melbourne, 8001 (Telephone no: 03-9688-4710).

Appendix F: Consent Form Study 3 (Autogenic Training Group)

Intervention for Prevention of Dance Injury
Consent Form for Participants Involved in Research

INFORMATION TO PARTICIPANTS

I would like to invite you to be a part of a study investigating how you handle stress and injury in dance. Dancers frequently experience injuries, which produce substantial financial and emotional costs to the individual and the community. Identification of physical factors associated with injuries in dance has not significantly reduced the frequency of dance injuries (Krasnow, Kerr, & Mainwaring, 1994). Psychological factors are likely to play a part, as they have been shown to affect the incidence of injuries in the similar performance context of sport (Williams & Andersen, 1998). In this study, I will measure how you handle stress. The study will then monitor injuries for one year.

CERTIFICATION BY PARTICIPANT

I, _____ of _____

(name) (address)

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study entitled: **Intervention for Prevention of Dance Injury**, being conducted at Victoria University of Technology by **Ms. Young-Eun Noh, Professor Tony Morris, and Associate Professor Mark Andersen.**

I certify that the objectives of the study, together with any risks to me associated with the procedures listed hereunder to be carried out in the study, have been fully explained to me by **Young-Eun Noh** and that I freely consent to participation involving these procedures.

PROCEDURES

You will take part in an intervention program (Autogenic Training), for 48 weeks. AT (Autogenic Training) is a relaxation technique. AT is based on six hierarchical stages, which should be followed in order: a) heaviness in the arms and legs, b) warmth in the arms and legs, c) regulation of heart beat, d) regulation of breathing, e) abdominal warmth and f) cooling of the forehead. You will train three times a week for 12 weeks under instruction. Then, you will be requested to practice the AT three times a week for another 36 weeks. During the whole period of AT practice, you will keep a diary logging practice of the AT technique and I will monitor any injuries you experience that affect your practice and performance. After 48 weeks, you will be asked to complete the coping questionnaire.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed: .....…. Date: .....…….....……..

Witness other than the researcher: .....…….

Any queries about your participation in this project may be directed to the researchers: Ms. Young-Eun Noh 03-9688-4066 and Professor Tony Morris 03-9688-5035. If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MC, Melbourne, 8001 (Telephone no: 03-9688-4710).

Appendix G: Consent Form Study 3 (Control Group)

Intervention for Prevention of Dance Injury
Consent Form for Participants Involved in Research

INFORMATION TO PARTICIPANTS

I would like to invite you to be a part of a study investigating how you handle stress and injury in dance. Dancers frequently experience injuries, which produce substantial financial and emotional costs to the individual and the community. Identification of physical factors associated with injuries in dance has not significantly reduced the frequency of dance injuries (Krasnow, Kerr, & Mainwaring, 1994). Psychological factors are likely to play a part, as they have been shown to affect the incidence of injuries in the similar performance context of sport (Williams & Andersen, 1998). In this study, I will measure how you handle stress. The study will then monitor injuries for one year.

CERTIFICATION BY PARTICIPANT

I, _____ of _____

(name) (address)

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study entitled: **Intervention for Prevention of Dance Injury**, being conducted at Victoria University of Technology by **Ms. Young-Eun Noh, Professor Tony Morris, and Associate Professor Mark Andersen**.

I certify that the objectives of the study, together with any risks to me associated with the procedures listed hereunder to be carried out in the study, have been fully explained to me by **Young-Eun Noh** and that I freely consent to participation involving these procedures.

PROCEDURES

You will log your activities in regular training for 48 weeks. During the whole period, I will monitor any injuries you experience that affect your practice and/or performance. After 48 weeks, you will be asked to complete the coping questionnaire.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed: .....…. Date: .....…….....……..

Witness other than the researcher: .....…….

Any queries about your participation in this project may be directed to the researchers: Ms. Young-Eun Noh 03-9688-4066 and Professor Tony Morris 03-9688-5035. If you have any queries or complaints about the way you have been treated, you may contact the Secretary, University Human Research Ethics Committee, Victoria University of Technology, PO Box 14428 MC, Melbourne, 8001 (Telephone no: 03-9688-4710).

Appendix H: Injury Form

Injury in Dance

☺ **Name of Dancer : _____**

Injury in Dance

Code: _____

Instruction. Please complete an injury form each day that a dancer is unable to practice or has to modify their practice because of injury.

Date	Nature of Injury	Practice Today? No practice □ Modified □	Modification

Appendix I: Autogenic Training Script

Autogenic Training Script

Get yourself into a nice, comfortable position, settle back
Take a couple of nice deep breaths, take it in & out. Take another deep breath in & out And feel yourself beginning to relax, feel yourself letting go as you continue to breath Feel yourself relaxing as you now focus, very keenly, on your right arm
And say to yourself over and over, inside your head
My right arm is heavy (repeat three times)
And feel the heaviness spread throughout your right arm into your shoulder
My right arm is heavy (repeat three times)
And feel you right arm comfortably sinking
My right arm is heavy (repeat three times)
And that heaviness will continue to grow, as you now move your attention from your right arm to your left arm, and say to yourself

My left arm is heavy (repeat three times)
And feel the heaviness spread from your left arm and into your shoulder
My left arm is heavy (repeat three times)
And feel your left arm comfortably sinking
My left arm is heavy (repeat three times)
And say to yourself

Both my arms are heavy (repeat three times)
And feel the heaviness spread throughout your arms and into your shoulders
Both my arms are heavy (repeat three times)
And feel your arms comfortably sinking
Both my arms are heavy (repeat three times)
And that heaviness will continue to grow, as you now move your attention from your arms to your right leg, and say to yourself

My right leg is heavy (repeat three times)
And feel that heaviness spread from your right leg and into your hip
My right leg is heavy (repeat three times)
And feel your right leg comfortably sinking
My right leg is heavy (repeat three times)
And that heaviness will continue to grow, as you now move your attention from your right leg to your left leg, and say to yourself

My left leg is heavy (repeat three times)
And feel the heaviness spread from your left leg and into your hip
My left leg is heavy (repeat three times)
And feel your left leg comfortably sinking
My left leg is heavy (repeat three times), and say to yourself

Both my legs are heavy (repeat three times)

And feel that heaviness spread throughout your legs and into your hips
Both my legs are heavy (repeat three times)
And feel your legs comfortably sinking
Both my legs are heavy (repeat three times), and say to yourself
My arms and legs are heavy (repeat three times)
And feel that heaviness spread throughout your arms and shoulders, legs and hips
My arms and legs are heavy (repeat three times)
And feel your arms and legs comfortably sinking
My arms and legs are heavy (repeat three times)
And that heaviness will continue to grow, as you now move your attention once again to your right arm, and say to yourself over and over

My right arm is warm (repeat three times)
And feel the warmth spread throughout your right arm and into your shoulder
My right arm is warm (repeat three times)
And feel the fresh warm blood flowing into your right arm
My right arm is warm (repeat three times)
And that warmth will continue to grow, as you now move your attention from your right arm to your left arm, and say to yourself

My left arm is warm (repeat three times)
And feel the warmth spread throughout your left arm and into your shoulder
My left arm is warm (repeat three times)
And feel the fresh warm blood flowing into your left arm
My left arm is warm (repeat three times)

And say to yourself
Both my arms are warm (repeat three times)
And feel the warmth spread throughout both your arms and into your shoulders
Both my arms are warm (repeat three times)
And feel the fresh warm blood flowing into your arms
Both my arms are warm (repeat three times)
And that warmth will continue to grow, as you now move your attention from your arms down again to your right leg, say to yourself

My right leg is warm (repeat three times)
And feel the warmth spread from your right leg and into your hip
My right leg is warm (repeat three times)
And feel the fresh warm blood flowing into your right leg
My right leg is warm (repeat three times)
And that warmth will continue to grow, as you now move your attention from your right leg to your left leg, and say to yourself

My left leg is warm (repeat three times)
And feel the warmth spread from your left leg and into your hip
My left leg is warm (repeat three times)
And feel the fresh warm blood flowing into your left leg
My left leg is warm (repeat three times)

And say to yourself
Both my legs are warm (repeat three times)
And feel the warmth spread throughout both your legs and into your hips
Both my legs are warm (repeat three times)
And feel the fresh warm blood flowing into your legs
Both my legs are warm (repeat three times)

And say to yourself
My arms and legs are warm (repeat three times)
And feel the warmth spread throughout your arms and shoulders, legs and hips
My arms and legs are warm (repeat three times)
And feel the fresh warm blood flowing into your arms and legs
My arms and legs are warm (repeat three times)

And say to yourself
My arms and legs are warm and heavy (repeat three times)
And feel the warmth and heaviness spread
My arms and legs are warm and heavy (repeat three times)
And feel the warmth and heaviness grow
My arms and legs are warm and heavy (repeat three times)
And that warmth and heaviness will continue to grow, as you now move your attention to your heart

Feel your heart beat
Maybe you feel it in your chest or down your legs, as you say to yourself
My heartbeat is calm and regular (repeat three times)
Feel your heart beat
My heartbeat is calm and regular (repeat three times)
Feel the strong and steady beat
My heartbeat is calm and regular (repeat three times)
And that strong, steady beat will continue, as you now just notice your breathing

Feel your chest rising up and falling down of its own accord
Easy, effortless breathing, as you say to yourself
It breathes me (repeat three times)
Like the air is being pushed into you and pulled out of you, you are passive
It breathes me (repeat three times)
Easy effortless breathing like you have nothing to do with it
It breathes me (repeat three times)
And the effortless breathing will continue, as you now focus on your solar plexus, and say to yourself

My solar plexus is warm (repeat three times)
And feel the warmth radiating out in all directions, just like a sunburst
My solar plexus is warm (repeat three times)
And feel the warmth radiating out
My solar plexus is warm (repeat three times)

And feel the warmth growing, as you now move your attention from your solar plexus to your forehead, and say to yourself

My forehead is cool (repeat three times)
And feel it like a nice cool breeze
My forehead is cool (repeat three times)
Just like a cool breeze
My forehead is cool (repeat three times)
And now that you have relaxed go ahead now and put pictures inside your head of what you wanted to see today, what you wanted to do, how you wanted to feel…run the pictures that you have planned today and enjoy yourself.

Appendix J: Daily Log of Reactions to Practice of Autogenic Training

Daily Log of Reactions to Practice of Autogenic Training

Code:_________________

- Please indicate when you practiced Autogenic Training in the space provided below.

Date	How long?	When?
e.g. 12/03/02	**20 minutes**	**Before practice**

Appendix K: Script for Dancers to Practice Imagery

Script for Dancers to Practice Imagery

General Instructions

I'd like to invite you to do imagery, which is when you imagine a scene, skills, or performance in your mind. In this study, I will imagine about 4 main categories such as concentration, confidence and achievement motivation, cocahablility, and coping with adversity. This imagery will help you to cope with stress and improve your confidence, focus on your movements, and maintain emotional control. It will take about 2 minutes to imagine specific situations and you will be asked to keep log of imagery. You can practice whenever you want, but you will be asked to practice at least three times a week.

Specific Instructions

When you image the skills or specific situations, try to experience all the senses associated with that skills or situations such as the sounds, sights, smell, touch and feelings in your muscles. Try to imagine the activity at real speed, so not in slow or at a faster speed. Try to make the images as vivid, clear and realistic as you can. Also image yourself performing the skills successfully. Do you have any questions before you begin your imagery?

OK, are you ready?

Concentration

Close your eyes with a comfortable mind. Take a deep breath, in with your nose and out with your mouth (repeat). Imagine you are an elite dancer in a National Ballet Company. You have a Swan Lake performance today. Many people have come to see your performance in the National Theatre of Korea. The audience is silent. You are a white swan. Now, you can hear the music and you concentrate on the music and the feeling of your heart beating. You walk forward to the centre of

the stage with a smile. You are in the centre with your partner. You concentrate on your movements and start to dance with your partner. Now, you concentrate on expressing sad feeling with smooth movements, because you have to leave the prince (your partner). You can also hear the very sad music and you perform an arabesque with your partner. You balance on your right leg, focusing on your partner's eyes. You and your partner start to turn and jump like a swan without any distractions and your focus is on your partner and your movements while hearing the music. You can feel your breathing and muscles moving. Your performance is absolutely perfect. Many people stand up and applaud. You and your partner bow in recognition to the audience.

Confidence and Achievement Motivation

Close your eyes with a comfortable mind. Take a deep breath, in with your nose and out with your mouth (repeat). Imagine you are the best student in this class. You learn a new technique such as arabesque today. A director shows the students how to do this technique. You observe the movements and feelings very carefully. You see the director’s arms and legs and eye positions and feel that you can learn this new technique. You balance by lifting the left leg no higher than 45 degrees and your right arm is in front of your shoulder at eye level. When your left leg lifts, you can feel the stretch in your right leg. You practice the technique many times with rhythm and are learning it quickly of your ability to perform the technique. You feel confident that you can do this like a professional. You learn it quicker than the other students. The director asks you to show this technique in front of the other students. You feel confident and you do very well. The director commends you and asks you to teach this technique to the students who are having difficulty learning the new technique.

Coachability

Close your eyes with a comfortable mind. Take a deep breath, in with your nose and out with your mouth (repeat). Imagine you have a performance in Gwangju theatre at 7 PM today. Now you practice dance and prepare rehearsal. At the beginning, you are nervous and you can feel the beating of the heart. Your heart

beats fast and you are afraid of making mistakes. As you dance, you make some mistakes. A director notices your mistakes and immediately yells at you with a microphone. You are embarrassed and you forget the next movements. However, you try to tell yourself to keep calm. You think to yourself " Everyone makes mistakes, I am only a learner and I think I can correct my mistakes". You work hard at correcting the mistakes and during the performance, you perform very well and you know how to correct your mistakes.

Coping with Adversity

Close your eyes with a comfortable mind. Take a deep breath, in with your nose and out with your mouth (repeat). Imagine you have a performance today. You have practiced everyday and you have invited your parents and your friends to this performance. When it is your turn, you smile and walk to the centre. You can feel your heart racing. You are very nervous. The music starts and you begin dancing in the spotlight. You try to turn 10 times without stopping. Your eyes focus to the front. Your arms round in front of the middle of your torso at the bottom of your sternum, your finger-tips almost touching during the turn. But during the performance, you slip and fall down on the stage. Everyone is surprised. Initially you are upset but you try to remain calm without any getting too embarrassed. You need to continue dancing without focussing on the fall. The music is still going on. You stand up and start to dance with a smile. You focus on the next movements without thinking about the fall. You can maintain emotional control until you have finished your performance. After finishing your dance, many people give you hearty cheers.

Appendix L: Daily Log of Reactions to Practice of Imagery

Daily Log of Reactions to Practice of Imagery

Code:_________________

- Please indicate when you practiced Imagery in the space provided below.

Date	**How long?**	**What kinds of imagery did you use?**	**When?**
e.g. 12/03/02	**2 minutes**	**Concentration imagery**	**After practice**

Appendix M: Script for Dancers to Practice Self-talk

Script for Dancers to Practice Self-talk

General Instructions

I'd like to invite you to think positive self-talk, which is to think positively in your mind. In this study, I will practice about 4 main categories such as concentration, confidence and achievement motivation, coachablility, and coping with adversity. This self-talk will help you to cope with stress and improve your confidence, focus on your movements, and maintain emotional control. You will be asked to keep log of self-talk. You can practice whenever you want, but you will be asked to practice at least three times a week.

Specific Instructions

When you say something to yourself, try to think very positively and believe what you say something. Try to say at real speed, so not in slow or at a faster speed. Try to practice as many as you can. Do you have any questions before you begin self-talk? OK, are you ready? Prepare yourself, get comfortable, focus on what you say to yourself. Now start to say about this sentence.

Concentration

1. I can focus my attention to practice dance without any distractions.
2. It is easy for me to concentrate my movements during practice and performance.

Confidence and Achievement Motivation

1. I can dance even difficult techniques.
2. I feel confident that I will practice well.

Coachability

1. I can keep dancing without becoming upset when a director yells me.
2. I can correct the mistakes without becoming upset when a director points out my mistakes.

Coping with Adversity

1. I can keep calm when things are going badly.
2. I can maintain emotional control no matter what happens.

Appendix N: Daily Log of Reactions to Practice of Self-talk

Daily Log of Reactions to Practice of Self-talk

Code:_________________

- Please indicate when you practiced Self-talk in the space provided below.

Date	**How many times?**	**What kinds of self-talk did you use?**	**When?**
e.g.12/03/02	**3 times**	**Concentration self-talk**	**Before bed**

Appendix O: Daily Log of Regular Practice Dance

Daily Log of Regular Practice Dance

Code:_________________

- Please indicate when you practiced dance in the space provided below.

Date	**How long?**
e.g. 12/03/02	**50 minutes**