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Using imagery to predict self-confidence and anxiety in young elite athletes

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Using Imagery to Predict Self-Confidence and Anxiety in Young Elite Athletes

By

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Abstract

As elite sport participation by children is growing (Smoll & Smith, 1996), it is important to study the psychological development of these athletes. Imagery is one strategy that may be used by young athletes in controlling arousal levels in competition (Weiss, 1991). Although there has been a great deal of research examining the use of imagery by adult athletes (Hall, 2001), there have been fewer studies investigating how imagery is related to competitive anxiety and self-confidence in young elite athletes (c.f., Vadocz et al., 1997). The purpose of this study was to examine how much imagery use predicts self-confidence and anxiety in young elite athletes through the development of a more child-centered measurement tool for imagery use. Participants were recruited from the national baton twirling championships in Canada and the USA. The sample consisted of 76 female athletes between the ages of 7-15 years. Athletes were divided into two age cohorts: 7-11 years and 12-15 years. A modified version of the Sport Imagery Questionnaire (SIQ; Hall et al., 1998) and the Competitive State Anxiety Inventory 2 for Children (CSAI-2C; Stadulis et al., 2002) were given to each participant prior to competition. Results indicated there were some developmental differences between the two age cohorts in imagery use, self-confidence, and anxiety. Stepwise multiple regression analyses found that MG-M imagery and MG-A imagery were significant predictors of self-confidence in both age cohorts. When cognitive anxiety was examined, MS and MG-A imagery were significant predictors for the 7-11 age cohort, whereas MS and MG-M imagery were significant predictors for the 12-15 age cohort. Moreover, CS imagery predicted somatic anxiety in the 7-11 age cohort. Multivariate analysis revealed significant differences between the imagery, self-confidence, and anxiety subscales in the

2 age cohorts. The 7-11 age cohort reported more frequent use of motivational imagery, lower levels of cognitive anxiety, and higher confidence than the 12-15 age cohort. Results from this study could help in developing more effective imagery interventions with young elite athletes from a developmental perspective. Modifying images could help them cope with the pressures of competing at a young age and build confidence.

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Introduction

A child's level of sport participation can range from a recreational to elite sport structure. However, the demands placed on children who participate at these levels are very different. Young elite athletes are more aware of the physical, competitive, and social consequences associated with intense participation in one sport than young athletes who are not focused intently on one sport (Feltz & Ewing, 1987). Intense participation in a sport is often described as specialization, which is defined as "the deliberate advancement of systematic training and planned competition with the specific goal of guiding the child, on a long-term basis, to top achievement in sport" (Grupe, 1985, p. 9). Specialization is a term that can also be applied to the concept of deliberate practice. Ericsson, Krampe, and Tesch-Römer (1993) defined deliberate practice as activities that are designed to advance the existing level of performance. Deliberate practice demands a great deal of time, energy and motivation. If success is to be attained, a child must engage in this type of practice. The authors also found that elite performers spend more time on deliberate practice than other performers or athletes and, moreover, if an individual begins deliberate practice at a young age, he/she will achieve higher levels of performance. Hoffman (1986) states, "modern athletic competition necessitates an extreme amount of grueling hours of practice, dedication and firm commitment to flawless performance" (p. 391).

There are many demands placed on children who are elite athletes, which include intense development of skill, physical body demands and time constraints (Nash, 1987). Although the greatest and most obvious benefits of specialization for young athletes are the acquisition, development and proficiency of motor skills related to the specific sport,

a serious concern is the impact of high intensity sport on the psychological development of children (Wiersma, 2000).

Children participate in sport for a variety of reasons. These reasons, ranked in order of importance, include: 1) to have fun, 2) to improve skills and learn new ones, 3) to be with friends and make new ones, 4) for the challenge and excitement of competition, 5) to succeed or win, and 6) to exercise or become fit (Coetzee & Viljoen, 2002; Daley & O'Gara, 1998; Gould, Feltz, & Weiss, 1985). Although research has found that fun is high on the list of reasons for participation for non-competitive children, this is not the case for young elite athletes. In a study done with young elite gymnasts, fun was not even ranked in the top ten reasons for their participation (Klint & Weiss, 1986). Their study examined participation motives for gymnasts in various sport structures (i.e., competitive, recreational and retired athletes). Competence, fitness, and challenge were the primary reasons for participation for the competitive gymnasts. In another study comparing young elite hockey players and non-competitive players, motives for participation were more achievement oriented (i.e., emphasis on winning) for those who were elite athletes (Feltz, 1986). For participants at the elite level, success and winning are emphasized and, therefore, specific concerns may exist for this population such as increased pressure and anxiety. Cognitive differences between young child athletes and older adolescent athletes may lead to a difference in their view of competitive situations and cognitive strategies used to cope. Although imagery has been widely researched in adult populations, few studies of examined the relationship of imagery and anxiety in young elite athletes (Vadocz, Hall, & Moritz, 1997). However, results have found that motivational general-mastery (MG-M) imagery is a significant

predictor of self-confidence and that motivational general-arousal (MG-A) imagery is a significant predictor of cognitive anxiety. As imagery has been used as a successful coping strategy for children, the aim for the present study is to further examine the relationship between imagery, self-confidence and anxiety in young elite athletes, more specifically, from a developmental perspective.

Literature Review

Children and Sport Participation

The participation of young children in elite sport is growing (Smoll & Smith, 1996). This growth is due, in part, to the fame and fortune that talented athletes can obtain regardless of age. These talented young athletes often may experience anxiety due to a variety of sources such as media, parents, and coaches (Nash, 1987). However, child athletes have been found to use a variety of coping strategies to help them through stressful situations. Weiss (1991) commented that relaxation and imagery are key strategies for young athletes, and also remarked that goal setting is very important in controlling anxiety. Li-Wei, Qi-Wei, Orlick, and Zitzelsberger (1992) examined the coping strategies used by 7 to 10 year old table tennis athletes and found that imagery techniques and relaxation techniques were the coping strategies most used. Other researchers have concluded that exercise itself is effective in reducing anxiety in children as physical activity may be a release for some children (Lariviere & Sydney, 1992). However, due to the nature of competitive sport situations, feelings of tension and frustration often lead to anxiety (Kraft & McNeil, 1985) thereby making physical activity a hindrance to anxiety reduction.

In contrast, some athletes develop improper coping strategies. Nash (1987) suggested that children who are under pressure may show many different physical ailments ranging from headaches to physical injuries. Moreover, Nash noted that many children realize that injury is an acceptable alternative to competition. If a child is injured, he/she can still feel like part of the team without any of the responsibility for the outcome and injury is then used as a coping strategy to escape the anxiety of competition. Due to inexperience in relation to the development of coping strategies, young athletes may exit sport due to external pressure (i.e., coaches, parents, pressure of competition), thereby no longer enjoying the sport they once loved (De Knop, Skirstad, Engstroem, & Weiss, 1996).

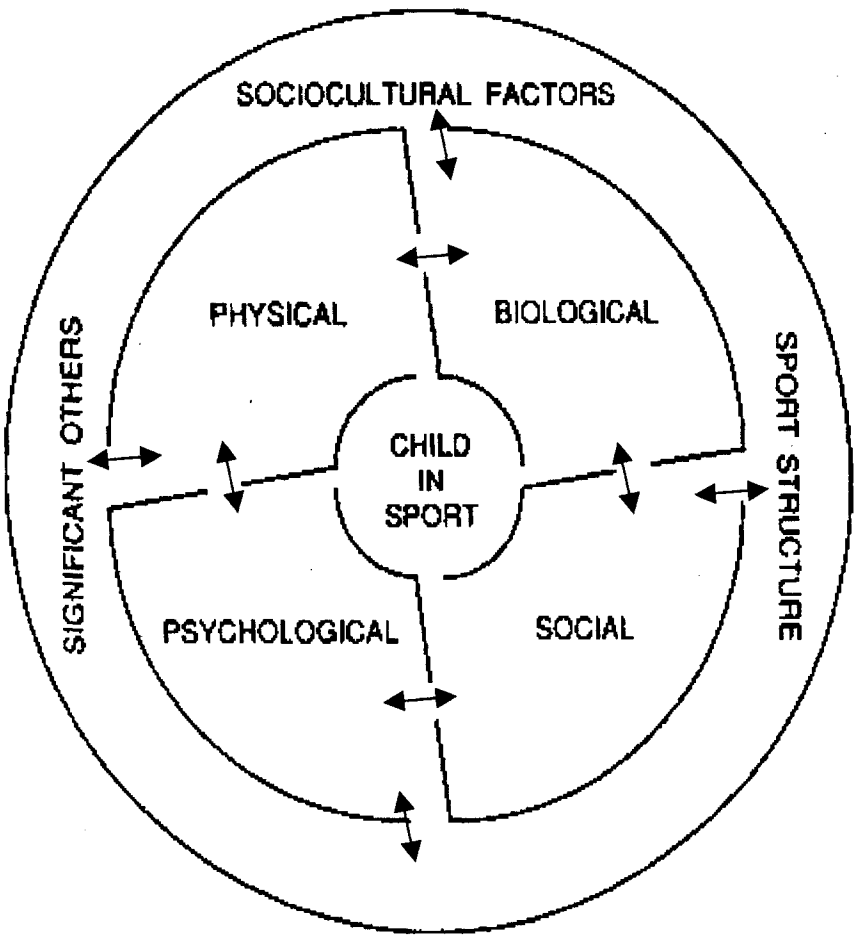
Although anxiety can be construed as negative experiences sometimes associated with sport, it is important to note that there are benefits cited regarding children's involvement in sport at an elite level. Some of these aspects include physical (e.g., motor skills, endurance, coordination) and sociological (e.g., development of cooperative skills, communication skills, formation of deep relationships with other adults) advancements (Wiersma, 2000). In addition, the development of stress management techniques such as relaxation that will help children in sport and throughout life (Gould, Wilson, Tuffey, & Lochbaum, 1993), and the ability to develop balance between school and sport lives (Brettschneider, 1999) are some benefits.

Wheel of Child Development

In an attempt to understand children's participation in sport, Weiss (1991) developed the 'Wheel of Child Development' (see Figure 1). This model considers the psychological, biological, social and physical influences that a child experiences within a

Figure 1

Wheel of Child Development (adapted from Weiss, 1991)



sports context. The innermost circle is labelled 'child in sport' and is surrounded by a circle representing individual factors. These factors contribute to whether a child's sport experience is positive or negative. Each area (i.e., physical, biological, social, and psychological) must be in balance for a positive experience to ensue. For example, a child may be physically ready and able to take the next step (i.e., the athlete can already execute a triple lutz in figure skating) but his/her social skills (i.e., interactions with peers) may be quite low. This combination may lead to problems as the child may experience social isolation or rejection even though he/she may be physically strong enough to handle the demands of the sport.

The outer circle represents social contextual factors that may influence a child in sport. These include significant others (i.e., parents, friends), sociocultural factors (i.e., race, ethnicity) and the sport structure (i.e., competitive, recreational). Therefore, the child's experience with sport is "not only influenced by biological and psychological attributes per se but also the *social context* in which these experiences occur" (Weiss, p. 338). Moreover, the Wheel is an open system; this means that interactions can occur among factors and between factors. Different factors interact to shape a child's experiences. These constant interactions help a child learn about him/herself and can help to enhance confidence. The involvement of a child in sport is constantly evolving. Whether a child is an elite or novice, his/her experiences in sport can change from season to season and from year to year.

Although the Wheel of Child Development provides representation of a child's support system in sport, the management of anxiety and stress are essential in order for an

athlete to perform optimally. As previously mentioned, each area of the wheel must be in balance in order for a child to have a positive experience in sport. Consequently, if the athlete is feeling stress or anxiety, the psychological and the physical areas may be affected and the sport experience may be viewed as negative.

Anxiety

Wiersma (2000) identified two major psychological concerns relating to the experience of children's participation in specialized sports: withdrawal/burnout issues and over-involvement and expectations of parents and other adults. Anxiety can develop in an athlete as a result of these issues and performance may be negatively affected (Wiersma, 2000). Anxiety is defined as "cognitive concerns and autonomic responses that accompany a stressful situation" (Naylor, Burton, & Crocker, 2002, p. 134). One study found that elite 11 and 12 year old hockey players had significantly higher anxiety levels than non-elite players (Pelham & Holt, 1999). They further suggested that the high anxiety scores were a reflection of the many demands placed on children in organized sport programs at the elite level.

Types of Anxiety and Anxiety Theories

Two types of anxiety have been identified in the literature: cognitive anxiety, which is the mental component (e.g., feelings of worry and apprehension) and somatic anxiety, which deals with physiological responses to stress (e.g., sweaty palms, butterflies) (Burton, 1988). There are several theories that have examined the anxiety-performance relationship.

Inverted-U Relationship. Burton (1988) suggested that an Inverted-U Relationship exists between somatic anxiety and performance. This relationship implies that athletes

perform best when anxiety is moderate but performance will worsen when anxiety decreases or increases from the optimal level. Burton also suggested that a negative linear relationship exists between cognitive anxiety and performance, and a positive linear relationship exists between self-confidence and performance.

Multidimensional Theory. Martens, Vealey, and Burton (1990) developed a Multidimensional Theory in order to explain the anxiety-performance relationship. This theory predicts that both cognitive and somatic anxiety should negatively impact performance. The theory also states that cognitive anxiety will have a greater debilitating effect on performance than somatic anxiety, and somatic anxiety will be more influential in performances of short duration and cognitive anxiety will be more influential to performances of long duration.

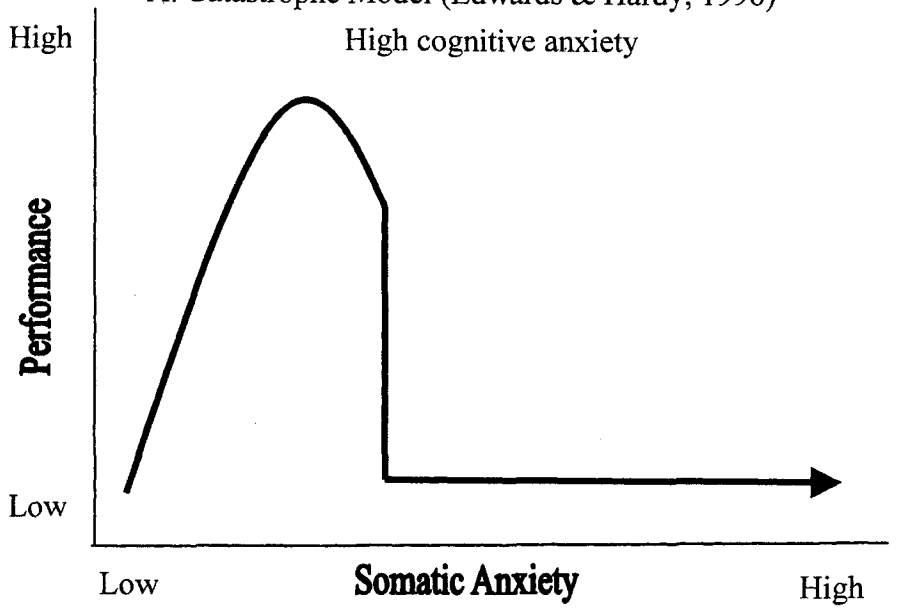
Catastrophe Model. Edwards and Hardy (1996) extended Martens et al.'s (1990) theory by developing the Catastrophe Model (see Figure 2A). This model suggests that high cognitive anxiety combined with low somatic anxiety is associated with better performance and that the greater a player's self-confidence, the lower the intensity of a person's anxiety symptoms. The researchers also suggest that self-confidence may be a more important predictor of performance than cognitive and somatic anxiety levels. The level of self-confidence, however, does not have an effect on the intensity of anxiety symptoms.

Butterfly Catastrophe Model. Hardy (1996) continued the anxiety-performance research by developing the Butterfly Catastrophe Model (see Figure 2B). This model states that, if an athlete is confident, he/she will be able to tolerate higher levels of somatic anxiety before experiencing any decrease in performance.

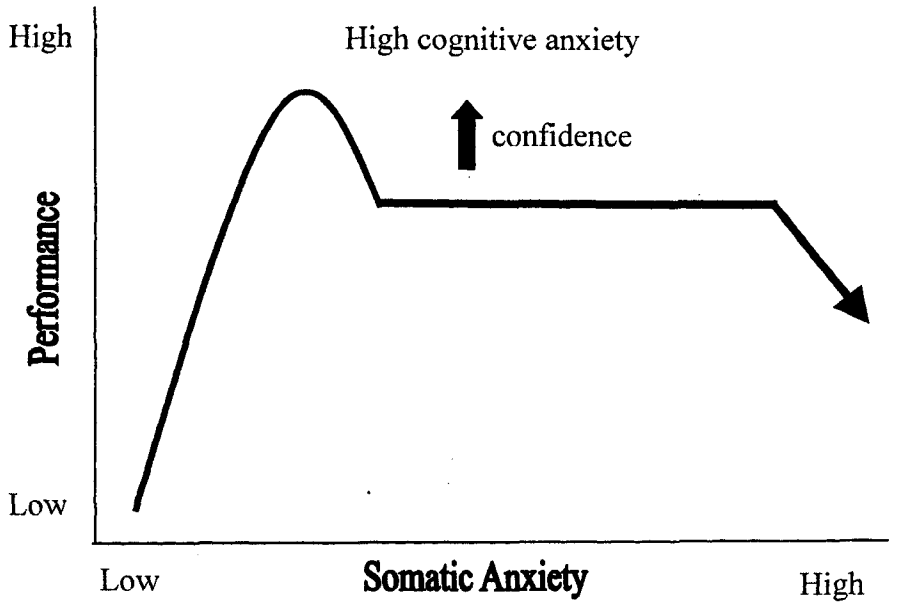
Figure 2

Catastrophe Model and Butterfly Catastrophe Model
(adapted from Weinberg & Gould, 1999, p. 84)

A. Catastrophe Model (Edwards & Hardy, 1996)



B. Butterfly Catastrophe Model (Hardy, 1996)



Research in the area of anxiety and performance has grown substantially over the past number of years. The Inverted-U Relationship, although once widely accepted, is not viewed favourably in today's research circles. Even though it has been instrumental in the foundational work of anxiety and performance, the theory is flawed as it does not recognize the multidimensional nature of anxiety and has been viewed as over-simplistic (Naylor et al., 2002). While the Multidimensional Theory attempted to overcome previous anxiety theory limitations by taking into account both cognitive and somatic anxiety dimensions, Hardy, Jones, and Gould (1996) have shown that somatic anxiety may help to improve performance. The Catastrophe Model (Edwards & Hardy, 1996) and the Butterfly Catastrophe Model (Hardy, 1996) have been more widely accepted in anxiety-performance research because of its multidimensional nature and the importance placed on athlete self-confidence (Edwards, Kingston, Hardy, & Gould, 2002; Woodman, Albinson, & Hardy, 1997). Naylor and colleagues commented, however, that testing this theory is very difficult due to "differential predictions and consequent measurement issues" (p. 146) and therefore remains a promising area in future research.

Anxiety and Self-Confidence in Children

Anxiety is evident in many different areas of a child's life. Symptoms are not only apparent in organized sport situations, but can also be observed before academic tests, music recitals and physical education classes (Simon & Martens, 1979). Furthermore, there have been differences found between the anxiety levels of individual performers versus group/team performers. Simon and Martens compared the individual activity situations to other team sport, academic, and group performance situations and found that solo band performance and individual sports (i.e., wrestling and gymnastics) were the

conditions in which anxiety levels were greatest. Other researchers have also found that individual sport athletes experience higher levels of precompetitive state anxiety than do team sport athletes (Murphy & Woolfolk, 1987; Page, Sime, & Nordell, 1999).

In individual performance situations, many youths may have either an increase or a decrease in self-confidence, according to performance results (Vealey, 2001). Vealey considers self-confidence to be a crucial mental skill that needs to be developed in athletes. Russell and Cox (2000) examined young male wrestlers' levels of self-confidence in competition. Results indicated that self-confidence is very important in the regulation of cognitive and somatic anxiety as confident athletes are more successful. Nine sources of sport confidence have been identified in the literature: mastery (i.e., improving skills), demonstration of ability (i.e., exhibiting more skill than opponents), physical/mental skill preparation (i.e., feeling of readiness before a performance), physical self-presentation (i.e., body image), social support (i.e., feedback from significant others), vicarious experience (i.e., gaining confidence from watching others be successful), coach's leadership (i.e., belief in coach's decision making), environmental comfort (i.e., feeling comfortable in the competitive situation), and situational favorableness (i.e., feeling that everything is 'going your way') (c.f. Vealey, 2001).

A lack of self-confidence may lead to a lower level of perceived competence in young athletes (Horn & Harris, 1996). A child's self-perception (i.e., how a child views him/herself) is one reason why anxiety levels are high or low and this factor alone may be an important aspect of youth involvement in sport. Harter's Competence Motivation Theory (1978, 1981) found links between low perceived competence (i.e., the level of confidence that an individual has in his/her abilities) and high achievement-related

anxiety. Also, Passer (1983) found a child's lower expectations of personal performance lead to higher anxiety in sport. Harter (1983) notes that a child's perception of ability may change according to age and cognitive ability; young children rely on feedback from parents and coaches whereas children, aged 10 to 15 years, rely more heavily on peer comparisons.

Research has indicated that additional factors may also lead to high anxiety in young athletes. Weiss, Wiese, and Klint (1989) examined young male gymnasts and their level of worry and self-efficacy before a competition and found that young athletes experienced high anxiety due to parental and coach expectations. Results also indicated that years of experience, worry, and state anxiety predicted gymnastic performance. Other research (Lewthwaite, 1990) concluded that anxiety may also be manifested in a youth athletes' perception of an inability to reach his/her goals. Results from this study found that male soccer players with higher anxiety levels perceived a greater threat to not achieving their competitive goals. Anxiety may also be associated with feelings of "over-training" (Feltz & Ewing, 1987), which is excessive physical exertion of a specific skill. The anxiety may stem from feelings of tiredness and fatigue that accompany long training sessions (Feltz & Ewing).

Although it appears that most children do not experience high levels of anxiety while physically participating in sport, this is not necessarily true for some children in specific sport situations such as having a coach yell at them or being in a losing situation while playing a game (Gould et al., 1993). Research has shown that one way to reduce anxiety is through mental strategies (c.f. Woodman & Hardy, 2001) and one strategy that has received considerable attention over the years is imagery (Hall, 2001).

Imagery

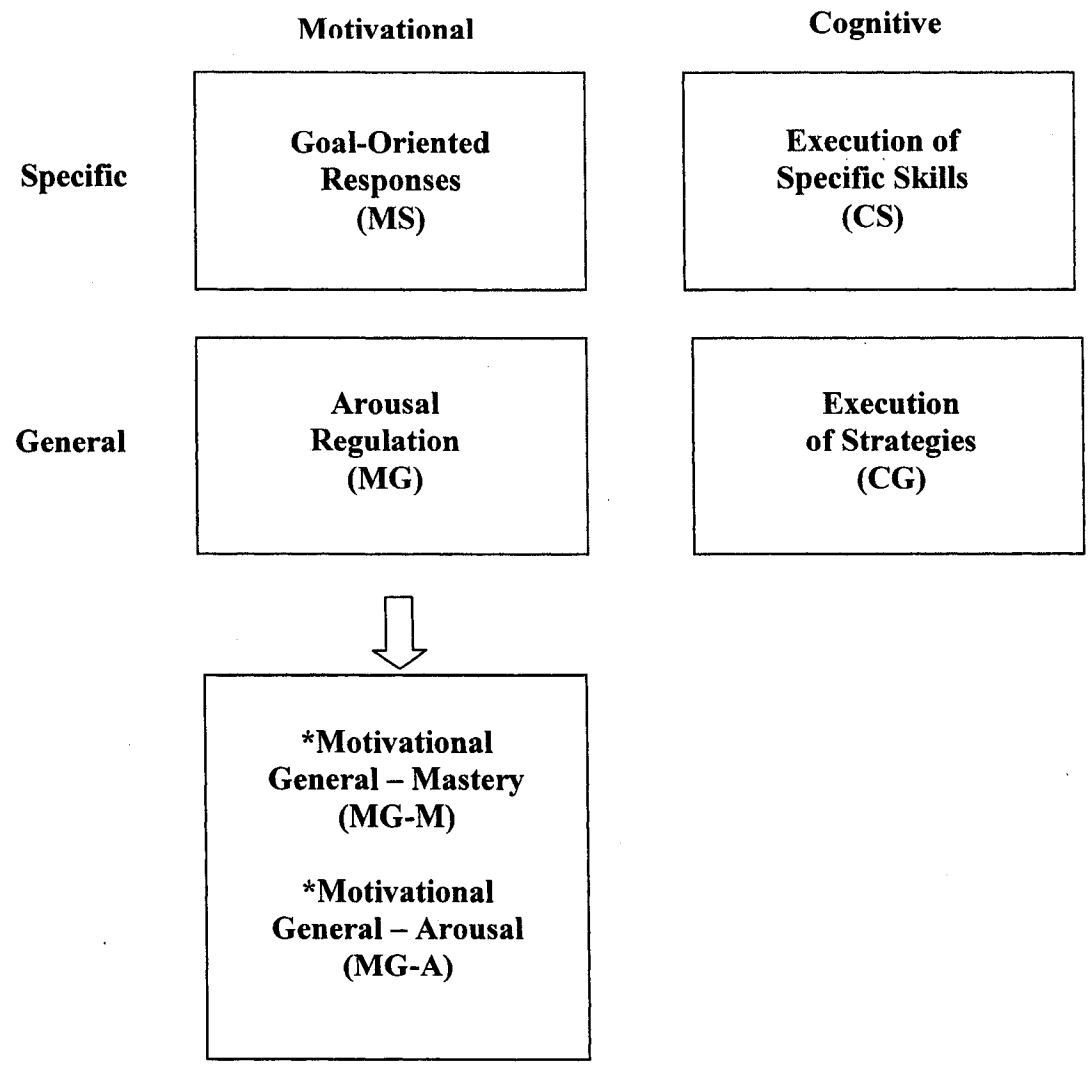
Imagery is one mental strategy used by adults and children. Imagery is defined as "an experience that mimics real experience. We can be aware of 'seeing' an image, feeling movements as an image, or experiencing an image of smell, tastes, or sounds without actually experiencing the real thing" (White & Hardy, 1998, p. 389). In fact, imagery is a natural skill for children. Even though researchers cannot see a child's imagery at work, psychologists believe that imagery does exist, even at a very young age, from the actions and imitations of a child through the child's symbolic representation of information (i.e., a toddler recreating an event) (Tomlinson-Keasey, 1985). Developmentally, children have extremely vivid imaginations and this is evident in observing children's play. For example, eidetic imagery (i.e., unusually vivid images representing a specific environment) is much more common with children than with adults (Tomlinson-Keasey). Imagery use in a sporting context may well be a natural extension for children. Weiss (1991) noted that mental imagery is a strategy used by children for skill development and retention and for competition strategies.

Sport Imagery

In addition to anxiety, imagery is a readily researched topic in the field of sport psychology (c.f. Hall, 2001). Paivio (1985) suggested that imagery plays both motivational and cognitive roles in mediating behaviour. Paivio divided the cognitive and motivational dimensions into four functions of imagery: cognitive general, cognitive specific, motivational general, and motivational specific (see Figure 3). The cognitive general (CG) dimension involves imaging any combinations of movements (i.e., game plans, routines) whereas cognitive specific (CS) involves imaging the execution of

Figure 3

Adapted from Paivio's Analytic Framework of Imagery Effects (1985)



* Based on Hall et al. (1998)

specific skills. Motivational general (MG) imagery involves imaging general physiological, emotional arousal,and affect (i.e., relaxing, "psyching-up", confidence) whereas motivational specific (MS) imagery includes goal-oriented imagery (i.e., winning a medal). Hall, Mack, Paivio, and Hausenblas (1998) expanded upon Paivio's model by further separating the motivational general function. They created a motivational general-arousal (MG-A) and a motivational general-mastery (MG-M) function; MG-A imagery involves imaging feelings of being relaxed or psyched up and MG-M imagery involves imaging feelings of being confident and mentally tough.

Over the years, researchers have studied the various factors that influence imagery use. Isaac (1992) examined the difference between trampoline athletes with high imagery ability and those with low imagery ability. It was found that high imagers improve their skills significantly more than low imagers. Other studies have examined the use of external imagery (i.e., imaging as if watching a video) and internal imagery (i.e., viewing image from inside of body) in enhancing performance (Hardy & Callow, 1999; White & Hardy, 1995) and found that external imagery is used to image the overall form of a skill or series of movements and internal imagery is associated more with imaging a complex set of movements in a more static environment. Additionally, elite performers have been found to use imagery more frequently than non-elite athletes (Hall et al., 1998) and use imagery to build self-confidence, increase motivation and control arousal (Hardy & Callow).

In a more descriptive study, Munroe, Giacobbi, Hall, and Weinberg (2000) examined where, when, why, and what athletes image. In response to where athletes image, it was found that athletes use imagery in both training and in competition.

Findings also revealed that athletes use imagery most just before competing. In regards to why athletes image, athletes were found to use imagery for both cognitive and motivational purposes as supported in research by Paivio (1985) and Hall et al. (1998). Athletes reported using all five functions of imagery (i.e., CS, CG, MS, MG-M, and MG-A) as well as an additional motivational function labelled, Flow. Flow is defined as all images that assist an athlete get into an automated state. Finally, with respect to what athletes image, responses support previous findings in imagery research detailing the vividness of an image, the use of a variety of senses during imagery, and the use of external and internal perspectives (see Appendix A). More recently, Cumming and Ste-Marie (2001) examined the functions of imagery and imagery perspective. The study involved 18 female novice synchronized figure skaters between the ages of 10 to 15 years. The authors noted that CS and CG imagery use did increase with the use of an external imagery perspective. Imagery perspective, however, did not influence the motivational uses of imagery.

Martin, Moritz and Hall (1999) developed an applied model for imagery use in sport, separating imagery use into three outcome groups: 1) skill and strategy learning and performance, 2) modifying cognitions, and 3) regulating arousal and competitive anxiety. The first outcome group, skill and strategy learning and performance, focuses on CS and CG imagery. The authors conclude that imaging motor skills and sequences "facilitates the learning, acquisition, and performance of those skills" (Martin et al., p. 250). The second outcome group, modifying cognitions, involves changing what athletes are thinking, namely their self-efficacy and self-confidence. Martin et al. note that MG-M imagery seems to be the most effective strategy used for this outcome. The third outcome

group involves the control of anxiety and stress associated with competition. MG-A imagery is suggested to be the function that is most used for this outcome.

Although there has been a great deal of imagery research examining the enhancement of skills (i.e., CS imagery) (Hall, 2001), there have been fewer studies examining the motivational functions of imagery, more specifically MG-A imagery. Munroe and colleagues (2000) found that MG-A imagery is used to increase, decrease, or maintain arousal levels, thus supporting Martin and colleagues' (1999) applied model. For example, to increase arousal levels, a person may image feeling energized whereas to decrease arousal levels, a person may image feeling relaxed and calm (Munroe et al.). In a study examining the effect of a stress reduction program on the performance of a fine motor task, Murphy and Woolfolk (1987) found that subjects in the stress reduction group (which included success imagery) had lower anxiety than subjects in the other groups.

Hale and Whitehouse (1998) also found that imagery can be used to manipulate both the intensity and direction of competitive anxiety. In their study involving experienced adult male soccer players, subjects in the challenge condition demonstrated less cognitive and somatic anxiety symptoms and more self-confidence than subjects in the pressure condition. Furthermore, Savoy (1997), in working with team sports, also found that imagery can be used to effectively manage anxiety. Two female college basketball players were assessed based on cognitive and somatic state anxiety and self-confidence prior to the commencement of the basketball season. Individualized psychological skills programs were developed and results showed that, by the end of the season, anxiety states had decreased and self-confidence and performance had increased

for both athletes. Although these studies show that imagery use is successful in reducing anxiety, one study (Page et al., 1999) found no significant effects of imagery in controlling anxiety. However, the authors do note that the descriptive data obtained hint that imagery may be an effective tool in reducing pre-competitive anxiety. In addition, it was suggested that the nonsignificant results may also be due to the short time frame allotted for the imagery training program.

Children's Imagery Use

Even though the majority of previous imagery studies have been conducted on an adult athlete population, there is no doubt that mental skills can enhance the learning of motor skills for children (Atienza, Balaguer, & Garcia-Merita, 1998; Li-Wei et al., 1992). Imagery skills are heavily used in children's dance training (Hanrahan, Tetreau, & Sarrazin, 1995; Purcell, 1990). Additionally, in an article by Short, Afremow, and Overby (2001), they presented nine uses of imagery that could be used to help coaches and educators when teaching skills to children. Imagery use, according to the authors, can be used for learning skills, performing, focusing, improving self-confidence, motivation, arousal regulation, changing negatives into positives, relaxation and healing. The many uses for imagery make this technique appropriate for children and adolescents. In Li-Wei et al.'s (1992) study examining the effect of mental skills training on 7 to 10 year old table tennis players, imagery enhanced their performance. The imagery training program was administered to these athletes every other day over a period of 19 weeks. The imagery group watched video of the world's best table tennis players and imaged themselves mimicking the elite athlete's play in their own performances. The quality of performances of the imagery group improved tremendously due to the great improvement

in technical abilities. According to Li-Wei et al., learning mental skills at an early age can give children "greater control over their personal destiny" (p. 240).

Imagery, Anxiety and Self-Confidence in Children

In one of the few studies examining imagery use and anxiety in young athletes, Vadocz, Hall, and Moritz (1997) examined 57 elite roller skaters (males and females) between the ages of 12 to 18 years (i.e., athletes were competing in the Junior North American Roller Skating Championships). Results found that MG-A imagery was one of the predictors of cognitive anxiety; athletes who reported using MG-A imagery showed higher levels of cognitive anxiety. The authors also found that athletes who reported more frequent use of MG-M imagery were more confident. Vadocz et al. encouraged coaches to use MG-M imagery with their athletes as confidence is a crucial component to successful athletic performance. Overall, it was found that motivational imagery was used to control competitive state anxiety and self-confidence, while the cognitive functions of imagery were not related to either anxiety or self-confidence. Due to the limited research examining anxiety and imagery use in young athletes, additional research is warranted to support Vadocz et al.'s findings.

Purpose

The sport setting can produce a high level of anxiety in some young athletes (Smoll & Smith, 1996). Instead of sport being a positive experience, Smoll and Smith state, "these young athletes undoubtedly endure anxiety and discomfort, which can have harmful psychological, behavioural, and health-related effects" (p. 370). It is important that young athletes learn how to use effective coping strategies in competitive situations. In a study by Gould et al. (1993), young athletes were asked about how they cope with

anxiety in competition. The panel of athletes identified the need to have coping strategies, such as positive self-talk, and they also indicated that coaches or parents did not show them how to relax so they were not able to use that strategy effectively. Although the participants were not elite athletes, their comments are nonetheless important to the present issue. Very few of these athletes knew exactly how to deal with their anxiety prior to or during competitive situations.

Based on previous literature, imagery should be an effective tool in reducing anxiety and increasing self-confidence in young elite athletes. However, Weiss (1991) stated "(I)magery has been used less frequently for anxiety and stress reduction prior to competition, rehearsal of alternative strategies, and picturing and sensing successful performances" (p. 349). Thus, providing children with strategies on how to use imagery effectively would be extremely useful in their sporting lives.

Anxiety in competition is a subject that affects many if not all athletes, regardless of age. Imagery is one means of controlling anxiety for adults (Munroe et al., 2000) and research with young elite athletes has commented that motivational imagery is one way of controlling competitive state anxiety and enhancing confidence (Vadocz et al., 1997). However, further research is warranted to determine the relationship between imagery use, self-confidence and anxiety for this population. If we know which functions of imagery are associated with anxiety in young athletes, interventions can be implemented to modify these images. The primary purpose of this study was to examine the relationship between imagery use, self-confidence and anxiety in young elite athletes. A secondary purpose was to develop a child-centered measure of imagery use in order to properly assess young children.

Rationale

Although the study from Vadocz et al. (1997) involved athletes in the 12 to 18 years range, there is a lack of empirical studies with younger athletes. Therefore, the first rationale for the study was to examine imagery use in children, especially those under the age of 12. Justification for the use of younger athletes lies in the fact that there are various stages of cognitive development.

According to Piaget's stages of development, a child will pass through four stages in his/her cognitive development (Piaget, 1952). The sensorimotor stage (i.e., from birth to 2 years of age) and the preoperational stage (i.e., from age 2 to age 6) are the first two stages of development. For the purposes of this study, the last two stages, concrete operations and formal operations, will be examined. In the concrete operations period, children from ages 7 to 11 years become more flexible in their thinking and are able to reason logically. Problem-solving skills, however, are not as developed and memory retention skills are lacking. Siegler (1998) discovered that older children (aged 11) have a much more developed short-term memory than younger children (ages 5 to 8). Also, at age 10 and 11 years, children become more selective in searching for information and they also begin to spend less time processing irrelevant information (Siegler).

In the formal operations period, the onset of adolescence invokes a higher level of cognitive maturity. These children, ages 12 years and older, are able to think in abstract terms, apply logic to ideas and problems, and develop many different solutions to a problem (Piaget, 1952). With the advent of the technology age, it has been demonstrated that instruction can be processed even more quickly and problem-solving skills may be much more mature now than in Piaget's day (Siegler, 1998). This information may be

very helpful when embarking on work with children as age is a determining factor in the interpretation of data. Thus, one could conclude that mental strategies are processed differently depending on the age of a child.

Weiss (1991) commented that imagery is used less frequently for anxiety/stress reduction than is relaxation or goal-setting techniques. Therefore, providing children with strategies on how to use imagery effectively would be extremely helpful to them in their sporting lives. Also, imagery is used more frequently prior to competition as opposed to during or post-competition (Munroe et al., 2000). As this study was conducted before the start of a national competition, it was very timely as athletes would be using imagery the most at that time.

The competitions where data was collected were all national championships. According to Jones and Swain (1992), less important competitions will not produce situations that are "sufficiently anxiety-provoking" (p. 470) for differences to be present. Thus, the level of competition and competitive situation used for this study were thought to produce results that are indicative of how athletes feel in competition.

Ultimately, coaches and parents want to create a sense of balance for their athlete/child in sport. Different factors interact to shape a child's experiences in sport. Creating a sense of balance in all areas will not only help a child as they involved in sport but also after they have ended participation at an elite level.

Hypotheses

The following formal hypotheses were made based on published empirical data.

Hypothesis 1:

Ha_1: MS imagery is a significant predictor of self-confidence in the 7-11 age cohort.

Hypothesis 2:

Ha_2: MG-M imagery is a significant predictor of self-confidence in the 12-15 age cohort.

Hypothesis 3:

Ha_3: MG-A imagery is a significant predictor of both cognitive anxiety and somatic anxiety in the 7-11 age cohort.

Hypothesis 4:

Ha_4: MG-A imagery is a significant predictor of both cognitive anxiety and somatic anxiety in the 12-15 age cohort.

Hypothesis 5:

Ha_5: Athletes in both age cohorts will differ in their use of cognitive and motivational imagery; athletes in the 12-15 age cohort will report more frequent use of cognitive and motivational imagery than those athletes in the 7-11 age cohort.

Hypothesis 6:

Ha_6: Athletes in both age cohorts will differ in the intensity of anxiety symptoms and self-confidence; athletes in the 12-15 age cohort will report to have lower levels of cognitive and somatic anxiety and higher levels of self-confidence than the 7-11 age cohort.

No predictions were made on the remaining imagery subscales or additional differences between the age cohorts due to the lack of empirical research in this area.

Methodology

Participants

The subjects for this study were 76 elite (i.e., level A) female athletes between the ages of 7 to 15 years (M = 12.54, SD = 2.21) from the sport of baton twirling. The years of experience ranged from 3 years to 12 years (M = 7.35 years, SD = 2.26).

The uniqueness of the sport of baton twirling allows it to be an ideal sport choice for this type of study. The sport involves many complex movement patterns and is extremely intricate. Athletes in the sport are required to perform a combination of dance, gymnastics, and baton skills while interpreting music. Moreover, baton twirling is a subjective sport. Researchers have found that athletes in subjective sports have higher levels of cognitive and somatic anxiety than athletes in objective sports (i.e., swimming or track and field) due to a decrease in perceived control over success (Martens et al., 1990). In addition, participants in the present study competed in individual events and research has shown that those participating in individual sports/activities show higher level of anxiety than those in team sports/activities (Pham, 2004; Simon & Martens, 1979). Although males do participate in baton, there are very small numbers in Canada and therefore the focus was on females.

The sample was recruited at the Canadian Baton Twirling Championships, the National Championships for the National Baton Twirling Association (NBTA), and the Amateur Athletic Union (AAU) Junior Olympic Baton Twirling Competition. All subjects in the Canadian Championships were members of a provincial team and had qualified at their respective provincial competitions in order to compete at the Canadian

Championships. Athletes in the NBTA Nationals and the AAU Junior Olympics had to qualify in their state/region to earn the right to compete at these competitions.

Measures

Sport Imagery Questionnaire for Children (SIQ-C). A modified version of the Sport Imagery Questionnaire (SIQ; Hall et al., 1998) was employed (see Appendix B). Stadulis, MacCracken, Eidson, and Severance (2002) commented that the "reliability and validity of administering the adult version (of a questionnaire) to children would be suspect due to the child's inability to comprehend terminology and concepts" (p. 148). It is also noted that measurements should reflect the cognitive stage of a sample, be written in a language and format appropriate for a sample, and address concerns that are relevant to a sample (Brustad, 1998). Therefore, questionnaires given to children should be age-appropriate. Although the SIQ has been used with adult populations, it is not clear that it is an appropriate measure for children.

The language of the SIQ was modified in order to make the questionnaire more child-friendly. The modification was a collaborative effort involving the lead author and two other experts in the fields of imagery and education. For example, question number 12 of the SIQ reads "I image the audience applauding my performance". The modified version of the same question reads "I see the audience cheering for me". Another example, question 23 of the SIQ, reads "I imagine myself appearing self-confident in front of my opponents" and the modified version reads "I see myself looking confident in front of others".

The SIQ-C is structured the same as the original SIQ. The 30 item self-report questionnaire measures frequency of imagery use rated on a 7 point Likert scale (1=rarely

and 7=often). The five functions of imagery are examined: CS (imaging the execution of specific skills), CG (imaging development of plans/strategies), MS (imaging outcomes), MG-A (imaging arousal levels related to performance), and MG-M (imaging confidence and mental toughness in competition). Each function (i.e., subscale) is comprised of six items. Factor analyses of the original SIQ have supported the five-factor structure of the instrument and inter-scale correlations have been found to be low to moderate (-0.45 to 0.32), indicating that the various functions of imagery use are related but independent (Hall et al., 1998). Researchers (Cumming, Hall, Harwood, & Gammage, 2002) have also found that the original SIQ has acceptable internal consistency estimates for each subscale (alpha coefficients of 0.70 and above). In the present study, Cronbach alpha coefficients of each subscale for the SIQ-C were adequate (CS = 0.78, CG = 0.65, MS = 0.83, MG-M = 0.77, and MG-A = 0.71). The MG-A subscale was the only subscale in which all six items could not be used in the analysis of results. When all six items were included, the reliability of the subscale was extremely poor (i.e., alpha = 0.30). As a result, three items (i.e., SIQ-C questions 4, 15, and 22) were omitted from the subscale in order to improve its reliability to the current value of 0.71.

Competitive State Anxiety Inventory 2 for Children (CSAI-2C). The CSAI-2C (Stadulis et al., 2002) comprises 15 items assessing cognitive anxiety, somatic anxiety and self-confidence (see Appendix C). The CSAI-2C is a modified version of the CSAI-2 (Martens, Burton, Vealey, Bump & Smith, 1990) and was developed for an adult population, consisting of 27 items.

For the CSAI-2C, five items are included in each of the subscales and participants rate the intensity of their anxiety symptoms on a 4-point Likert scale (1= not at all to 4=

very much so). Construct validation of the CSAI-2C was supported using the Sport Competition Anxiety Test for Children (Martens et al., 1990). Cronbach alpha coefficients for the subscales in the study by Stadulis et al. (2002) ranged from 0.73 to 0.78. For the present study, the Cronbach alpha coefficients for each subscale of the CSAI-2C were adequate (cognitive anxiety = 0.78, somatic anxiety = 0.82, and self-confidence = 0.85).

Experimental Procedure

Upon approval from the Ethics Review Board of the University of Windsor, a recruitment letter was sent to provincial/state team manager(s), provincial/state coaches, and parents outlining the purpose of the study (see Appendix D). The letter was composed in order to ensure that the managers and/or coaches understood the purpose of the study and increased awareness of the study to the baton community. At the end of provincial/state team practices before the competition, athletes and coaches were briefed on the purpose of the study and what was involved if an athlete chose to participate. Participation in the study was voluntary and consent from a parent/guardian was obtained before any data was collected (see Appendix E). An assent form was also obtained from the athlete (see Appendix F). Upon the return of the consent and assent form, the athlete was given the SIQ-C to complete 2-3 days before the competition. Approximately 2 hours before the athlete competed on the first day of competition, the CSAI-2C was completed. The 2-3 hour time frame for completion of the CSAI-2C was ideal to get an accurate representation of competitive anxiety (Martens et al., 1990).

Design and Analyses

Athletes were grouped into 2 age cohorts: 7-11 years (N = 25), and 12-15 years

(N = 51). Correlations were performed on the subscales of the SIQ-C and the CSAI-2C. Subsequently, stepwise multiple regression analyses were used to determine which functions of imagery (i.e., 5 functions) predicted cognitive anxiety, somatic anxiety, and self-confidence. The order of entry of the variables into the stepwise multiple regression analyses were determined from the absolute value of the correlations coefficients; the larger the value of the correlation coefficient, the stronger the linear association. Using the correlation coefficient values from Table 1 and Table 2, the absolute values were entered in ascending order for the regression analyses. In the regression analyses, the R^2 change values were examined to predict the unique contribution that the independent variable (i.e., imagery subscales) would have on the dependent variable (i.e., anxiety subscale). The beta values were examined to report the directional relationship of the independent variable. MANOVAs were then conducted to see if differences existed between the different age groupings on the dependent variables from the two questionnaires (i.e., the 5 subscales of the SIQ-C and the 3 intensity subscales of the CSAI-2C).

Results

Descriptives

See Table 1 for means and standard deviations of the imagery and anxiety subscales. The probability of Type 1 error was set at 0.05 for all analyses.

Correlation Analyses

Correlations were performed on the SIQ-C and the CSAI-2C for each age cohort. The 7-11 age cohort reported several significant correlations (see Table 2). CS imagery and MG-M imagery reported significant negative correlations with both cognitive anxiety

Table 1
Means and Standard Deviations of Imagery Subscales and Anxiety Subscales

Variable	7-11		12-15	
	Mean	SD	Mean	SD
Imagery subscales				
CS	5.09	1.25	4.73	1.03
CG	4.83	0.79	5.09	1.06
MS	5.12	1.24	4.58	1.32
MG-M*	5.64	0.80	5.05	1.15
MG-A*	5.72	1.17	4.99	1.37
Anxiety subscales				
Cognitive anxiety*	1.82	0.74	2.25	0.69
Somatic anxiety	2.08	0.84	2.03	0.74
Self-confidence*	3.48	0.53	2.92	0.67

*$p < 0.05$

Note: The SIQ-C is rated on a 7 point Likert scale with 1= rarely and 7= often. The intensity subscale of the CSAI-2C is rated on a 4 point Likert scale with 1= not at all to 4= very much so.

Table 2
Correlations Between Imagery Subscales and
CSAI-2C Subscales for 7-11 Age Cohort

	Cognitive Anxiety	Somatic Anxiety	Self-Confidence
1. CS	-0.495*	-0.452*	0.293
2. CG	-0.263	-0.075	0.330
3. MS	-0.562*	-0.132	0.575*
4. MG-M	-0.499*	-0.430*	0.676*
5. MG-A	-0.534*	-0.243	0.605*

* $p < 0.05$

and somatic anxiety. MS imagery and MG-A imagery also reported significant negative correlations with cognitive anxiety. Furthermore, each of the motivational functions of imagery had a significant positive correlation to self-confidence.

In contrast, the 12-15 age cohort only reported 3 significant correlations (see Table 3). The only significant negative correlation was found between MG-M imagery and cognitive anxiety. In addition, MS imagery and MG-M imagery reported significant positive correlations with self-confidence.

Hypotheses

Hypothesis 1. It was hypothesized that MS imagery would be a significant predictor of self-confidence in the 7-11 age cohort. Based on the correlations, the variables were entered into the stepwise multiple regression analyses as follows: 1) MG-M, 2) MG-A, 3) MS, 4) CG, and 5) CS. MG-M imagery and MG-A imagery proved to be significant predictors of self-confidence in this population, accounting for 45.7% and 9.8% of the variance, respectively (see Table 4). Together, these 2 functions of imagery account for 55.5% of the variance. Moreover, beta values indicated positive relationships for both MG-M and MG-A and self-confidence (see Table 4). Results from stepwise multiple regression analyses indicated that MS imagery was not a significant predictor of self- confidence. Therefore, the first hypothesis was rejected.

Hypothesis 2. It was hypothesized that MG-M imagery would be a significant predictor of self-confidence in the 12-15 age cohort. Based on the correlations, the variables were entered into the stepwise multiple regression analyses as follows: 1) MG-M, 2) MS, 3) CG, 4) CS, and 5) MG-A. It was found that MG-M imagery was a significant predictor of self-confidence in this population accounting for 21.4% of the

Table 3
Correlations Between Imagery Subscales and
CSAI-2C Subscales for 12-15 Age Cohort

	Cognitive Anxiety	Somatic Anxiety	Self-Confidence
1. CS	-0.270	-0.226	0.218
2. CG	-0.201	-0.064	0.267
3. MS	0.140	0.168	0.321*
4. MG-M	-0.399*	-0.195	0.476*
5. MG-A	-0.270	-0.181	0.193

* $p < 0.05$

Table 4
Summary of Regression Analyses for Imagery Functions Predicting Cognitive Anxiety, Somatic Anxiety, and Self-Confidence

Variable	R^2	$R^2 \Delta$	Beta
Self-Confidence			
MG-M[a]	0.457	0.457	0.49*
MG-A[a]	0.555	0.098	0.36*
MG-M[b]	0.214	0.214	0.78*
MG-A[b]	0.287	0.073	-0.42*
Cognitive Anxiety			
MS[a]	0.380	0.380	-0.51*
MG-A[a]	0.554	0.175	0.43*
MG-M[b]	0.175	0.175	-0.52*
MS[b]	0.257	0.082	0.30*
Somatic Anxiety			
CS[a]	0.262	0.262	-0.51*

* $p < 0.05$

[a] 7-11 age cohort
[b] 12-15 age cohort

variance (see Table 4). Additionally, MG-A imagery was also a significant predictor, accounting for an additional 7.3% of the variance. These 2 functions of imagery account for 28.7% of the total variance. Beta values indicated a positive relationship with MG-M and self-confidence, however, the relationship with MG-A and self-confidence was negative. Nonetheless, the second hypothesis was supported.

Hypothesis 3. It was hypothesized that MG-A imagery would be a significant predictor of both cognitive and somatic anxiety in the 7-11 age cohort. Based on the correlations, the variables were entered into the stepwise multiple regression analyses as follows: for cognitive anxiety – 1) MS, 2) MG-A, 3) MG-M, 4) CS, and 5) CG and for somatic anxiety – 1) CS, 2) MG-M, 3) MG-A, 4) MS, and 5) CG. Results from stepwise multiple regression analyses demonstrated a strong relationship between MS imagery and cognitive anxiety in this population accounting for 38% of the variance (see Table 4). MG-A imagery was also a significant predictor of cognitive anxiety, accounting for an additional 17.5% of the variance. The 2 imagery functions account for 55.5% of the total variance. Beta values indicated that MS imagery and cognitive anxiety had a negative relationship however, MG-A and cognitive anxiety had a positive relationship. With respect to somatic anxiety, CS imagery was found to be its biggest predictor, accounting for 26.2% of the variance. Beta values for CS imagery and somatic anxiety indicated a negative relationship. As such, the third hypothesis was partially supported as MG-A imagery proved to be a significant predictor of cognitive anxiety but not somatic anxiety.

Hypothesis 4. It was hypothesized that MG-A imagery would be a significant predictor of both cognitive and somatic anxiety in the 12-15 age cohort. Based on the correlations, the variables were entered into the stepwise multiple regression analyses as

follows: for cognitive anxiety – 1) MG-M, 2) CS, 3) MG-A, 4) CG, and 5) MS and for somatic anxiety – 1) CS, 2) MG-M, 3) MG-A, 4) MS, and 5) CG; Results from stepwise multiple regression analyses found that, for cognitive anxiety, MG-M imagery was a significant predictor accounting for 17.5% of the variance (see Table 4). MS imagery was also a significant predictor of cognitive anxiety, accounting for an additional 8.2% of the variance. The total variance accounted for is 25.7%. Beta values indicated that the relationship to MG-M imagery and cognitive anxiety is negative and the relationship to MS imagery and cognitive anxiety is positive. None of the imagery subscales emerged as significant predictors for somatic anxiety. Therefore, the fourth hypothesis was rejected.

Hypothesis 5. It was hypothesized that athletes in the 12-15 age cohort would use more cognitive and motivational imagery than athletes in the 7-11 age cohort. Multivariate analysis revealed a significant effect between the 7-11 age cohort and the 12-15 age cohort, $F(5, 63) = 3.95$, $p < 0.05$. Univariate analysis revealed significant differences between the two groups in their use of MG-M imagery and MG-A imagery (see Table 5), however univariate analysis between the age cohorts and the cognitive imagery subscales revealed no significant effect. In both cases, the mean scores for the 7-11 age cohort were higher than their older counterparts (see Table 1). The fifth hypothesis was rejected.

Hypothesis 6. It was hypothesized that athletes in the 12-15 age cohort would report lower levels of cognitive and somatic anxiety and higher self-confidence than the 7-11 age cohort. Multivariate analysis revealed a significant effect between the two age cohorts and the anxiety subscales, $F(3, 66) = 5.25$, $p < 0.05$. Analyses of variance revealed significant differences in the cognitive anxiety subscale and in the

Table 5
Analysis of Variance
for Age Range and Dependent Variable

Dependent variable	*Df*	F	Mean Square	*p*
Self-confidence	1	12.35	4.83	0.001*
Cognitive anxiety	1	5.74	2.70	0.019*
Somatic anxiety	1	0.043	0.026	0.837
CS	1	1.639	2.053	0.205
CG	1	1.085	1.043	0.301
MS	1	2.673	4.469	0.107
MG-M	1	4.84	5.35	0.031*
MG-A	1	4.89	8.38	0.030*

*$p < 0.05$

self-confidence subscale (see Table 4). Upon further investigation of the mean scores and standard deviations (see Table 1), it was found that the 7-11 age cohort reported lower levels of cognitive anxiety and higher levels of self-confidence than the 12-15 age cohort. The sixth hypothesis was therefore rejected.

Discussion

The primary aim of the present study was to examine the relationship between imagery use, self-confidence and anxiety in young elite athletes. This was achieved, in part, through the development of a more child-centered measurement tool for imagery use. The findings indicated that there were some developmental differences with respect to imagery use, self-confidence and anxiety between the 2 age cohorts (7-11 years and 12-15 years) that were examined.

Results from the present study indicated that MG-M imagery was a significant predictor of self-confidence in the 7-11 age cohort and in the 12-15 age cohort. Moreover, both cohorts reported a positive relationship between MG-M imagery use and self-confidence. This finding is supported by Vadocz et al. (1997) and Hardy and Callow (1999) who found that athletes use imagery to enhance performance and to enhance confidence. More specifically, Vadocz et al. concluded that MG-M imagery was a significant predictor of self-confidence in elite roller skaters ages 12-18 years. The authors suggested MG-M imagery is related to images of confidence and mental toughness and therefore, its use by the athletes was expected and understandable.

In addition to the previous findings relating to self-confidence, Vealey (2001) suggested that self-confidence is critical to an athlete's development. As a result, athletes in the present study may be using mastery, physical/mental skill preparation and

vicarious experience as possible sources of confidence. Moreover, Harwood, Cumming, and Hall (2003), in their examination of achievement goal orientation and imagery use in elite youth sport participants, concluded that situational motives may have an impact on imagery function. Depending on the situation, young elite athletes may use a variety of imagery functions in order to manipulate the amount of ego involvement they may be experiencing. Thus, higher ego involvement in a competitive situation may persuade an athlete to use more MG-M imagery. Because the present study did not examine task and ego orientation, the previous point is purely speculative.

In addition to MG-M imagery, MG-A imagery was also a significant predictor of self-confidence in the two age cohorts. However, it is interesting to note that, for the 7-11 age cohort, the relationship of MG-A imagery and self-confidence is positive and for the 12-15 age cohort, the relationship is negative. This finding may be due to the fact that MG-A imagery is used to increase or decrease arousal levels and enable an athlete to feel more energized or more calm (Munroe et al., 2000), thereby allowing an athlete to attain a personal level of comfort. This level of environmental comfort may lead to an increased level of confidence (Vealey, 2001). It may be suggested, therefore, that developmental differences may exist in the athletes' use of MG-A imagery whereby younger athletes are more comfortable using MG-A imagery to control confidence levels. Harter (1983) commented that adolescent children rely more heavily on peer comparisons and that older children experience higher levels of anxiety. The high anxiety levels may lead to a decrease in self-confidence as peer influence is highly valued in the older age cohort.

The finding of MG-M and MG-A as predictors of self-confidence for the 7-11 age cohort was contradictory to the hypothesized MS imagery. The rationale for the

hypothesis was that previous research suggested elite athletes were more achievement oriented than non-competitive athletes (Feltz, 1986). Therefore, it was possible to conclude that, due to the outcome-oriented nature of participation motives, younger athletes would be more inclined to use MS imagery. Furthermore, because successful expert athletes have high levels of confidence (Janelle & Hillman, 2003), MS imagery would have been used to portray an image of success thereby increasing confidence. One explanation for why MS imagery was not a significant predictor of self-confidence may be due to the nature of the sport of baton twirling (i.e., subjectively judged sport). Images of receiving tangible rewards may be detrimental to confidence as the locus of control is different; athletes do not have complete control of the outcome. Consequently, images of confidence and calmness may be preferred by the younger age cohort in order to enhance confidence.

The present study found that MG-A imagery was a significant predictor of cognitive anxiety for the 7-11 age cohort and that this relationship was positive. This is supported by the results from Vadocz et al.'s (1997) study with young elite roller skaters. Results also indicated a positive relationship between MG-A imagery and cognitive anxiety for this age group. This finding was expected as MG-A imagery is used to regulate arousal and the stress associated with competition (Martin et al., 1999, Munroe et al., 2000).

MS imagery was also a predictor of cognitive anxiety for both the 7-11 and 12-15 age cohorts. With the younger age cohort, this relationship was negative and thus, worthy of note. The athletes in the present study were in a subjectively evaluated individual sport, arguably where anxiety will be at its highest (Martens et al., 1990; Page et al.,

1999). These young athletes may feel pressure from parents and/or coaches to perform well and may feel increased pressure when they do not achieve their goals (Lewthwaite, 1990; Weiss et al., 1989). Furthermore, as a performance-oriented goal style is suggested for young sport participants (Locke & Latham, 1990), MS imagery, which is based on competitive outcome, would seem to be detrimental. Why, then, would these findings suggest that increased images of tangible success would lead to less anxiety for the younger age cohort? One explanations could be that these athletes have experienced success at a very young age and may take comfort (i.e., have increased feelings of confidence) in their image of being successful. Vadocz et al. found that athletes who had previous success in competition were less worried about upcoming competitions. In the present study, the athletes' image of success may provide something specific upon which they can focus, thereby diverting their attention from cognitive anxiety symptoms. The results may also be explained by Bandura's (1986) self-efficacy theory (i.e., situation specific self-confidence) which states that previous success is the biggest predictor of self-efficacy. Based on this knowledge, it is possible to conclude that the younger athletes may be able to re-create successful experiences in their minds thus enabling them to engage more easily in thoughts about being successful and increasing confidence. In addition, the 7-11 age cohort may be more oblivious to the pressures of the competitive situation and therefore, not experience a high level of worry about their impending performance.

Although MS imagery was also a significant predictor of cognitive anxiety for the 12-15 age cohort, the correlation was positive. This finding suggests that, as a young elite athlete ages, thoughts of winning (i.e., outcome goals) may increase the anxiety level of

the athlete. In the present study, the images of success that proved helpful in reducing anxiety in the younger age cohort are resulting in worry and apprehension in the older age cohort. This may explain why MG-M imagery proved to be a significant predictor of cognitive anxiety for the 12-15 age cohort; the negative correlation suggests that thoughts regarding confidence are more important at this age as these are the thoughts that help the 12-15 age cohort cope with the stress of competition. These findings give support to a study by Russell and Cox (2000) who found that self-confidence is crucial in regulating cognitive and somatic anxiety as those athletes who are more confident are also more successful. Another explanation of this result may lie in the fact that the older athletes may have experienced and witnessed more failure in competition due to the greater number of years of involvement. The older athletes may therefore use MG-M imagery as a coping strategy used to enhance confidence in a competitive situation.

With respect to somatic anxiety, CS imagery was found to be its biggest predictor in the 7-11 age cohort. The negative relationship suggests that the more CS imagery (i.e., images related to skill acquisition and execution) is used, the less somatic anxiety is experienced. Given that baton twirling is an extremely technical sport, it is not surprising that the imaging of skills be important for this age group as there are many different skills present in a routine. It is imperative that the athlete's arousal level remains low due to the complexity of the sport (Burton, 1988). However, it is surprising that this result is not consistent for the 12-15 age cohort. In fact, none of the imagery subscales emerged as significant predictors of somatic anxiety. Vadocz et al. (1997) suggested the type of task and competition importance may affect which subscale is the biggest predictor of performance. In this case, due to the experience of the athletes in the 12-15 age cohort,

they may have already developed alternate coping strategies to help them deal with the presence of somatic anxiety. These strategies may include simulation training (Hardy et al., 1996), and relaxation techniques (Gould et al., 1993; Li-Wei et al., 1992).

As mentioned previously, it has been noted by researchers that young children use imagery more than adults (Tomlinson-Keasey, 1985). This developmental difference may be one reason why the 7-11 age cohort used more MS imagery (mean = 5.12), MG-M imagery (mean = 5.64), and MG-A imagery (mean = 5.72) than did the 12-15 age cohort (means of 4.58, 5.05, and 4.99, respectively). Imagery may be more spontaneous and frequent with the younger age cohort. It is interesting to note, however, that upon examination of the cognitive imagery subscales (i.e., CS imagery and CG imagery), there were no significant differences between the means of the two age cohorts although the 7-11 age cohort reported a higher use of CS imagery and the 12-15 age cohort reported higher use of CG imagery. It was hypothesized that the 12-15 age cohort would use more cognitive imagery simply based on the fact that they have more experience and have been involved in the sport over a longer period of time. Also, the older age cohort would be performing more complex and more intricate skills and longer sequences of skill combinations, and hence, would use more cognitive imagery. Due to the fact that deliberate practice dictates that these young athletes spend a great deal of time perfecting skills (Ericsson et al., 1993) and that elite child athletes are involved in programs which include intense skill development (Nash, 1987), the young elite athletes involved in the present study may be using similar amounts of CS and CG imagery as they continue to develop specific skills and routines.

Limitations

This study is not without limitations. First, the sample size of 76 female athletes is small and therefore, results are difficult to generalize to a broader sport population and gender. Also, the nature of the sport (i.e., baton twirling) is quite unique. An examination of a variety of sports may have led to different results. Baton twirling is a very technical and intricate sport and it is also based on routine construction and skill acquisition. Munroe, Hall, Simms, and Weinberg (1998) found that imagery use varies according to sport and differences may be present in team versus individual sports. Pham (2004) reported that those young athletes competing in individual subjective sports may use more imagery than those competing in individual objective sports. Therefore, some results may have been skewed because of the type of sport used in the present study.

Secondly, the modified SIQ-C proved to have some problems. Firstly, the CG imagery subscale demonstrated low reliability (i.e., alpha value of 0.65). The low reliability could have been due to the wording of this subscale. The use of the phrase "game plans" from the original SIQ was not familiar to these athletes in the context of their sport. The inability of the young athletes to comprehend the central theme of the questions may have had an impact on their ability to answer the question properly and, subsequently, this had an effect of the reliability of the subscale. Pham (2004), upon using the SIQ-C in a recent study, excluded the CG imagery subscale from the analysis due to very low internal consistency. Pham cited problems due to the wording of the CG imagery subscale and commented that children involved in aesthetic sports may have difficulty interpreting phrases such as "game plans" and "making plays" when answering questions related to their sport.

Thirdly, the MG-A imagery subscale was altered in order to improve its reliability (i.e., 3 questions were removed in order to bring the alpha value to an acceptable level). As research demonstrates that young athletes experience high levels of anxiety in certain sport situations, it is difficult to understand why the athletes may have had difficulty understanding the questions in this subscale. One explanation could be the wording of the questions. For example, question four read, "In my head, I imagine how I feel before I compete". The word "feel" may be difficult for young athletes to interpret. Another explanation could be that some of the young athletes were answering the questions (i.e., questions 15 and 22) with the mindset that the researcher would be judging them and hence would answer the questions based on what was expected of them (i.e., social desirability). A discrepancy may lie in the fact that some athletes answered more honestly than others, either consciously or unconsciously.

Another limitation may be that the athletes may be had some formal imagery training. With training, some of the athletes could have been more aware of the various uses of imagery in sport and perhaps, their increased knowledge could have impacted their understanding of the study and comprehension of some of the concepts/questions.

Future Directions

The development of the SIQ-C is an area that is in need of additional research. To date, only a handful of studies have examined imagery in young athletes (Li-Wei et al., 1992; Pham, 2004; Vadocz et al., 1997). A child-centered measure is necessary due to the cognitive differences that exist between children and adults (Piaget, 1952) and to further the research in the area of athlete development. Several areas need to be addressed. One concern is the 7-point Likert scale included in the SIQ-C. A suggestion

would be to reduce the current 7-point Likert scale to a 4-point or 5-point Likert scale as this modification may help children to narrow their focus when they are attempting to answer the question (e.g., PPCSC, Lintunen, 1987; CSAI-2C, Stadulis et al., 2002). Finally, leaving blanks in the SIQ-C (as was done in the CSAI-2C) to accommodate sport-specific terms may be a method that can be used to increase comprehension. Another method of increasing comprehension would be to develop open-ended questions for the young athletes to answer regarding their thoughts on the definitions of imagery, anxiety, arousal and nervousness. The answers could be reviewed and subsequently used in the development of a child-friendly questionnaire. Morton-Williams and Sykes (1984) suggested that problems in comprehension may come from difficulties in understanding concepts rather than from unknown vocabulary. Therefore, it is important to make concepts as clear as possible and the inclusion of sport-specific terms may aid in the young athletes' comprehension.

The CSAI-2C does not include a directional component to measure how an athlete perceives their anxiety symptoms. Jones and Swain (1992) developed a directional scale for anxiety in a study with adult populations. Duda (1998) suggested that future anxiety measurements need to include a combination of direction and intensity components and Stadulis et al. commented that "(T)he model presented by Jones...needs to be considered also in future validation efforts concerning the CSAI-2C" (2002, p. 163).

Future research involving children of both genders is needed. Research regarding adult populations has not demonstrated any gender difference (Hall et al., 1998) however, there may be differences that occur with children based on the developmental differences that occur as they mature (Piaget, 1952).

Recent research investigating developmental differences have focused on the cognitive differences arising within the 7-11 age grouping from Piaget (1952). Future research may probe how the cognitive differences may impact their use of imagery during competitive situations.

The present study focused specifically on young elite athletes. While it is important to study this population, children who are non-elite must also be examined. As there were differences found between elite and non-elite adult athletes' use of imagery (Hall, 2001), so too may there be differences among elite and non-elite child sport participants in relation to imagery use, self-confidence and anxiety.

Time of season is another interesting factor to consider. Given that athletes in this study were competing at national competitions, the environment was expected to elicit a high degree of anxiety (Jones & Swain, 1992). As imagery use does differ according to the time of season (Munroe et al., 1998), further research needs to identify which functions of imagery are most prominent for competitions occurring at various times throughout the season.

Implications

Positive sport experiences at a young age can help in the development of a child's confidence. The Wheel of Child Development proposed by Weiss (1991) identifies the interdependence of physical, biological, social, and psychological aspects on the development of a child in sport. Self-confidence in young athletes is achieved by a delicate balance between each aspect. This study highlights the psychological aspect in exploring the relationship between self-confidence, competitive anxiety and imagery. In regards to the psychological development of young elite athletes, this study demonstrates

the importance of engaging these athletes in mental training strategies, namely, imagery. Orlick and McCaffrey (1991) commented that children are very capable of learning and applying important mental skills such as relaxation, goal-setting, and imagery. Also, Martin et al. (1999) found that the use of MG-M imagery is integral in modifying cognitions, in particular self-confidence. Through the use of Piaget's cognitive stages of development, results from the present study will help tailor effective imagery interventions for young elite athletes at various ages. Also, results may help coaches and parents to understand and implement imagery training with athletes as imagery can be used to help young elite athletes cope with the pressures of competing.

The sport of baton twirling is extremely demanding and for young athletes, high levels of anxiety can be detrimental to their performance. This study highlights the importance of developing confidence in young athletes; it is vital to elite athletes, especially children and adolescents, as they progress in their sport participation. Developing confidence will not only help them as elite athletes, but also help them long after they have completed their participation in elite level sport.

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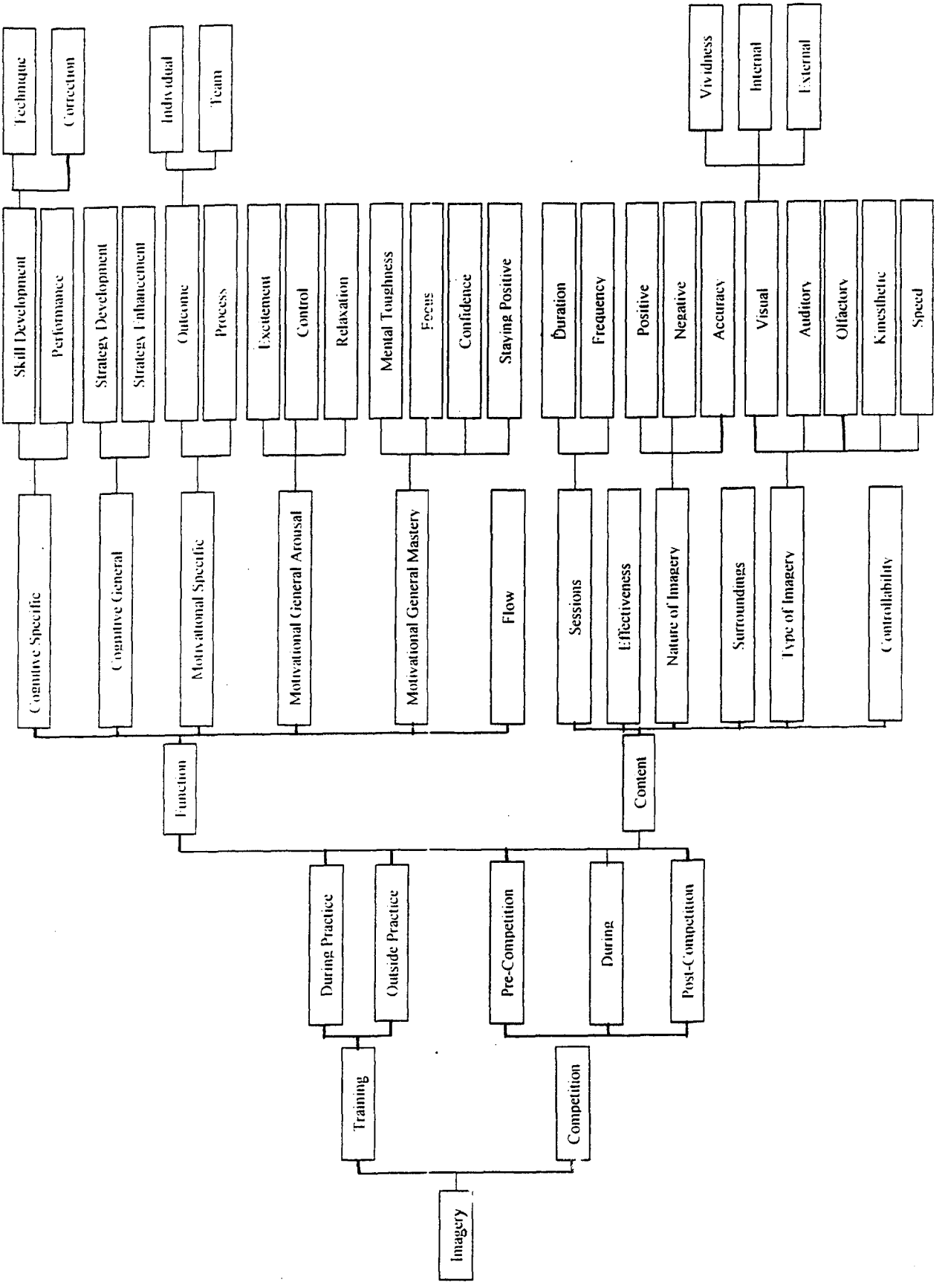
Appendix A

A Conceptual Framework for Athletes' Use of Imagery

(Used with permission from Munroe et al., 2000)



Appendix B

Sport Imagery Questionnaire for Children (SIQ-C)

(adapted from Hall et al., 1998)

MODIFIED SPORT IMAGERY QUESTIONNAIRE FOR CHILDREN
SIQ-C

Name: _____ **Age:** _____
Number of Years in Sport: _____

Directions: Imagery is a mental skill that is used to create and re-create pictures in your mind. Athletes use imagery in practices and in competition. Imagery can be used to see different skills in your head and can also be used to help with your confidence and nervousness. This questionnaire measures how you are using imagery **right now**. Any statement that explains an imagery situation that you often use should be given a high number.

The statements will be scored from 1-7. Please read each statement and then circle the number that most applies to you for that statement. Feel free to use a number more than once and remember – there are no right or wrong answers.

Not often						**Often**
1	**2**	**3**	**4**	**5**	**6**	**7**

Statement	Scale
1. I make up new plans in my head.	1 2 3 4 5 6 7
2. I see how the gym looks as I win a competition.	1 2 3 4 5 6 7
3. I see myself doing my very best in a competition.	1 2 3 4 5 6 7
4. In my head, I imagine how I feel before I compete.	1 2 3 4 5 6 7
5. I see what I would do if my game plans did not work out.	1 2 3 4 5 6 7
6. I imagine myself staying calm in competitions.	1 2 3 4 5 6 7
7. I imagine other people telling me that I did a good job.	1 2 3 4 5 6 7
8. I can usually control how a skill looks in my head.	1 2 3 4 5 6 7
9. I see every part of a game.	1 2 3 4 5 6 7
10. I imagine how it would feel to win a medal or trophy.	1 2 3 4 5 6 7
11. It's easy for me to change how a skill looks.	1 2 3 4 5 6 7
12. I see the audience cheering for me.	1 2 3 4 5 6 7

Not often 1 2 3 4 5 6 Often 7	
13. When I think of doing a skill, I always see myself doing it perfectly.	1 2 3 4 5 6 7
14. I see myself winning a medal or trophy.	1 2 3 4 5 6 7
15. I see myself being nervous at competitions.	1 2 3 4 5 6 7
16. I see myself never quitting in a competition, even if it is not going well.	1 2 3 4 5 6 7
17. When I think of a competition, I imagine myself getting excited.	1 2 3 4 5 6 7
18. I can correct a skill in my head.	1 2 3 4 5 6 7
19. I see myself doing skills exactly how I want them to look in a competition.	1 2 3 4 5 6 7
20. Before trying a skill, I see myself doing it perfectly.	1 2 3 4 5 6 7
21. I see myself being mentally strong.	1 2 3 4 5 6 7
22. When I think about an upcoming competition, I imagine myself being nervous.	1 2 3 4 5 6 7
23. I see myself looking confident in front of others.	1 2 3 4 5 6 7
24. I imagine how exciting it is to be in a competition.	1 2 3 4 5 6 7
25. I see myself being interviewed as a champion.	1 2 3 4 5 6 7
26. I see myself being focused in a tough situation.	1 2 3 4 5 6 7
27. When learning something new, I see myself doing it perfectly.	1 2 3 4 5 6 7
28. I see myself being in control in tricky situations.	1 2 3 4 5 6 7
29. I see myself following my own plan at competitions.	1 2 3 4 5 6 7
30. I see myself getting through tough situations with good results.	1 2 3 4 5 6 7

Appendix C

Competitive State Anxiety Inventory 2 for Children (CSAI-2C)

(Stadulis et al., 2002)

COMPETITIVE STATE ANXIETY INVENTORY 2 FOR CHILDREN
CSAI-2C

Name: _____ **Age:** _____

Directions: Below are some statements about how boys and girls feel when they play games or participate in sports and physical activities, like baton twirling. Please read each statement, then circle the appropriate number to the right of the statement to indicate **how you feel right now** – at this moment – as a competitor at the Canadian Baton Twirling Championships. There are no right and wrong answers. Do not spend too much time on any one statement, but choose the answer which describes your feelings **right now**. If you do not understand any statement or word, CIRCLE that statement or word, THEN ask the tester for an explanation.

Statements	Not at all	Somewhat	Moderately So	Very Much So
1. I am concerned that I may not twirl as well as I can today.	1	2	3	4
2. My body feels tense.	1	2	3	4
3. I feel self-confident.	1	2	3	4
4. I feel tense in my stomach.	1	2	3	4
5. I feel secure.	1	2	3	4
6. I'm confident I can meet the challenge of twirling well today.	1	2	3	4
7. I'm concerned that I will twirl poorly today.	1	2	3	4
8. My heart is racing.	1	2	3	4
9. I'm confident that I will twirl well today.	1	2	3	4
10. I am worried about reaching my baton goal.	1	2	3	4
11. I feel my stomach sinking.	1	2	3	4
12. I'm concerned that others will be disappointed with my baton performance.	1	2	3	4
13. I'm confident because, in my mind, I picture myself reaching my goal.	1	2	3	4
14. I'm concerned about not being able to concentrate today.	1	2	3	4
15. My body feels tight.	1	2	3	4

Appendix D

Recruitment Letter

UNIVERSITY OF
WINDSOR

RECRUITMENT LETTER

Faculty of Human Kinetics
University of Windsor
Windsor, ON
N9B 3P4

To Provincial/State Team Managers and/or Provincial/State Coaches,

I am writing this letter to ask for your cooperation in conducting a research study on young athletes' use of imagery and anxiety before competition. I am recruiting female athletes between the ages of 7-15 years. All athletes must be Level A or Advanced status in at least one individual event (i.e., freestyle, medley, solo, 2-baton, 3-baton or solo dance twirl). Recruitment will take place at the Canadian, American National, or Junior Olympic competitions in July 2003. Subjects will be asked to complete 2 questionnaires. One questionnaire, the Sport Imagery Questionnaire (SIQ), will be completed approximately 2 days before competition. The other questionnaire, the Competitive State Anxiety Inventory 2 for Children (CSAI-2C), will be completed approximately 2-3 hours before the athlete is to compete. The purpose of this study is to examine the relationship between imagery use and anxiety in young elite athletes. Studying this relationship will provide insight into what young athletes are imaging and how this information can be used to reduce or cope with competition.

Athletes will be asked to volunteer as participants in this study. Consent will be obtained from the athletes' parent or guardian and assent will be obtained from the athlete. Confidentiality will be assured. There are no known or anticipated risks associated with this study. An initial meeting will be held with Junior A parents, coaches and athletes at the conclusion of one of the provincial/state practices. The SIQ will be competed at the conclusion of another practice time. The CSAI-2C will be given approximately 2-3 hours before the athlete competes in her first event. If the researcher is unable to administer to questionnaires, a coach may be asked to do so and will be briefed beforehand.

Please feel free to pass this information on to members of your provincial/state contingent and parents or guardians. If you have any questions or concerns about the study, please contact myself, Leisha Strachan, at the phone number or email address below.

Thank you for your time and consideration.

Sincerely,

Leisha Strachan
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Faculty of Human Kinetics
University of Windsor
(519) 988-1027
strach5@uwindsor.ca

Appendix E

Parent/Guardian Letter of Information and Consent Form

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Parent/Guardian Letter of Information and Consent Form

Using Imagery to Control Anxiety in Young Elite Athletes

Your child is being asked to participate in a research study conducted by Leisha Strachan, a graduate student from the Faculty of Human Kinetics at the University of Windsor. Working in collaboration with Dr. Krista Munroe, imagery use and anxiety in young, elite athletes will be investigated.
If you have any questions or concerns about this research, please feel free to contact Leisha Strachan at (204) 694-6025, (519) 988-1027, or strach5@uwindsor.ca.

Purpose of the Study
The purpose of the study is to investigate the use of imagery by young elite athletes ages 7-15 years using 2 questionnaires (i.e., the Competitive State Anxiety Inventory 2 for Children and a modified version of the Sport Imagery Questionnaire). Anxiety in sport is associated with feelings of stress that a person may experience. It can manifest itself in feelings of worry or apprehension or in physical sensations such as sweaty palms or butterflies. Imagery is defined as creating or re-creating an experience in one's mind. Imagery can be used to increase confidence, decrease anxiety, and evaluate skills and routines.

Procedures
If you volunteer your child to participate in this study, I would ask her to do the following: Permission/consent will be obtained from you before the athletes participate in the study. The athletes will be recruited from the Canadian Baton Twirling Championships taking place in Toronto, National Baton Twirling Association Nationals, and the Amateur Athletic Association Junior Olympics, all taking place in July 2003 Participants will be asked to complete the Sport Imagery Questionnaire 1-2 days before competing. This will take place after a provincial/state practice at the competition venue. On the day of competition, the athletes will complete the Competitive State Anxiety Inventory 2 for Children (CSAI-2C) approximately 2-3 hours before they compete. It is ideal to complete the CSAI-2C 2-3 hours before an athlete competes in order to get an accurate representation of competitive anxiety.

Feedback from the Study
The primary investigator will provide feedback via provincial coaches. If additional information is requested, information can be sent via email (strach5@uwindsor.ca) or regular mail.

Potential Risks or Discomforts
There are no known or anticipated risks from discussing previous and current imagery use and anxiety in sport.

Potential Benefits to Subjects and/or to Society
Findings from this study will provide insight into what young athletes are imaging during competition. Knowing what young athletes image can help researchers to discover what imagery techniques may be most useful in control anxiety during competitions.

Payment for Participation

Subjects will not be compensated for their involvement in this study; participation is voluntary.

Confidentiality

Any information that is obtained in connection with this study and that can be identified with your child will remain confidential and will be disclosed only with your permission. The information obtained will not be used for any purpose other than the research and communication of results.

Participation and Withdrawal

Your child can choose whether to be in this study or not. If your child volunteers to be in this study, she may withdraw at any time without consequences of any kind. You may exercise the option of removing your child's data from the study. Your child may also refuse to answer any questions that she does not want to answer and still remain in the study. The investigator may withdraw your child's participation in the study if circumstances arise which warrant doing so.

Rights of Subjects

You may withdraw your consent at any time and discontinue participation without penalty. This study has been reviewed and received ethics clearance through the University of Windsor Research Ethics Board. If you have questions regarding your child's rights as a research subject, contact:

Research Ethics Co-ordinator
University of Windsor
Windsor, ON
N9B 3P4
Telephone: (519) 253-3000, extension 3916
Email: ethics@uwindsor.ca

SIGNATURE OF PARENT OR GUARDIAN

I understand the information provided for the study "Using Imagery to Control Anxiety in Young Elite Athletes" as described herein. My questions have been answered to my satisfaction, and I agree to allow my child to participate in this study. I have been given a copy of this form.

Name of child: _____

Name of Parent/Guardian (please print): _____

Signature of Parent/Guardian: _____

SIGNATURE OF INVESTIGATOR

In my judgement, the subject is voluntarily and knowingly giving informed consent to participate in this research study.

Signature of Investigator: _____ Date: _____

Appendix F

Child's Assent Form

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CHILDREN'S ASSENT FORM

USING IMAGERY TO CONTROL ANXIETY IN YOUNG ELITE ATHLETES

My name is Leisha and I am a researcher. I am doing a study on young athletes' use of imagery and anxiety in competitions. Imagery is creating or recreating a situation in your mind. Anxiety is what you feel before you compete (nervous feelings such as worry or butterflies in your stomach). There are 2 questionnaires for you to fill out for this study. The questionnaires will ask you about how you use imagery while you are twirling and about how you feel before you compete.

When everyone who volunteers for this study is finished with the questionnaires, I will write a report on what I have learned. It might be put in a book, but no one will know who has filled in the questionnaires. I want you to know that I will not be telling your coaches, parents or any other kids what you answer.

Your mom/dad/guardian have said that it is okay for you to answer the questionnaires about imagery and anxiety. Do you think that you would like to answer them? You won't get into any trouble if you say "no". If you decide to answer the questions, you can stop answering them at any time, and you don't have to answer any questions you do not want to answer. It's entirely up to you. I will be available though, if you need any help.

Would you like to try answering the questions?

Please sign your name below if you understand what you are being asked to do in the study and if you agree to be in the study.

Signature: _____

Witness: _____

Date: _____

Vita Auctoris

Name: Leisha Strachan

Place of Birth: Winnipeg, Manitoba

Year of Birth: 1974

Education:

Master of Human Kinetics
University of Windsor
Windsor, ON
2002-2004

Bachelor of Education
University of Manitoba
Winnipeg, MB
1997-1999

Bachelor of Physical Education
University of Manitoba
Winnipeg, MB
1994-1997

Presentations:

"Examining thoughts about exercise in previously sedentary obese females". Presented at the North American Society for the Psychology of Sport and Physical Activity, Vancouver, British Columbia, June 2004.

"Closing the gap between sport psychology and motor control: An analysis of the sport of baton twirling". Presented at the Eastern Canadian Sport and Exercise Psychology Symposium, Brock University, St. Catharines, Ontario, March 2004.

"Modifying the sport imagery questionnaire: Making it developmentally appropriate for young athletes". Presented at the Canadian Society for Psychomotor Learning and Sport Psychology Conference, Hamilton, Ontario, October 2003.

"Using imagery to control anxiety in young, elite athletes: A proposed study". Presented at the Eastern Canadian Sport and Exercise Psychology Symposium, McGill University, Montréal, Québec, March 2003.

Scholarly Experiences: Graduate Student Representative

Human Kinetics Society
Faculty of Human Kinetics
University of Windsor
Windsor, ON
October 2002 – April 2004

Attended the Association for the Advancement of Applied Sport Psychology (AAASP) conference
Philadelphia, PA
October 2003