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Effects of a cognitive specific imagery intervention on the soccer skill performance of young athletes aged 11--12 and 13–14: A developmental perspective.

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Effects of a Cognitive Specific Imagery Intervention on the Soccer Skill Performance of Young Athletes Aged 11-12 and 13-14: A Developmental Perspective

By

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Abstract

The primary purpose of the present study was to examine the effects of a cognitive specific imagery intervention on the soccer skill performance of young athletes aged 11-12 and 13-14 years and determine if such performances vary with age and gender. A secondary purpose was to determine if such performances are a result of imagery function. Participants were 68 soccer athletes belonging to eight different teams. Teams were randomly assigned to either a CS or MG-A imagery group. Athletes were administered the SIQ-C and tested on the soccer skill to determine baseline performance. Following the intervention, athletes were tested on the same soccer skill, and completed the SIQ-C. Athletes in the current study did not increase their frequency of imagery use, nor did they improve their performance. Performances varied with respect to gender however, no significant age group differences were present. Reasons for these findings are discussed.

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Introduction

In the last 50 years, imagery has been extensively researched with adult athletes. However, there has been very limited research examining imagery use by young athletes and almost no research examining imagery use from a developmental perspective (Munroe-Chandler, Hall, & Fishburne, 2006). It is known that mental skills can be beneficial to young athletes as long as they are comprehensible to the child (Weiss, 1991). Moreover, there is support for the notion that children's mental skills improve significantly with practice (Weiss).

Imagery has been shown to be a promising mental skill for children (Munroe-Chandler, Hall, Fishburne, & Shannon, 2005; Orlick & Zitzelsberger, 1996; Partington 1990). In particular, imagery presents an opportunity to learn skills faster, as well as at an earlier age which, in turn, provides children with greater control over their own destiny (Li-Wei, Qi-Wei, Orlick, & Zitzelsberger, 1992). Li-Wei and colleagues conducted one of the few experimental studies to examine the effects of cognitive specific (CS) imagery on children's sport performance. Results indicated that players (ages 7-10) using imagery experienced significantly greater improvements in their table tennis performance than players not using imagery. Previous research has also demonstrated that young athletes benefit from utilizing motivational general-arousal (MG-A) imagery to relax and reduce anxiety prior to competition (Munroe-Chandler et al., 2005). Therefore, incorporating mental skills, such as imagery, into regular physical practice sessions should be beneficial (Munroe-Chandler & Hall, 2004-2005). The positive aspects of imagery use may also lead to increases in young athletes' performance and, ultimately, their continued involvement in sport (Munroe-Chandler et al., 2005).

Although there has been minimal support for examining imagery use by young athletes from a developmental perspective (Munroe-Chandler, Hall, & Fishburne, 2006), it may be possible that the use of imagery by young athletes is influenced by changes in cognitive development that occur during childhood (Munroe-Chandler et al., 2006). However, it still remains unclear whether there are specific childhood age cohorts in which children can most effectively utilize and learn mental strategies. It may be expected that if a child begins to use imagery early, he/she will then become more proficient at imagery and develop increased learning and self-efficacy from imagery training (Munroe-Chandler et al., 2006).

By examining children's use of imagery in an intervention study, a greater understanding of the impact of imagery on sport performance during pre adolescence and adolescence will be gained. Also, studying young athletes' use of imagery will provide the opportunity to understand the differences in imagery use between adults and children. Accordingly, the purpose of the present study was to examine the effects of a CS imagery intervention on the soccer skill performance of young athletes aged 11-12 and 13-14 years and determine if such performances vary with age and gender. A secondary purpose of the present study was to determine if such performances were a result of imagery function (i.e., cognitive or motivational).

Results of the present study will expand on the minimal imagery literature on young athletes and shed light on the developmental aspect of young athletes' use of imagery. Moreover, results of the present study will aid in the development and planning of appropriate CS and MG-A imagery interventions for young athletes.

Literature Review

Imagery

Individuals use mental imagery for many purposes in everyday life, such as giving and receiving directions or trying to recall a lost object (Moran, 2004). Silva and Stevens (2002) suggest that imagery is often viewed as "the cornerstone of sport psychology interventions" (p. 206) as it is one of the most popular mental training tools used by athletes of all competitive levels. Numerous studies have found that athletes use imagery extensively in order to learn new skills and strategies, and increase motivation (Hall, 2001). Though a universally employed definition has yet to transpire from the literature, most researchers agree that imagery is:

> ...an experience that mimics real experiences. We can be aware of 'seeing' an image, feeling movements as an image, or experiencing an image of smells, tastes, or sounds without actually experiencing the real thing....It differs from dreams in that we are awake and conscious when we form an image (White & Hardy, 1998, p. 389).

Vealey and Greenleaf (2001) state that imagery is a mental training tool that provides athletes with the capacity to see and believe, which gives them the confidence to perform successfully. Although most beneficial when used in conjunction with physical practice, imagery allows athletes to practice sport skills without physically being in the practice environment (Vealey & Greenleaf). Once the benefits of imagery have been realized, most athletes tend to treat their imagery sessions similar to the manner in which they approach their physical practice sessions (Hall, Rodgers, & Barr, 1990). Thus, imagery is a skill as well as an ability and, like any skill, can be enhanced through regular, deliberate practice (Cumming & Hall, 2001; Rodgers, Hall, & Buckolz, 1991).

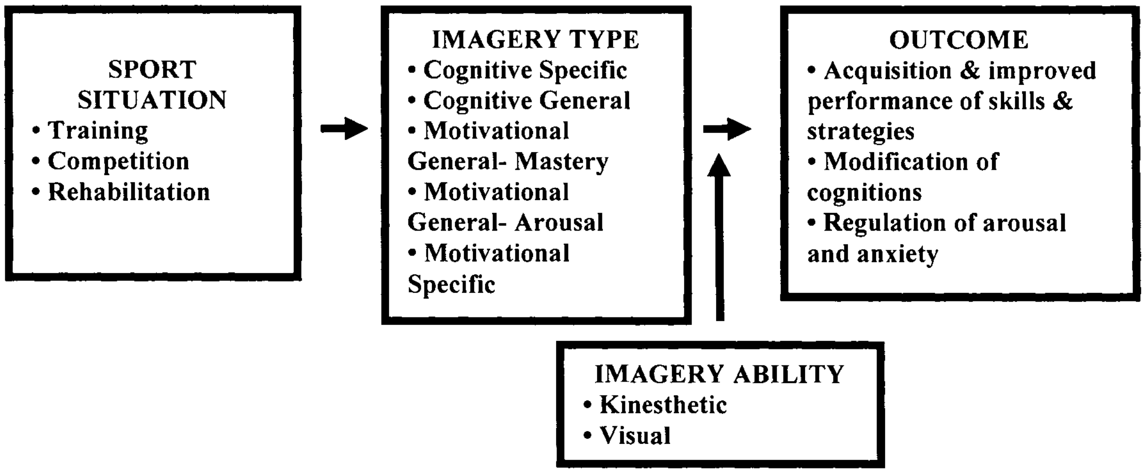
Applied Model of Mental Imagery Use in Sport

In 1999, Martin, Moritz, and Hall developed an applied model of imagery use in sport (see Figure 1) with the goal of reducing the many imagery-related variables that have been examined in applied sport contexts to the smallest possible set of meaningful factors. The model consists of four key constructs; the sport situation, the type of imagery used, the outcomes associated with imagery use, and imagery ability as a potential moderator. Overall, the model represents how athletes use imagery.

Sport situation. Different sport situations can affect imagery use. Martin and colleagues' (1999) model demonstrates that athletes use mental imagery in training periods between competitive events, immediately prior to and during a competitive event, and when they are rehabilitating an injury. Across these sport situations, certain types of imagery use may be more prevalent than others (Hall, 1995). For instance, Salmon, Hall, and Haslam (1994) found that soccer players tended to use imagery more in conjunction with competition than practice, while Cumming and Hall (2002) indicated that athletes use all five functions of imagery, even in the off-season. During training phases, the type of imagery used by an athlete depends on the focus of the training program and the athlete's skill acquisition level (Perry & Morris, 1995). Once novices have acquired the basic sport skills, the emphasis of their training turns to preparation of these skills for performance under competitive pressure (Martin et al.). Advanced athletes, on the other

Figure 1.

Applied Model of Mental Imagery Use in Sport.
(adapted from Martin et al., 1999).



hand, may use imagery to enhance the performance of well-learned skills and strategies and to help them stay focused (Munroe, Hall, Simms, & Weinberg, 1998).

Type of imagery. The model centers around the type of imagery used by athletes (i.e., the function that imagery is serving) (Martin et al., 1999) (see Figure 1). These functions were derived from Paivio's (1985) earlier work in which he proposed an analytic framework indicating that imagery plays both a motivational and a cognitive role in mediating behaviour (see Figure 2). Each of these two functions operates at either a general or specific level. On the cognitive domain, imagery can affect general behavioural strategies or specific responses involved in motor skills. The general motivational level refers to the degree of physiological arousal or emotion that may accompany it, while the specific aspect refers to goal-oriented activity. Therefore, cognitive general imagery includes images of strategies, game plans, or routines (e.g., imaging a figure skating routine); cognitive specific imagery includes images of specific sport skills (e.g., imaging a soccer pass); motivational general imagery includes images relating to physiological arousal levels and emotions (e.g., imaging feeling excited before an important game); and, motivational specific imagery includes images related to an individual's goals (e.g., imaging winning a running race).

Years later, Hall, Mack, Paivio, and Hausenblas (1998) further separated the motivational general function of imagery (see Figure 3). The motivational general-mastery function represented imagery that corresponded to imaging being in control, mentally tough, and self-confident. The motivational general-arousal function involved imagery associated with stress and arousal. Therefore, the collaborative findings of Paivio (1985)

Figure 2

Analytic Framework of Imagery Effects.
(adapted from Paivio, 1985)

	MOTIVATIONAL	COGNITIVE
GENERAL	AROUSAL LEVELS AND EMOTIONS (MG)	STRATEGIES (CG)
SPECIFIC	GOAL ORIENTED RESPONSES (MS)	SKILLS (CS)

Figure 3

Revised Analytic Framework of Imagery Effects.
(adapted from Hall et al., 1998).

	MOTIVATIONAL	COGNITIVE
GENERAL	MASTERY (MG-M) & AROUSAL (MG-A)	STRATEGIES (CG)
SPECIFIC	GOAL ORIENTED RESPONSES (MS)	SKILLS (CS)

and Hall et al. resulted in the production of the five functions of imagery, which are readily used by athletes in a variety of sports and competitive levels. The five functions of imagery are; cognitive general (CG), cognitive specific (CS), motivational specific (MS), motivational general-arousal (MG-A), and motivational general-mastery (MG-M). Moreover, the cognitive and motivational functions of imagery are thought to be orthogonal (Vadocz, Hall, & Moritz, 1997). Thus, athletes can image two functions or types of imagery at once, or image a specific skill without making a behavioural goal, or image emotional situations without any specific cognitive components (Vadocz et al.).

Outcomes associated with imagery use. Athletes may utilize the different functions of imagery for various outcomes or purposes, thus leading to the third aspect of Martin and colleagues' (1999) model (see Figure 1). In other words, the goal behind imagery use has always been "what you see is what you get" (Short, Monsma, & Short, 2004, p. 342). The major outcomes of imagery, addressed in Martin and colleagues' model are facilitating skill and strategy learning and performance, modifying cognitions, and regulating arousal and competitive anxiety. The model examines the effects of the five specific functions of imagery (i.e., CS, CG, MS, MG-M, and MG-A), as well as the effects of imagery use in general. Callow and Hardy (2001) suggested that a differentiation must be made between the function of imagery (i.e., motivational and cognitive) an athlete uses and the interpretation of that image. Short et al. further elaborated on this point by suggesting that two performers may use the same function of imagery, but the content of the image and the importance of the image may be unique to each athlete.

In addition to examining the content of athletes' images, Short and her colleagues (2004) examined athletes' perceptions of imagery functions on the Sport Imagery Questionnaire (SIQ; Hall et al., 1998). Examination of responses demonstrated that all items on the SIQ were perceived as serving more than one function, however, for 25 out of the 30 items, the image content matched to the specific function on the SIQ subscale. The CS function of imagery was strongest in demonstrating concordance with all the items under its respective function. For example, the majority of athletes sampled strongly agreed that the CS imagery function matched specifically to the item (i.e., outcome) of 'helping to learn and perform sport skills'. Also, athletes felt that the outcome of 'effecting arousal or anxiety' strongly pertained to the MG-A function of imagery. The above examples illustrate that the majority of athletes link particular functions of imagery with similar potential outcomes. This supports the notion that each specific function of imagery should matched with its desired outcome, when designing imagery interventions (Martin et al., 1999).

Ahsen's (1984) Triple Code Theory indicates that even if individuals are asked to image an identical scenario, every image imparts a particular meaning and no two people, will have the exact same imagery experience. Although impossible to control for the perceptions of imagery use in all individuals, it is important to match imagery function (i.e., CS, CG, MS, MG-M, and MG-A) with its intended outcome if imagery is to be most beneficial (Munroe, Giacobbi, Hall, & Weinberg, 2000). It would seem that imagery can serve a number of functions, however, these functions should be prioritized within athletes' imagery practice (Hall, 2001). For example, if the goal is to improve a sport skill (e.g., free throw shot in basketball), then the athlete should use CS imagery rather than another function of imagery. Therefore when designing imagery interventions, one must try and develop training programs that incorporate the use of particular imagery functions that closely pertain to the athletic goal.

Imagery ability. The final component of Martin and colleagues' (1999) model is imagery ability. Everyone has the ability to generate and use imagery, but not to the same extent (Paivio, 1985). Individual differences in imagery ability can influence the learning and performance of motor skills (Hall et al., 1998). Two key factors used to measure imagery ability are vividness and controllability. Vividness is the clarity and intensity of the image and controllability is the ease at which the image can be manipulated (Richardson, 1977). Therefore, it is essential that athletes learn how to use imagery effectively in order to positively affect performance. Research among athletes has shown that the ability to visually and kinesthetically image physical movements is associated with greater sport performance (Vadocz et al., 1997). It has also been suggested that athletes higher in kinesthetic imagery ability tend to use more CS and MG-A imagery (Vadocz et al.).

Based on previous research, Martin and colleagues (1999) suggested that imagery ability moderates the effects of imagery use on outcomes. A moderator is "a variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable" (Baron & Kenny, 1986, p. 1174). Most research, to date, examining the moderating effects of imagery ability, has dealt with CS imagery and performance (Martin et al.).

Athletes higher in imagery ability are more likely to use imagery and, in turn, this strengthens imagery ability. In other words, if an athlete is more skilled at using imagery, he/she will be more likely to optimize its effects (Abma, Fry, Li, & Relyea, 2002). It has also been suggested that experienced performers benefit the most from imagery training on motor tasks (Driskell, Copper, & Moran, 1994). For instance, elite athletes reported using more imagery than non elite athletes regardless of the function imagery served and that visual and kinesthetic imagery was used with relatively equal frequency (Salmon et al., 1994). Athletes' imagery ability has most recently been assessed by the Movement Imagery Questionnaire-Revised (MIQ-R; Hall & Martin, 1997), which measures visual and kinesthetic imagery ability for specific movements (i.e., CS imagery).

Cognitive Specific Imagery

The function of imagery that has received the most attention by researchers in the past is CS imagery (Martin et al., 1999). Given that CS imagery deals particularly with the learning and performance of sport skills (Munroe et al., 2000), coaches and athletes may want to incorporate this function of imagery into their training routines for performance enhancement. Previous findings have suggested that CS imagery may be the most effective strategy for promoting athletes' development and performance of individual motor skills (Martin et al.).

CS imagery is the imagined rehearsal of specific sport skills, which is further divided into skill development and skill execution (Munroe et al., 2000). Skill development is related to the learning of a skill and entails working on technique and making corrections and skill execution involves attempting to perform the skill as best as possible in a given situation (e.g., double axel in a competition) (Munroe et al.). It is the most widely examined function of imagery as a technique for enhancing the acquisition and performance of motor skills (Martin et al., 1999). The term acquisition refers to improvement in performance of a motor task with practice over time (Creelman, 2003).

Athletes at varying competitive levels seem to find it relatively easy to visualize and feel themselves performing skills (Hall et al., 1990) and report using CS imagery more for skill execution than skill learning (Munroe et al. 2000). In a study conducted by White and Hardy (1998) with gymnasts and canoeists, it was found that both groups of athletes used CS imagery for learning, understanding, and rehearsing moves in practice and competition. In addition, gymnasts and canoeists used CS imagery to learn appropriate timing of skills and to restructure mistakes following a performance review, respectively. More specifically, gymnasts used CS imagery to understand the technical demands of movement skills and canoeists used CS imagery more for rehearsing difficult manoeuvres.

According to Martin et al. (1999), novice athletes tend to use imagery primarily for its cognitive functions because they are generally focused on learning sport skills and strategies. Additionally, Burhans, Richman, and Bergey (1988) demonstrated that participants who used CS imagery showed greater performance improvements than participants who used MS imagery in the initial stages of a training program for beginner runners. Research does suggest, however, that advanced or elite athletes still tend to report using a substantial amount of CS imagery, even though their skills are well developed (Martin et al.).

In a study examining CS imagery use with elite and novice soccer players, Blair, Hall, and Leyshon (1993) found that participants in the imagery group significantly improved their performance on a soccer task (i.e., a sequence of dribbling, passing, shooting skills) compared to the control group (i.e., no imagery). Performance on the post test, as measured by response time, revealed an equal yet significant improvement for both the skilled and novice players in the imagery group. The control group failed to show any improvements and no effects were found for performance accuracy. The results of this study support previous research by demonstrating that an imagery intervention can facilitate the acquisition of a serial gross motor task just as it can with discrete skills. The majority of imagery studies have dealt with discrete skills, which are single tasks, with a beginning and an end, such as dart throwing (e.g., Straub, 1989). Serial tasks involve a combination of skills sequenced together (e.g., Blair et al.). Therefore, CS imagery practice is an adequate substitute in the instance that physical practice may not be possible, since it contributes directly to skill performance (Hall, 2001).

Overall, the positive effect of CS imagery practice on movement performance is attributed to increased responses of higher-level mental nodes, which in turn increase the over-all speed of response (Bohan, Pharmer, & Stokes, 1999). When learning a novel task in which component motor skills are already well rehearsed, imagery practice may be sufficient to improve motor performance with little or no additional physical practice. It has been said that imagery should be more effective after the performer has had practice doing a task, because this will ensure that a strong internal representation of the skill will have been developed (Bohan et al.). This prior experience allows the performer to form a clear accurate image of what superb task performance looks like (Abma et al., 2002) and subsequent performance is then directed at copying the imaged performance (Blair et al., 1993).

Motivational General-Arousal Imagery

While the majority of the imagery studies have examined the use of CS imagery on skill performance, MG-A imagery has received some attention (White & Hardy, 1998). MG-A imagery is associated with feelings of relaxation, stress, arousal, and anxiety that accompany sport competition (Munroe-Chandler et al., 2006). It is a very important function of imagery in that athletes use it to get psyched up or motivated during a game or to stay relaxed and calm prior to competition (Munroe et al., 2000). Out of the five functions of imagery, soccer players specifically used MG-A imagery the most for the purpose of staying energized during practice and competition (Salmon et al., 1994). White and Hardy (1998) demonstrated the use of MG-A imagery in a study with gymnasts and slalom canoeists. Both gymnasts and canoeists used imagery to control anxiety while performing difficult moves in training and competition. In addition, canoeists used MG-A imagery to feel more aggressive and create an appropriate mood state for competition.

Imagery has also been shown to be an effective strategy for controlling levels of competitive anxiety (Vadocz et al., 1997). Vadocz and colleagues explored the relationship between imagery use, imagery ability, competitive anxiety, and performance with 57 competitive roller skaters. Results revealed that MG-A imagery was a predictor of cognitive state anxiety. In other words, athletes using more of this type of imagery had higher levels of cognitive anxiety. Interestingly, athletes higher in kinesthetic imagery ability reported using more MG-A imagery, as well as more CS imagery. In general, results indicated that athletes seem to use motivational imagery prior to competing and to help control other variables important to performing successfully. For example, when athletes image the excitement associated with an upcoming performance, it may help them get psyched to compete (Vadocz et al.).

Imagery Theories

There are various theories that attempt to explain how imagery works to benefit individuals (e.g., Ahsen, 1984; Lang, 1979). These theories ultimately provide the necessary information to effectively design imagery interventions, using the different functions of imagery (e.g., CS and MG-A imagery). When designing imagery scripts in the sporting context, imagery theories may provide a background on how to properly mentally stimulate athletes, depending upon the sport situation, the performance or skill involved, and the function of imagery being used.

Both the Bio-informational Theory (Lang, 1979) and the Triple Code Theory (Ahsen, 1984) have demonstrated superiority in effectively explaining imagery use over previous theories such as the Symbolic Learning Theory (Sackett, 1934) and the Psychoneuromuscular Theory (Jacobson, 1930). The Symbolic Learning Theory (Sackett) suggests that movement patterns are coded into an individual's memory system as mental blueprints. The use of imagery serves to strengthen these mental blueprints by increasing an individual's familiarity with the blueprint, or movement pattern, being mentally recalled (Sackett). The Psychoneuromuscular Theory states that neural pathways are activated when mentally imaging a skill and these neural pathways are identical to those activated when physically performing the specific movement (Jacobson).

Lang's (1979) Bio-informational Theory suggests that mental practice effects reflect an interaction of three separate factors: the environment in which the movement is performed ("stimulus" information), what is felt as the movement occurs ("response" information), and the perceived importance of the skill to the performer ("meaning" information). Lang began with the notion that mental images are not just "pictures in the mind" but propositional representations in long-term memory. Stimulus propositions are statements that describe the content of the situation being imaged (e.g., the feel of the soccer ball on the foot). Response propositions are statements that describe how and what the individual feels as he/she responds to the imaged scenario (i.e., tension before the penalty kick). Lastly, meaning propositions refer to the perceived importance of the skill being imagined to the individual (e.g., trying to score the winning goal of a championship game).

The Bio-informational Theory adds to previous imagery theories by incorporating the unique factor of the impact of affective responses on the efficacy of imagery use. Moritz, Hall, Martin, and Vadocz (1996) found that high sport-confident roller skaters used more mastery and arousal imagery than low sport-confident skaters. This critical finding suggests that emotions are an important imagery mediator. Evidence has shown that imagery scripts emphasizing response propositions elicit greater physiological reactions than do those predominately containing stimulus propositions (Lang, Kozak, Miller, Levin, & McLean, 1980). In order for mental practice to be maximally effective, both stimulus and response propositions must be activated by the imagery script used (Lang, 1979). Response propositions are of significant interest to researchers because they are believed to be coded as bodily responses that are primed by efferent outputs to the muscles of the body (Moran, 2004). Even if the response propositions are negatively imaged, evidence demonstrates that individuals can still benefit from their affect and improve performance to a greater extent than if they were to only image the stimulus propositions alone. It is essential that response propositions be activated so they can be modified, improved, and strengthened in order for imagery to facilitate sport performance (Vealey & Greenleaf, 2001). Thus, imagery scripts that heavily stress response propositions should influence athletes' mental practice by enhancing the vividness of the desired image (Moran). The Bio-informational Theory is an improvement over earlier theories, however, due to its psychophysiological basis, it explains little about the motivational functions of imagery and does little to explain the role of imagery in linking action with language (Hall, 2001).

Ahsen's (1984) Triple Code Theory (ISM) is very similar to Lang's (1979) Bio-informational Theory. Ahsen postulates that an image is composed of three sources of information that are coded by the individual. The image (I) is related to Lang's stimulus propositions in which effective images are vivid and realistic and closely replicate the object, skill, or scenario as it would occur in reality. The second source of information involves the individual's somatic responses (S) (similar to Lang's response propositions), which results in an individual experiencing psychophysiological changes when imaging a skill. These can include somatic responses such as an increase in heart rate, heavy breathing, or other physiological responses to anxiety or arousal. The third source of information is the meaning of the image (M), which speculates the need to consider individual differences with respect to imagery use. Again, Ahsen indicates that every image imparts a meaning and that no two people, even if provided with identical imagery scripts, will have the exact same imagery experience. The Triple Code Theory states that the most effective images are realistic and vivid, evoke psychophysiological responses, and impart significance to the individual (Ahsen). A weakness of the Triple Code Theory may be its inability to encompass all five of the functions of imagery. Much like Lang's Bio-informational Theory, it is possible to assume inclusion of the five functions, however, there is no exact explanation of how the three sources of information of the Triple Code Theory (ISM) are related to, or affect, each of the five functions of imagery.

Utilizing the components of the Bio-informational Theory and the Triple Code Theory is essential when designing imagery scripts for athletes in order to convey stimulating and responsive situations, as well as meaningful and emotional interpretations. These components may ultimately increase the effectiveness of the athletes' imagery use. Further, Holmes and Collins (2001) stress that the imagery modality used should present the participants with an imagery experience that is realistic and employs the motor representation as fully as possible. Effective imagery scripts will incorporate the above components from each theory (i.e., Bio-informational and Triple Code) by using the PETTLEP approach to motor imagery. The PETTLEP model incorporates seven aspects that relate to imagery script construction (Holmes & Collins). The seven factors are; (P)-physical, (E)-environment, (T)-task, (T)-timing, (L)-learning, (E)-emotion, and (P)-perspective. Motor imagery effectiveness can be improved by including one or more of the model's components throughout the imagery script (Holmes & Collins).

The use of a video-model may also utilize certain components from the above theories (e.g., response stimuli, meaning) and add to the effectiveness of the imagery intervention. Smith and Holmes (2004) stated that observing others is an effective way to enhance motor skill performance. For instance, through the use of external visual imagery, the athlete should be provided with the chance to visually rehearse the key visual parameters extracted from the model and plan the desired motor responses (White & Hardy, 1995). Moreover, in Li-Wei and colleagues' (1992) study, participants observed a video model as part of their imagery training and were asked to imagine and feel themselves perform in the same manner as the player in the video. It was argued that this procedure helped transfer the high level of technical skill viewed on the video into the quality of their own subsequent execution of the skill. The use of video can maximize the effectiveness of imagery, since it may involve greater multi-sensory engagement of the performer when generating the image content (Smith & Holmes).

Cognitive Development and Imagery Use

The pre adolescent and adolescent years are crucial times in terms of cognitive (Piaget, 1971) and motor development (Fishburne, 1988). It is important to involve children in cognitive and motivational imagery practices, not only to gain in performance of specific activities, but also to aid these children in developing and improving their imagery skills (Munroe-Chandler et al., 2006). Weiss (1991) indicated that imagery is a natural skill for children and thus getting them to imagine performance strategies is a natural transfer because these children, more than likely, will have used some form of imagery in play or sport. Despite this contention, most previous studies examining children's use of imagery have focused on areas other than sport.

Imagery from a developmental perspective has been examined for many years, dating back to Piaget's (1971) initial findings relating to children's cognitive processing. Thus, in order to use imagery successfully, a child must have enough imaging ability to experience images almost as though they were real (Kwekkeboom, Maddox, & West, 2000). "The origins of imaginal skills and the readiness to spontaneously utilize imaginal capacities lie in the imaginative make-believe play and fantasy experiences of childhood" (Qualls & Sheehan, 1983, p. 91). A number of factors have been identified that seem to enhance make-believe play in children and may, in turn, lead to better imagery abilities later in life (Sheikh & Korn, 1994). Some factors include; positive interpersonal experiences early in life as well as the opportunity for personal space (Tower, 1983), encouragement to engage in role-taking activities (Saltz, Dixon, & Johnson, 1977), and parental storytelling during youth (Hilgard, 1980). Singer (1961) indicated that children who play alone report more imaginative play. Therefore, children who have experienced some of the above factors may have better imaging abilities than children who were not introduced to such situations.

Additionally, Piaget (1971) argued that there are important times during childhood development when cognitive processing changes occur. It is possible that such changes may be reflected in a young athletes' imagery use (Munroe-Chandler et al., 2006). Piaget identified a number of stages of cognitive development that children pass through as they move from early to late childhood (Piaget, 1971; Piaget & Inhelder, 1971). Through critical observation and a number of ingenious block and wire experiments, Piaget reported that images are not formed until the child is between 2 and 3 years of age.

Further, it is only when children move into the concrete operational stage, from about 8-11 years of age (i.e., pre adolescence) that they begin to produce transformational images (Piaget, 1971). Children in this stage are now able to partake in kinetic and transformational imagery and imagery is becoming reproductory and anticipatory. In other words, they can reproduce what has been seen, and they can anticipate changes in form and location. They are no longer egocentric in their thinking and can think logically about objects and events (Piaget). Children at this stage also have a broader perceptual focus and can concentrate on more than one aspect of stimuli. They spend less time processing irrelevant cues and are more selective with information pertaining to various tasks (Gallagher, French, Thomas, & Thomas, 1996). Flexibility in their thinking develops as well as an increased short term memory, although memory retention skills are still lacking (Piaget). They are also able to represent time, space, and force parameters and produce kinetic images through their own body movements (Piaget). Children and pre adolescents, aged 8-11 years, still require more cognitive cues than adolescents, aged 12-14 years, or adults when performing motor tasks (Gallagher et al.). Lastly, children and pre adolescents, 8-11 years of age, are capable of anticipatory imagery and can predict new and simple movement sequences (Gallagher et al.).

As children progress into pre adolescence (i.e., approximately 11-12 years) and adolescence (i.e., approximately 13-14 years) they enter Piaget's (1971) formal operational stage. They are now sufficient at logical hypothetical deductions and are able to perform operations not only on objects themselves, but also between classes of objects. It is possible that operational thought enhances the ability to form better images, and in turn, the development of imagery assists in operational thought. Children at this stage can also think in abstract terms, process instructions more quickly, and come up with solutions to problems (Piaget). In general, during the formal operational stage of cognitive development, pre adolescents' and adolescents' speed of processing, attention span, mental space, spatial cognition, and memory skills improve (Gallagher et al., 1996).

Thus, it is evident that between childhood, pre adolescence, and adolescence, children, ages 8-14 years, undergo cognitive processing changes that may affect their ability to use imagery and, during this period, visual and kinesthetic imagery improve (Fishburne, Hall, & Franks, 1987). It has been speculated that by 14 years of age, imagery ability has fully developed and is identical to that of an adult (S. Kosslyn, personal communication, September 3, 2002).

It is thought, by most, that children use imagery in their thinking, more than adults (Kosslyn, Margolis, Barrett, Goldknopf, & Daly, 1990). Perhaps this is due to their natural creativity and vivid imaginations. Thus, the properties of children's imagery may have great impact on their concepts and reasoning (Kosslyn et al.). Due to the different cognitive components of imagery, individuals of different age groups may be more or less well suited for performing certain imagery tasks (Kosslyn et al.). For instance, Hale (1990) suggested that the speed of mental rotation increases with age, until about 15 years of age. Results of a study examining age differences in imagery indicated significant performance increases between 8 year-old children and 14 year-old adolescents in image scanning, rotation, and generation (Kosslyn et al.). However, no differences were found between the two age groups, with respect to image maintenance. Kosslyn and colleagues demonstrated that there might be age differences in certain information processing components, but not in others.

Further, imagery use by children as well as the developmental relevance for imagery properties, such as vividness and control, has been recognized as an important area (Wolmer, Laor, & Toren, 1999). Isaac and Marks (1994) found substantial increases in children ages 9 to 10 years, for both boys and girls, and in pre adolescents ages 11 to

12 years for boys, in imagery vividness. It was suggested these changes were related to physiological and hormonal changes at these childhood and adolescent developmental stages (Isaac & Marks). It was also discovered that children's ability to manipulate visual images is a function of both task demands and control processes that develop with age (Brandimonte, Hitch, & Bishop, 1992). Wolmer et al. investigated the development of control of mental images in boys and girls aged 7 (i.e., childhood) to 17 (i.e., late adolescence) years. Results showed that a developmental change in reported imagery control as well as vividness occurred between the children and adolescents. With respect to gender, it was found that girls showed more ability in controlling stationary mental images but not with images that contained a higher difficulty. This suggests that girls may perform better than boys on low difficulty tasks but no differences exist between genders on tasks that require complex cognitive demands. Results demonstrated potential gender differences and that capacity for image control increases from childhood to adolescence and even into adulthood (i.e., approximately 9-20 years of age).

Again, very little research has focused on young athlete's imagery use from a developmental perspective. Although it may be clear that imagery ability increases during childhood (i.e., with age) and may differ between genders, it is not yet known which age groups or gender provide the greatest differences in ability. The mixed evidence resulting from the above research indicates the necessity for future studies examining the effects of athletes' imagery use from a developmental perspective.

Imagery Use and Young Athletes

Psychological skills in children may be associated with the qualities or characteristics that are potentially gained through participation in sport (Weiss, 1991).

Alterations in these psychological skills (e.g., imagery) will produce improvements in sport participation rates, enjoyment of physical activity, skill performance, and general well-being (Weiss). Although, little research has been conducted on young athletes and imagery, it has been demonstrated that children's motor performance can be improved through the use of mental imagery (Short, Afremow, & Overby, 2001). Therefore, increasing sport performance through psychological skills, such as imagery, will ultimately lead to greater sport involvement among youth.

Young performers are capable of learning and using cognitive strategies, such as imagery, to improve their performance (Wrisberg & Anshel, 1989). Although young athletes have the capability to use imagery successfully, imagery ability has been shown to increase with age and practice (Fishburne, 1990). Previous research has demonstrated that young athletes are motivated by opportunities and techniques they perceive to enhance their skill development (Klint & Weiss, 1987). More specifically, Wrisberg and Anshel indicated that mental imagery combined with arousal control is a useful pre-shot cognitive strategy that young athletes may use to improve free throw shooting performance.

Li-Wei, and colleagues' (1992) study was one of the first to shed light on the benefits of CS imagery training for children. Participants consisted of three groups of table tennis players aged 7-10 years and the purpose of the study was to assess the value of imagery training with respect to children's performance enhancement. General results demonstrated that children who used mental imagery experienced significantly greater improvement in the accuracy and technical quality of their shots in relation to video observer groups and control groups. More specifically, the mental training group was the only group to show significant increases in scores from pre to post intervention on all four measures of performance (i.e., accuracy and technical ratings of topspun and underspun balls). The improved performance of the children in the mental imagery group may have been due to the participants forming a more perfect image of what they were attempting to perform, as well as a stronger motor pattern for actually executing the skill. It is postulated that the more one can integrate quality imagery with quality movement, within real practice environments, the better the results will be (Li-Wei et al.).

Similarly, Atienza, Balaguer, and Garcia-Merita (1998), conducted a pilot study to analyze the effects of complementing physical training for tennis serves with video-model observation and imagery training, on a group of child and pre adolescent tennis players (9-12 years of age). Participants were divided into three groups; a physical practice group, a physical practice + video group, and a physical practice + video + imagery group. The physical training group did not improve their tennis serve performance from pre to post test, whereas the group that received mental imagery training (i.e., CS imagery) improved their performance. It was concluded that a combination of physical training with mental training, using video-model observation, as well as the combination of physical practice, video-model observation, and imagery produced improvements in tennis serve technique. Such improvements clearly support the use of video-models for learning motor skills.

Due to the fact that previous research has stated that MG-M imagery is most beneficial for increasing an athlete's self-confidence (Martin et al., 1999), Munroe-Chandler and Hall (2004-2005) implemented an MG-M imagery intervention in order to increase a pre adolescent (i.e., 10-12 years) female soccer teams' collective efficacy. The intervention was given to three groups of youth soccer players (i.e., forwards, midfielders and defense/goal keeper). Results revealed that the forwards and midfielders experienced an increase in their collective efficacy scores in both training and competition with the imagery intervention. The defense/goal keepers did not show any change in their collective efficacy for either training or competition, although this group still reported using imagery on a consistent basis and found it to be beneficial. Also, results demonstrated that all athletes (i.e., children and pre adolescents) used imagery on a daily basis and had a positive reaction to the imagery sessions.

Further, Munroe-Chandler and colleagues (2005) studied the effectiveness of a CG imagery intervention on three soccer strategies in a pre adolescent elite female soccer team (12 years of age). As hypothesized, CG imagery increased from baseline to post intervention. However, results also indicated that players increased their CS and MG-A imagery from baseline to post intervention. The authors indicated that CS imagery use increased given that soccer strategies are comprised of various skills (Munroe-Chandler et al.), while the increase in MG-A imagery may have been because players were using this function of imagery to relax or reduce anxiety, prior to executing the strategy. Overall, findings indicated that pre adolescent athletes use imagery quite extensively and their use of imagery increased over the seven weeks, most likely due to the imagery intervention (Munroe-Chandler et al., 2005).

As previously stated, minimal research has been conducted on young athlete's imagery use from a developmental perspective. However, one study (Ille & Capodi, 1999) researched the performances of 8 to 13 year-old skilled and less skilled gymnasts on a gymnastics routine recall task, by examining the role of imagery ability and memorization techniques. Results indicated that recall performance improved with age and skill level. However, performance was higher for subjects with better imagery skills. Children's techniques for recalling complex movement sequences seemed to broaden with age (Ille & Capodi). It is thought that by age 10 or 11 (pre adolescence), major strategies have been acquired and do not continue to improve into adulthood (Fishburne, 1990). Moreover, Ille and Capodi found that visual imagery skills did not differ between groups, however, kinesthetic imagery increased between ages 8 and 9 and ages 12 (pre adolescence) and 13 (adolescence) in less skilled gymnasts. These results are consistent with previous findings stating that imagery abilities increase until age 10 or 11 and imagery improves between ages 6 and 11 years (Fishburne). In Ille and Capodi's study, it could be postulated that since mental imagery abilities are the same between the 10 to 11 (pre adolescent) and 12 to 13 (adolescent) age groups, the 12 to 13 year old skilled gymnasts may have used their abilities more efficiently than the younger gymnasts in order to kinesthetically encode movements and improve performance.

Recently, Munroe-Chandler and colleagues (2006) investigated young athletes' imagery use from a developmental perspective with both male and female athletes, aged 7-14, (i.e., from childhood to adolescence) competing in team and individual sports. Being one of the first studies of its kind, findings revealed the initial support needed for examining the functions of imagery use from a developmental perspective. Results indicated that all athletes reported using imagery in both training and competition for both cognitive and motivational purposes. Further, all age groups reported using all five functions of imagery (e.g., imagery for skill development and execution-CS imagery). Particularly, males and females (7 to 10 years) differed in their use of CS imagery for technique enhancement. Male athletes in this age cohort did not report using imagery for this purpose, which may be a result of less developed information-processing abilities in younger boys. Moreover, while female athletes of all ages used imagery to control arousal and anxiety, only the pre adolescent and adolescent female athletes (11-12 and 13-14 years) reported using imagery for excitement and relaxation purposes (MG-A imagery). Using imagery to remain focused was reported by all age groups and genders (MG-M imagery). Overall, results revealed that children (7 to 10 years) used fewer sub-categories of MG-A and MG-M imagery than their pre adolescent and adolescent counterparts (Munroe-Chandler et al., 2006). This could be due, in part, to the fact that as children age, their long-term memory improves, allowing them to acquire and retain knowledge with less difficulty (Santrock & Yussen, 1992).

Motor Development in Pre Adolescence and Adolescence

It is known that movement performance improves during the pre adolescent periods of development (Thomas, Gallagher, & Thomas, 2001). Adolescence is characterized by a growth spurt and is a time of considerable variation in terms of the rate at which children pass through this stage of development (Baxter-Jones & Malina, 2001). The processes of growth and biological maturation are related, and both influence physical performance (Baxter-Jones & Malina). Studying skill acquisition in pre adolescents and adolescents involves unique methodological issues. For instance, growth and maturation may contribute to improvements in skill (Thomas et al.). These factors present a problem because they are not controllable and may interfere with interventions in which there is no relation to such factors. Perhaps this is why Thomas (1980) suggested that narrow and distinct age groups (e.g., 11-12 year-olds) should be used.

This ensures that the ages selected have common physical and developmental characteristics.

Moreover, the growth rate of children increases drastically at puberty (Thomas et al., 2001). Most boys are at similar weight and height, prior to puberty. By about 9-10 years of age in girls and pre adolescence (i.e., 11-12 years of age) in boys, the rate of growth in height begins to increase (Baxter-Jones & Malina, 2001). This marks the beginning of the adolescent growth spurt which is highly variable among individuals. Girls, on average, tend to reach their peak height velocity and stop growing approximately two years earlier than boys. The only period that girls' average weight and height is superior to boys is during their growth spurt, at puberty. More specifically, while the growth spurt begins at approximately 9-10 years of age for girls and peak growth occurs at age 12 (i.e., pre adolescence), boys begin around 11-12 years of age (i.e., pre adolescence) and reach their peak growth at about 14 years of age (i.e., adolescence) (Baxter-Jones & Malina). Overall, age and gender differences become greater in motor skill activity in the early stages of adolescence (Thomas et al.).

Accordingly, with the onset of adolescence, motor performances of boys show an acceleration, while those of girls improve up to about 14-15 years of age, and then level off or improve slightly (Baxter-Jones & Malina, 2001). Overall, boys show a greater increase in performance than girls with the onset of a growth spurt. Performances in motor tasks requiring strength, power, speed, endurance, agility, and coordination tend to increase with age, and gender differences, again, increase during puberty or adolescence. Performances during adolescence are influenced by individual differences in the timing of the adolescent growth spurt (Baxter-Jones & Malina).

With respect to potential gender differences on gross motor tasks, boys often perform superior to girls (Fagard, 1996). With running, gender differences in favour of boys were found as early as kindergarten age (i.e., age 7), and increased after the age of 13 or 14 years (i.e., adolescence). Cultural expectations and practice may reinforce gender differences, since the skills in which such differences are typically found, lie in gender oriented activities. For example, males may be superior at kicking because soccer is typically a male dominated sport (Fagard).

The ability to utilize selective attention is an important skill, pertaining to motor development that improves with age (Thomas et al., 2001). It involves the ability to select relevant information from the environment and disregard what is irrelevant or does not pertain to the task at hand. Selective attention can be used to develop proper skill cues for tasks in order to help the child remember the location of the movement (Thomas et al.). Similarly, both cognitive and motor times related to skill performance, decrease as children progress through adolescence. This also explains a portion of the age-related differences exhibited between the motor performance of pre adolescents and adolescents (Thomas et al.).

Also, Thomas and colleagues (2001) have indicated that controllability of movement is an important component in successfully performing motor skills. It is a skill that increases with age and may differentiate between young athletes due to variability in motor development. Specifically, when compared to adults, children take more time to process information, make more errors, and use more feedback-based adjustments as they approach targets. Controllability of movement is especially evident in skills that require hand-eye/foot-eye coordination, as well as speed and accuracy

(Thomas et al.). With age, children become more accurate with respect to limb position and anticipation timing (Thomas & Thomas, 1987). As young athletes progress through adolescence, improved sensory discrimination gives them quality information on which to make decisions for motor program selection, parameterization, and error detection and correction (Thomas et al.).

Further, in a study assessing rehearsal strategy effects on developmental differences for recall of a movement series, it was found that pre adolescents, aged 11 years, rehearsed by grouping items together, indicating a more mature mental strategy to enhance performance than children aged 5 and 7 years (Gallagher & Thomas, 1984). Thus, results demonstrated that pre adolescents are able to process similar amounts of information in a shorter time frame or increased amounts of information in the same time frame than children (Gallagher & Thomas, 1980).

Overall, from 8-14 years of age (childhood to adolescence), automization, skill refinement, and the ability to generate motor plans increase. This may be due, in part, to improvements in cognitive skills such as, metacognition, anticipation timing, and visual motor ability which occur throughout the adolescent years (Gallagher et al., 1996). Therefore, given that factors such as growth, maturation, and learning abilities may affect a child's skill acquisition, any intervention that does not match the required task with the developmental stage of the child will have little influence on performance (Thomas et al., 2001).

Rationale

In the last 50 years, imagery has been a well-researched topic with adult athletes, especially relatively elite ones. However, there has been very limited research examining imagery use by young athletes and close to no research examining imagery use from a developmental perspective (Munroe-Chandler et al., 2006). Studying pre adolescent and adolescents' use of imagery will not only provide the opportunity to understand the differences in imagery use between adults and children, it also affords an opportunity to study imagery development. That is, to gain a greater understanding of the development of imagery usage as a function of age.

Orlick and Zitzelsberger (1996) emphasized the importance of mental skills training and it is known that mental skills can be beneficial to young athletes as long as they are explained in a comprehensible manner (Weiss, 1991). Further, there is support for the notion that children's mental skills, such as imagery, improve substantially with practice (Short et al., 2001). In a 1989 survey of imagery intervention studies (Greenspan & Feltz, 1989), only two studies examined athletes under18 years of age. Although more studies dealing specifically with youth have been published since that time, it is essential that young athletes' imagery use be further explored (Munroe-Chandler & Hall, 2004-2005).

Moreover, there have also been few published studies on imagery that have dealt with athletes performing sport skills in real-life environments, seeing as most imagery research has been conducted in laboratory settings (Moran, 2004). Additional studies should be performed under the same conditions and in the same environment in which sport skills are actually performed (Moran). Given this need, the present study attempted to ensure ecological validity by taking place directly on the soccer field, in the familiar environment in which the teams practice.

Interestingly, soccer is the largest youth participation sport in Canada with over 644,000 youths (19 years and under) registered in the year 2000 (Canadian Soccer Association). Furthermore, previous research has examined imagery use in soccer with adult, child, and pre adolescent and adolescent athletes, (Blair et al., 1992; Munroe-Chandler & Hall, 2004-2005; Munroe-Chandler et al., 2005) although not from a developmental perspective.

Based on the above evidence concerning the development of imagery, young athletes between the ages of 11-14 (i.e., pre adolescent and adolescent) years were included in the present research. In addition, as suggested by Thomas and his colleagues, (Thomas, 1990; Thomas et al., 2001) narrow and distinct age groups were employed in the present study. Specifically, the age groups were 11-12 and 13-14 year olds and participants were randomly divided into one of two imagery intervention groups.

Purpose

The primary purpose of the present study was to examine the effects of a cognitive specific imagery intervention on the soccer skill performance of young athletes aged 11-12 and 13-14 years and determine if such performances vary with age and gender. Moreover, a secondary purpose was to determine if such performances are a result of imagery function (i.e., cognitive or motivational).

Hypotheses

Based on previous research, there were five hypotheses made regarding the results of the present study: 1) The 13-14 year olds will show greater performance improvements on the soccer task (pre to post test) than the 11-12 year olds; 2) The CS imagery groups will show greater performance improvements on the soccer task (pre to post test) than the

MG-A imagery groups; 3) The CS imagery groups will show a greater increase in CS imagery (pre to post test) on the SIQ-C compared to the MG-A imagery groups; 4) The MG-A imagery groups will show a greater increase in MG-A imagery (pre to post test) on the SIQ-C compared to the CS imagery groups; 5) The MG-A imagery groups will show a greater decrease in competitive state anxiety scores on the CSAI-2C (pre to post test) than the CS imagery groups. Hypotheses based on potential gender differences in skill performance or imagery ability were not included due to the lack of empirical research in the given area.

Methodology

Participants

Eighty-eight young athletes were recruited from the Windsor/LaSalle area to participate in the current study. Twenty of the participants did not complete the post test and, as a result, were eliminated from the subsequent analyses. The final sample included 68 participants (30 males, 38 females; M_{age} = 12.13 years). The participants were volunteer, competitive, male and female youth soccer players, between the ages of 11 (pre adolescence) and 14 (adolescence) years. There were 42 athletes within the 11-12 year age range (21 males, 21 females) and 26 athletes within the 13-14 year age cohort (9 males, 17 females). Athletes belonged to eight different soccer teams, with four teams (n = 39 athletes) participating in a CS imagery intervention and four teams (n = 29 athletes) completing a MG-A imagery intervention. More specifically, participants consisted of eight groups; 11-12 girls (CS imagery, n = 12), 11-12 girls (MG-A imagery, n = 10), 11-12 boys (CS imagery, n = 12), 11-12 boys (MG-A imagery, n = 9), 13-14 girls (CS imagery, n = 8), 13-14 girls (MG-A imagery, n = 7), 13-14 boys (CS imagery, *n* = 7), and 13-14 boys (MG-A imagery, *n* = 3). The years of experience ranged from 2 years to 9 years (*M* = 6.10 years, *SD* = 1.91) for the 11-12 year age group and 1 year to 13 years (*M* = 6.70 years, *SD* = 2.84) for the 13-14 year age group. Collectively, between the age groups, the mean years of playing was 6.33 (*SD* = 2.31).

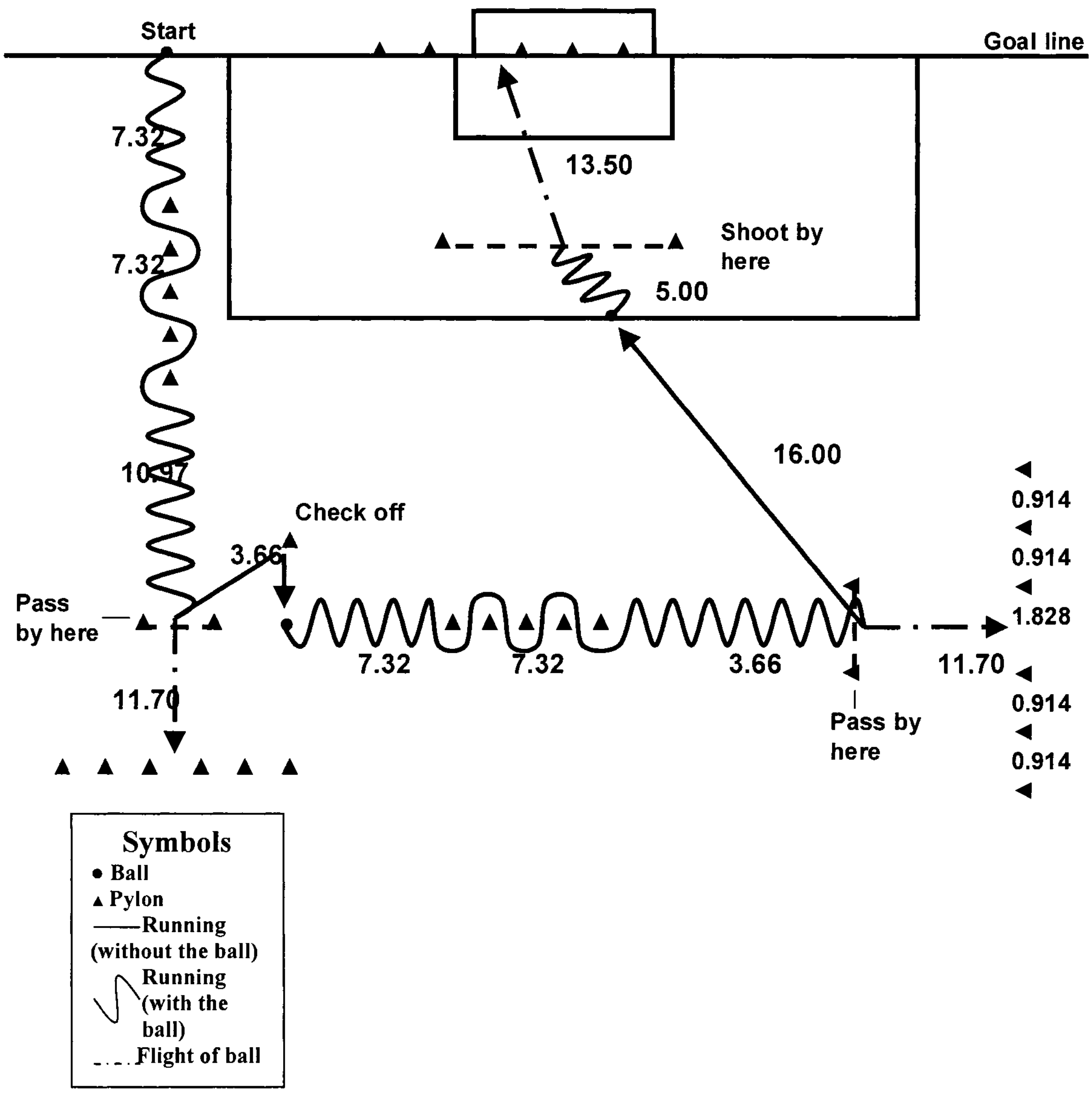
Recruitment

The participants were recruited from local soccer organizations in the Windsor/LaSalle area. Initial contacts to the soccer organizations/teams were made to the respective coaches by phone or e-mail. Permission to approach the young athletes to request their participation in the study was first obtained from the leaders of these organizations and/or coaches of the teams through a recruitment letter (see Appendix A).

Task

The task that was used in this study, prior to and following the imagery intervention, was a series of game-like soccer skills. The task was derived from a previous imagery study (Blair et al., 1993) and consisted of dribbling, passing, shooting, and checking off (i.e., moving into empty space, then back to the ball). Figure 4 provides a symbolic representation of the task as well as the measurements (i.e., distances) used in the present study. Participants were instructed to complete the task as quickly and accurately as possible. Therefore, time required to complete the task, as well as time penalties for each error made, were recorded. All time penalties imposed and distances measured were adapted, through pilot testing, from the task used by Blair and colleagues and made appropriate for pre adolescents and adolescents 11-14 years of age (see Figure 4). In the study by Blair and colleagues (1993), the distances and time penalties were as follows: For the dribbling segments, the ball had to be dribbled through the pylons and

Figure 4
Diagram of soccer task employed in the present study.
(dimensions in meters, adapted from Blair et al., 1993)



a 2 second penalty was imposed each time a pylon was touched. For the passing segments, passes were taken before a prescribed distance from the target (15 yards). One pass had to be taken by the right foot and the other with the left foot. An 8 second penalty was imposed for missing the target completely, 6 seconds for being inaccurate within 1-2 yards to either side of the central target, and 4 seconds for being inaccurate by up to 1 yard. Lastly, for the shooting segment, the shot had to be taken with either foot from a distance greater than 12 yards from the goal. A 2 second penalty was awarded for missing the chosen target (a yard to the inside of either corner of the net) within 1 yard, a 4 second penalty was awarded for missing the target by 1-2 yards, and a 6 second penalty was imposed for being inaccurate by more than 2 yards.

The task from Blair and colleagues' (1993) study was considered quite difficult, even for skilled soccer players. In the game of soccer, players are often put under the stress of having to perform many manoeuvring skills quickly before being in a position to pass or shoot the ball, thus necessitating the need for using such a complex task. The task was a combined test of speed and accuracy and contained both cognitive and motor components. For example, a cognitive component would be deciding on the best way to weave in and out of the pylons or how fast to approach the ball, and a motor component would involve actually executing a proper pass or shot at the target. Moreover, imagery is most effective for skills that contain a cognitive and a physical component (Hall, 2001). Another reason Blair et al. (1993) suggested for using such a difficult task was to ensure that participants had sufficient room for improvement. A pilot study conducted by Blair et al. indicated that the time penalties assigned were sufficient and that measurable improvement on the task was possible with practice, for adults. Since the above task was likely to be too difficult for children to perform, a pilot test was conducted to determine appropriate distances (i.e., in meters) and time penalties for pre adolescents and adolescents 11-14 years of age.

Pilot Study

Prior to the data collection phase, the researcher ran a pilot test of the soccer task in order to determine appropriate distances (i.e., between pilons and targets) and time penalties for pre adolescent and adolescent athletes 11-14 years of age. Males and females ($N = 4$) (i.e., 11-14 years) were recuited in order to properly assess the required skill. The distances were decreased and the time penalties remained the same, from the soccer task used in Blair and colleagues' (1993) study conducted with adults. The pilot test also ensured that measurable improvement in the task was possible with practice. Further adaptations from Blair et al.'s study included converting all distances into meters, increasing the distance between each pylon and reducing the number of pylons in the passing segments from 6 to 5, reducing the passing target distance by 2 meters, and allowing athletes to use their dominant foot for all dribbling, passing, and shooting segments. Athletes in the pre adolescent age cohort (i.e., 11 years of age) who participated in the pilot study indicated that the passing target distances were too far and failed to reach the target line in their attempts at the pass. Therefore, this lends justification as to why the passing distances were reduced. Overall, the purpose of the pilot study was to ensure that an appropriate developemental task, both physically and cogntively, was created for athletes aged 11-14 years (see Figure 4 for exact task measurements).

Measures

Sport Imagery Questionnaire for Children (SIQ-C; Hall, Munroe-Chandler, & Fishburne, 2006). The SIQ-C (see Appendix B) stems from the SIQ (Hall et al., 1998), which was developed for adults to assess the motivational and cognitive functions of imagery proposed by Paivio's (1985) analytic framework of imagery effects. It is a 21-item questionnaire with statements measuring the frequency of children's imagery use. Statements were scored from 1 = 'not at all' to 5 = 'very often' and participants were asked to circle the number that most applies to that particular statement. Any statement that explains an imagery situation that the child often uses should have been given a high number. Each of the five functions of imagery was assessed throughout the 21 items. For example, the statement; "I can usually control how a skill looks in my head" addressed the CS function of imagery and the statement; "I make up new game plans or routines in my head" addressed CG imagery. The statement; "I see myself being mentally strong" assessed MG-M imagery and the statement; "In my head, I imagine how calm I feel before I compete" addressed the MG-A imagery function. Finally, the statement; "I see myself doing my very best" addressed MS imagery. The alpha reliabilities on each of the subscales were 0.80, 0.69, 0.75, 0.82, and 0.69 for CS, CG, MS, MG-M, and MG-A imagery, respectively (Hall et al., 2006).

Movement Imagery Questionnaire – Revised (MIQ-R; Hall & Martin, 1997). The MIQ-R is an 8-item questionnaire which assesses an individual's visual and kinesthetic imagery ability (see Appendix C). Participants were asked to first physically perform, and then visually or kinesthetically image four different movements. Each movement involved an arm, leg, or whole body movement. Participants then rated how well they felt they were able to visually or kinesthetically image the movement on a 7-point Likert scale, where 1 = 'very hard to see/feel' and 7 = 'very easy to see/feel'. Hall and Martin suggest that the MIQ-R is an acceptable revision of the original Movement Imagery Questionnaire (MIQ; Hall & Pongrac, 1983), as a high correlation was found between the visual and kinesthetic subscales of the MIQ and the MIQ-R ($r = .77, p < .001$ for both subscales). More recently, Monsma and Overby (2004) have shown adequate reliabilities for the MIQ-R when used with children ages 12-21 years (0.85 for visual imagery and 0.83 for kinesthetic imagery). Only the visual subscale of the MIQ-R was examined in the present study because the SIQ-C, which was used to examine imagery use, includes predominantly visual imagery components.

Competitive State Anxiety Inventory - 2 for Children – (CSAI-2C; Stadulis, MacCraken, Edison, & Severance, 2002). The CSAI-2C is a 15-item instrument (see Appendix D) used to measure three dimensions of competitive state anxiety in children. In the present study, the CSAI-2C was used to ensure that there were no differences in arousal/anxiety levels amongst the groups before completion of the soccer drill. Such differences may, in turn, have an impact on soccer task performance. Each dimension, with five items in each, appeared adequately assessed by the CSAI-2C: Cognitive Anxiety (Worry), Somatic (Physical) Anxiety, and Confidence. For example, a statement relating to worry was; "I'm concerned about not being able to concentrate today". A statement regarding somatic anxiety was; "My heart is racing". Lastly, a statement relating to confidence was; "I feel self confident". Participants rated their currrent feelings prior to performing the soccer skill on a scale from 1 = 'not at all' to 4 = 'very much so'. Cronbach's alpha levels for cognitive anxiety, physical anxiety, and confidence were 0.75, 0.78, and 0.73, respectively (Stadulis et al.).

Post experimental manipulation check. On completion of the data collection (i.e., after post intervention), each participant (in both MG-A and CS imagery groups) was asked to complete a five item manipulation check (see Appendix E). The purpose of the manipulation check was to determine the perceived level of importance of accuracy and speed to the athlete, while performing the soccer drill. The manipulation check also helped to determine how easy or difficult it was for the athlete to image, both, with the script being read by the researcher and with the script being read on their own. It assessed whether any imagery was used before performing the soccer task and if the imagery helped or hurt the participant during the task. These items were all measured on a 7-point likert scale. Lastly, the manipulation check was used to determine, roughly, how many times the participant practiced the imagery script, on their own time, during the six week intervention period.

Experimental Procedures

Upon receiving ethics clearance from the Research Ethics Board, the investigator provided a permission letter (see Appendix F) that was then signed by the head of each organization in regards to their respective soccer teams' participation in the study. When permission was granted, the researcher then provided the head coaches with letters of information and consent forms (Appendix G) as well as assent forms (Appendix H) for the athletes. The letter of information/consent form provided parents/participants with general information regarding the purposes of the study as well as information regarding withdrawal and how to obtain a copy of the study results. Once consent/assent forms were signed, the researcher then met with the athletes of eight different soccer teams of specific age cohorts (11-12 and 13-14 years) and genders (male and female), in the Windsor/LaSalle area (this was done on separate days for each team). At that time, participants were asked to complete the SIQ-C and the MIQ-R in a group setting. Questionnaires were counter-balanced between the teams, as half of the teams (i.e., four) completed the SIQ-C prior to the MIQ-R and half of the teams (i.e., four) completed the MIQ-R prior to the SIQ-C.

Once the initial questionnaires were completed, the teams were randomly counter-balanced into a CS imagery group or a MG-A imagery group. There were four CS imagery groups (11-12 boys, 11-12 girls, 13-14 boys, and 13-14 girls), and four MG-A imagery groups (11-12 boys, 11-12 girls, 13-14 boys, and 13-14 girls). Next, a pre-determined date, time, and location (outside of team's regular practice time) was agreed upon in which all participants individually completed the soccer task.

Participants were tested individually and out of sight of the remaining athletes being tested on the task. This ensured that no observational learning occurred between participants. Each athlete was first given a visual representation of the task on a laptop screen (Figure 4) and given verbal instructions to explain the task, viewed a video of a skilled performer complete the soccer task, and given any final verbal instructions to explain the task. Before performing the soccer task, each participant individually completed the CSAI-2C, which measured confidence and anxiety prior to completing the task (Stadulis et al., 2002).

Continuous fieldwork with children and high performance athletes strongly suggests that skill improvement may be even greater if movement imagery is integrated with viewing of video-taped images (Atienza et al., 1998; Li-Wei et al., 1992). Smith and Holmes' (2004) study indicated that the use of video and audiotape, together with the use of imagery instructions highlighting the importance of functionally equivalent mental stimulation, significantly improved the effectiveness of such interventions. Videos may also help to imprint the image into the athlete's memories more clearly (Smith & Holmes). It has also been suggested that the use of a video model may enhance physical and perceived competence and motivation, and reduce anxiety in young athletes (Weiss, 1991). Models that are used to emphasize correct technique and not to stress social comparison, communicate information for proper skill development and provide a motivating factor for young athletes (Weiss). Therefore, an older and more highly skilled model was used in the current study in order eliminate social comparison amongst the participants.

Players were then asked to perform the task to the best of their ability, and were informed of the time penalties involved. Instructions given to participants with respect to the task were kept consistent from pre to post test. No feedback or coaching was provided to the players. Each player then performed the task three times and received scores for speed and accuracy. Players were instructed to fully complete each section of the task. If, by chance, a portion of the task was missed (e.g., dribbling around a pylon), participants were instructed to backtrack and complete the missed section. Participants were instructed to rest between trials while they walked from the end of the soccer drill, back to the starting point. An average score for their three attempts was calculated, for both speed (i.e., performance response time) and accuracy (i.e., number of errors), thus representing their baseline (i.e., pre test) performance measure (Blair et al., 1993). Two other assistants helped the researcher time subjects, as well as to observe errors and retrieve soccer balls.

Not to interfere with regularly scheduled practices, the researcher met with each team for approximately 10-15 minutes, bi-weekly, at the beginning of the team's practice. This is the same amount of training Munroe-Chandler and Hall (2004-2005) and Munroe-Chandler and colleagues (2005) employed in their study with young soccer players. Also, Munroe-Chandler and colleagues (2005) conducted imagery sessions directly on the soccer field and at the beginning of practice. The imagery intervention portion of the present study lasted six weeks which is consistent with the time used in Blair et al.'s (1993) intervention. All groups were taken through a one-page guided imagery script, three times, involving soccer performance, during the training sessions. The written scripts also took into consideration the ethnic diversity evident in the Windsor/LaSalle area (i.e., children for whom English is not their first language). The language used in the script was tested in the pilot study which ensured that it was simplistic and comprehensible for children from various ethnic backgrounds.

According to previous research, the use of a written script, orally delivered to the athlete, has been the most popular technique for administering imagery interventions (Perry & Morris, 1995). Incorporating strong verbal triggers throughout the imagery script aids the athlete in focusing on the correct cues during imagery and in programming the proper image (Vealey & Greenleaf, 2001). Moreover, the imagery script or training program should be an integral part of the athletes' practice and should be fairly simple and concise (Vealey & Greenleaf). In Li-Wei et al.'s (1992) study, it was found that children's tennis shot performance appeared to have gained from following a specific guided imagery script.

Also, in Munroe-Chandler and Halls' (2004-2005) study with youth soccer players, the MG-M imagery intervention consisted of 10-15 minutes of guided imagery, through a script, once a week. This was shown to be adequate time for increasing most of the team's collective efficacy through the imagery. The script involved adverse situations a young soccer player may encounter on the pitch during practice and competition. In addition, players were asked to practice the imagery script on their own time on a daily basis, for approximately ten minutes. Results from the Imagery Assessment Questionnaire (IAQ) indicated that all young athletes of the various positions used the imagery directly from the script, on average, four to six times per week (Munroe-Chandler & Hall). Group imagery exercises, such as guided scripts, are most practical for team sports (Vealey & Greenleaf, 2001).

The CS imagery groups, in the present study, were read a script (see Appendix I) specifically pertaining to the soccer task that was performed pre and post intervention. The length of time required to read and image the script should resemble the amount of time to complete the physical task (Smith & Holmes, 2004). The MG-A imagery groups were read a script (see Appendix J) pertaining to being psyched up before an important soccer game, staying calm and reducing anxiety at half time, and staying energized to battle through fatigue in the last portion of a game. This script was un-related to the skill that was being performed by the participants and did not mention any soccer skill (i.e., passing, dribbling, and shooting) related to the task.

Both scripts were constructed based on Lang's (1979) Bio-informational Theory of emotional imagery and Ahsen's (1984) Triple Code Theory, which includes stimulus, response, and meaning propositions. Stimulus propositions are statements that describe the content of the situation being imaged (e.g., wiping the sweat off one's forehead). Response propositions are statements that describe how and what the individual feels as he/she responds to the imaged scenario (e.g., anxiety and excitement before a game). Meaning propositions refer to the perceived importance to the person of the skill being imagined (e.g., weaving through pylons as if they were opponents). These three components are essential for evoking emotion within the scripts (Moran, 2004). In addition to being read the script by the researcher during their training sessions, each player was given a copy of the script and asked to image the respective scenario on their own. They were asked to read the script and image a minimum of three times daily and were required to keep a log to record their imagery practice while away from training. To monitor imagery practice and improvement, it is recommended that athletes keep a log of their imagery experience (Vealey & Greenleaf, 2001). Shambrook and Bull (1996) stated that self-monitoring, through the use of a diary, will encourage and promote adherence to the imagery.

At the end of the six-week intervention, another designated day (outside of regular practice time) was determined, and all players completed the CSAI-2C and were tested on the soccer task for a second time. The same procedures used in the initial testing were used in this testing, except players did not watch the video demonstration of the skilled performer. Again, this was to minimize the effects of observational learning. After the post intervention testing was complete, athletes completed the SIQ-C and the post manipulation check questionnaire. The latter focused on the training they had experienced.

Data Analyses

Preliminary analyses. A one way ANOVA was conducted with gender as the independent variable and imagery ability (i.e., visual) as the dependent measure. Additionally, a Repeated Measures (RM) MANOVA was conducted with gender as the independent variable, tests (i.e., pre and post) as the within subject factor, and performance speed and accuracy as the dependent variables, followed by univariate analyses.

Primary analyses. A RM MANOVA was performed with age group (i.e., 11-12 and 13-14 years), as the independent factor, tests (i.e., pre and post) as the within subject factor, and the dependent measures being scores for performance speed and accuracy. Additonally, a RM MANOVA was conducted with imagery group (i.e., CS and MG-A) as the independent variable, tests as the within subject factor, and the dependent measures being scores for performance speed and accuracy.

Secondary analyses. A RM MANOVA was performed with imagery group as the independent variable, tests as the within subject factor, and the dependent measures being scores on the five functions of the SIQ-C (i.e., CS, CG, MS, MG-M, and MG-A). Moreover, a RM MANOVA was conducted with imagery group as the independent factor, tests as the within subject variable, and scores on the three dimensions of the CSAI-2C (i.e., cognitive anxiety, somatic anxiety, and confidence) as the dependent variables.

Results

Descriptive Statistics

See Tables 1-3 for means and standard deviations of the variables used in the analyses. The probability of Type 1 error was set at 0.05 for all analyses.

Preliminary Analyses

Reliability coefficients were calculated for each subscale of the SIQ-C and CSAI-2C as well as for imagery ability (i.e., visual). The Cronbach alpha coefficients of each subscale of the SIQ-C was adequate at, both, pre (CS = 0.73, CG = 0.69, MS = 0.72, MG-M = 0.78, and MG-A = 0.65) and post test (CS = 0.76, CG = 0.65, MS = .77, MG-M = 0.78, and MG-A = 0.70). Previous research has demonstrated the CG subscale to be slightly lower than the remaining four subscales in a youth sample (Monsma & Overby, 2004). In addition, the Cronbach alpha coefficients for the CSAI-2C subscales were adequate at pre (cognitive anxiety = 0.68, somatic anxiety = 0.69, and self-confidence = 0.71) and post test (cognitive anxiety = 0.68, somatic anxiety = 0.70, and self-confidence = 0.69). One item was deleted from the cognitive anxiety subscale in order to increase the reliability from 0.64 (pre and post test) to .68 (pre and post test). Item 12 (i.e., "I'm concerned that others will be disappointed with my soccer task performance") may have negatively impacted the reliability of the cognitive anxiety subscale score because it deals with the individual athlete's perceptions of what the other players think. Other people's perception was irrelevant for purposes of the present study given the athletes individually performed the soccer task, out of sight of his or her teammates. Lastly, the Cronbach's alpha for the visual subscale of the MIQ-R, given at pre-test was also adequate (visual = 0.76).

Table 1

Means and Standard Deviations of Performance Speed and Accuracy Pre and Post Test by Gender, Age Group, and Imagery Group

	Gender		Age Group		Imagery Group	
Variable	**Male**	**Female**	**11-12**	**13-14**	**CS**	**MG-A**
			Time (sec.)			
Speed 1	**33.62(4.76)**	**39.50(4.86)**	**37.22(5.45)**	**36.40(5.95)**	**35.60(6.54)**	**37.32(4.12)**
Speed 2	**32.10(3.57)**	**36.66(3.98)**	**35.45(4.37)**	**33.35(4.25)**	**34.47(5.16)**	**34.88(3.22)**
			Errors (sec.)			
Accuracy 1 *(Time Penalty)*	**8.31(3.07)**	**10.04(3.41)**	**9.48(3.59)**	**8.95(2.96)**	**9.50(3.83)**	**8.97(2.61)**
Accuracy 2 *(Time Penalty)*	**11.73(2.58)**	**11.12(3.39)**	**12.17(2.96)**	**11.39(3.05)**	**11.54(3.45)**	**11.20(2.46)**

Note: Means are displayed as the first number and standard deviations are indicated in brackets. The numbers 1 and 2 are used to represent scores at pre and post test, respectively. The accuracy score is determined by the number of times penalties, incurred during the task, measured in seconds.

Table 2

Means and Standard Deviations of Imagery Subscales Pre and Post Test by Gender, Age Group, and Imagery Group

	Gender		Age Group		Imagery Group	
Variable	**Male**	**Female**	**11-12**	**13-14**	**CS**	**MG-A**
Imagery subscales						
CS 1	**3.63(.79)**	**3.27(.79)**	**3.49(.84)**	**3.34(.75)**	**3.20(.71)**	**3.77(.82)**
CS 2	**3.58(.91)**	**3.34(.86)**	**3.48(.81)**	**3.39(.65)**	**3.17(.77)**	**3.84(.90)**
CG 1	**3.10(.72)**	**3.14(.73)**	**3.19(.78)**	**3.00(.63)**	**3.03(.59)**	**3.23(.87)**
CG 2	**3.03(.88)**	**3.25(.70)**	**3.20(.84)**	**3.10(.69)**	**3.04(.63)**	**3.31(.94)**
MS 1	**3.64(.78)**	**3.72(.83)**	**3.81(.78)**	**3.49(.82)**	**3.66(.65)**	**3.71(.99)**
MS 2	**4.23(1.50)**	**3.82(.81)**	**4.26(1.27)**	**3.58(.82)**	**3.80(.71)**	**4.28(1.55)**
MG-A 1	**3.37(.79)**	**3.39(.90)**	**3.48(.81)**	**3.22(.90)**	**3.28(.67)**	**3.52(1.05)**
MG-A 2	**3.43(.76)**	**3.46(.76)**	**3.58(.76)**	**3.22(.81)**	**3.34(.69)**	**3.59(.91)**
MG-M 1	**3.73(.76)**	**3.58(.72)**	**3.71(.73)**	**3.54(.75)**	**3.55(.70)**	**3.77(.77)**
MG-M 2	**3.81(.69)**	**3.75(.72)**	**3.80(.73)**	**3.73(.68)**	**3.76(.71)**	**3.79(.70)**

Note: The SIQ-C is rated on a 5 point Likert scale with 1 = rarely and 5 = often. Means are displayed as the first number and standard deviations are indicated in brackets. The numbers 1 and 2 are used to represent scores at pre and post test, respectively.

Table 3

Means and Standard Deviations of Anxiety Subscales Pre and Post Test by Gender, Age Group, and Imagery Group

	Gender		Age Group		Imagery Group	
Variable	**Male**	**Female**	**11-12**	**13-14**	**CS**	**MG-A**
Anxiety subscales						
Cognitive anxiety 1	**1.61(.49)**	**1.93(.51)**	**1.82(.52)**	**1.74(.54)**	**1.85(.52)**	**1.71(.52)**
Cognitive anxiety 2	**1.66(.46)**	**1.75(.52)**	**1.63(.45)**	**1.84(.54)**	**1.80(.51)**	**1.59(.45)**
Somatic anxiety 1	**1.46(.48)**	**1.68(.52)**	**1.66(.52)**	**1.46(.49)**	**1.58(.52)**	**1.58(.51)**
Somatic anxiety 2	**1.41(.42)**	**1.55(.66)**	**1.51(.58)**	**1.46(.57)**	**1.52(.52)**	**1.44(.64)**
Self-confidence 1	**3.08(.63)**	**2.86(.59)**	**3.05(.61)**	**2.79(.60)**	**2.92(.57)**	**3.01(.68)**
Self-confidence 2	**3.07(.52)**	**3.03(.65)**	**3.10(.60)**	**2.96(.57)**	**2.95(.61)**	**3.17(.55)**

Note: 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. Means are displayed as the first number and standard deviations are indicated in brackets. The numbers 1 and 2 are used to represent scores at pre and post test, respectively.

Gender differences for MIQ-R scores (visual subscale). A one-way ANOVA, with gender as the independent variable and MIQ-R visual subscale score as the dependent variable, revealed no significant differences between males and females (F (1, 66) = .487, p = .488, η^2 = .402). Participants completed the MIQ-R prior to the imagery intervention as a screening tool to ensure they all had the ability to image. All of the athletes scored at least a level 3.5 (i.e., somewhat easy to see images) or above on the visual imagery subscale of the MIQ-R, illustrating that all participants could image at a respectable level, suitable for the current study.

Gender differences for performance speed and accuracy (pre to post test). It is important to note that two dependent variables, both speed and accuracy, were included in performance in order to measure an overall effect for performance. A RM MANOVA, with gender as the independent variable and accuracy and speed at pre and post test as the dependent variables revealed a significant main effect for overall performance (Pillai's Trace (F (3, 64) = 1013.369, p = .000, η^2 = .979). Further, results showed a significant performance by gender interaction effect (Pillai's Trace test (F (3, 64) = 9.838, p = .000, η^2 = .305). In order to determine where the specific significant differences lie, two one way performance x gender ANOVAs were performed. A one way ANOVA for speed, revealed significant results for gender at, both, pre (F (1, 66) = 24.929, p = .000, η^2 = 578.688) and post test (F (1, 66) = 24.131, p = .000, η^2 = 349.305). More specifically, it was demonstrated that males performed faster than females at pre (Males: M = 33.62, SD = 4.76, Females: M = 39.50, SD = 4.86) and post test (Males: M = 32.10, SD = 3.57, Females: M = 36.66, SD = 4.00). Additionally, a one way ANOVA for accuracy demonstrated significant results for gender, however only at pre test (F (1, 66) = 4.673, p

= .034, η^2 = 49.826). Accuracy results at post test between the genders was non-significant (F (1, 66) = .668, p = .417, n^2 = 6.249). More specifically, it was shown that males made less errors or had better accuracy than females at pre test (Males: M = 8.31, SD = 3.07, Females: M = 10.04, SD = 3.41), while no performance accuracy differences existed at post test (Males: M = 11.73, SD = 2.58, Females: M = 11.12, SD = 3.39). Therefore, significant gender differences with respect to performance were evident in both speed and accuracy, with males performing better than females.

Primary Analyses

Age group differences for performance speed and accuracy (pre to post test): Hypothesis 1. It was hypothesized that the 13-14 year age cohorts would demonstrate greater improvement on the soccer skill task than the 11-12 year age cohorts from pre to post test. Improvement on the soccer skill was measured in terms of speed (i.e., decrease in time measured in seconds) and accuracy (i.e., decrease in number of errors measured in seconds) scores, from pre to post test, in order to achieve an overall effect for performance. A specific number of seconds was added to the participant's speed score in order to account for errors made during the soccer task and was depended on the severity of the error. Time penalties were levied to participants for errors made during the dribbling, passing, and shooting portions of the soccer task. Age group was the independent variable and speed and accuracy (pre to post test) were the dependent measures. A Repeated Measures MANOVA was conducted to examine differences between age groups with respect to overall performance (speed and accuracy). There was a non significant multivariate effect (Pillai's Trace (F (3, 64) = .1.420, p = .245, η^2 = .062). In other words, the older age cohort did not improve to a greater extent than the younger age group from pre to post test. As such, the first hypothesis was rejected. Means and standard deviations for speed and accuracy, pre and post test, with respect to age group, are demonstrated in Table 1.

Imagery group differences for performance speed and accuracy (pre to post test): Hypothesis 2. It was hypothesized that the CS imagery groups would demonstrate greater improvement on the soccer skill task than the MG-A imagery groups from pre to post test. Imagery group was the independent variable and speed and accuracy (pre to post test) were the dependent measures. A Repeated Measures MANOVA was conducted to examine imagery group differences with respect to overall performance (speed and accuracy). There was a non significant multivariate effect (Pillai's Trace (F (3, 64) = .343, p = .794, η^2 = .016) (see Table 1 for means and standard deviations). As such, athletes who received the CS imagery intervention did not improve to a greater extent than those who received the MG-A imagery intervention from pre to post test. Therefore, the second hypothesis was rejected.

Secondary Analyses

Imagery group differences for SIQ-C scores (pre to post test): Hypotheses 3 and 4. It was hypothesized that the CS imagery groups would demonstrate a greater increase in CS imagery use on the SIQ-C, in comparison to the MG-A imagery groups, from pre to post test. Means and standard deviations for imagery subscale scores, pre and post test, with respect to imagery group, are demonstrated in Table 2. The independent variable was the imagery intervention group (i.e., CS or MG-A) and the dependent variables were the five functions of imagery on the SIQ-C (i.e., CS, CG, MS, MG-A, and MG-M) (pre to post test). A RM MANOVA was conducted to examine CS scores on the

SIQ-C, pre to post test, between the two imagery intervention groups. There was a non significant multivariate effect (Pillai's Trace (F (9, 44) = 1.125, p = .366, η^2 = .187). Therefore, the third hypothesis was rejected. Additionally, no significant differences were found between the imagery intervention groups in the remaining four functions of imagery on the SIQ-C, pre to post test (see Table 2 for means and standard deviations).

It was also hypothesized that the MG-A imagery groups would demonstrate a greater increase in MG-A imagery use on the SIQ-C, in comparison to the CS imagery groups, from pre to post test. Similar to hypothesis three, the independent variable was imagery intervention group and the dependent variables were the five functions of imagery, pre to post test. A RM MANOVA was conducted to examine MG-A scores on the SIQ-C, pre to post test, between the two imagery intervention groups. There was a non significant multivariate effect (Pillai's Trace (F (9, 44) = 1.125, p = .366, η^2 = .187) (see Table 2 for means and Standard Deviations). Therefore, the fourth hypothesis was rejected. Again, regardless of the imagery intervention received, all athletes used the four remaining functions of imagery on the SIQ-C with similar frequencies, pre to post test. Additionally, no significant effects for gender or age group, pre and post test, were revealed with respect to SIQ-C subscale scores (see Table 2 for means and standard deviations).

Imagery group differences for CSAI-2C scores (pre to post test): Hypothesis 5. It was hypothesized that the MG-A imagery groups would show a greater decrease in competitive state anxiety scores on the CSAI-2C, from pre to post test, than the CS imagery groups. Means and standard deviations for anxiety subscale scores, pre and post test, in regards to imagery group are indicated in Table 3. The imagery intervention group was the independent variable while the dependent measures were the three subscales of the CSAI-2C (i.e., somatic anxiety, cognitive anxiety, and self-confidence), pre to post test. A RM MANOVA was conducted to examine imagery group differences with respect to state anxiety scores, pre to post test. There was a non significant multivariate effect (Pillai's Trace (F (5, 51) = .787, p = .564, η^2 = .072). Therefore, the MG-A imagery groups did not decrease their state anxiety scores to a greater extent than the CS groups, pre to post test. As a result, the fifth hypothesis was rejected. Moreover, no significant effects for gender or age group, pre and post test, were revealed with respect to CSAI-2C subscale scores (see Table 3 for means and standard deviations).

Post Manipulation Check

The purpose of the manipulation check was to determine the perceived level of importance of accuracy and speed to the child, while performing the soccer drill. The manipulation check also helped to determine how easy or difficult it was for the child to image, both, with the script being read by the researcher and with the script being read on their own. Moreover, it assessed whether any imagery was used before performing the soccer task and if the imagery helped or hurt the participant during the task or caused them to feel excited before performing the task. Lastly, the manipulation check was used to determine, roughly, how many times the participant practiced the imagery script, on their own time, during the six week intervention period. The results revealed that, on a Likert scale from 1 to 7 (1 = not concerned at all and 7 = very concerned), athletes reported feeling "somewhat concerned" with completing the soccer task accurately (M = 3.85 and SD = 1.72). Similarly, with respect to the soccer task, trends revealed that athletes were also "somewhat concerned" with performing the task quickly (*M* = 3.81 and *SD* = 1.62). With respect to script visualization with the researcher, on a Likert scale from 1 to 7 (1 = very difficult and 7 = very easy), athletes indicated that it was "neither easy nor difficult" to see the images being read (*M* = 4.94 and *SD* = 1.80). In regards to feeling the images in the script, athletes responses also demonstrated that it was, "neither easy nor difficult" (*M* = 4.21 and *SD* = 1.79).

Moreover, when the athletes were asked to image their respective scripts on their own time, trends revealed that most responses fell in the, "neither easy nor difficult" to "very easy" range, in response to seeing the images (*M* = 5.00 and *SD* = 1.39). With respect to feeling the images, athletes responses indicated that it was "neither easy nor difficult" (*M* = 4.32 and *SD* = 1.68). When athletes were asked how often they imaged the script on their own time, in the last six weeks, results revealed that most athletes imaged the script a few times a week (*M* = 3.42 and *SD* = 1.99).

Results also demonstrated that approximately half of the athletes used imagery before performing the three soccer skill trials, at post test, and the other half did not use imagery at all. Of those athletes who used imagery before the soccer trials at post test, when asked how much imagery helped with performing the soccer task, using a Likert scale from 1 to 7 (1 = did not help and 7 = helped a lot), athletes reported that it "neither helped nor hurt" their performance (*M* = 3.74 and *SD* = 1.70). Lastly, athletes indicated that, before completing the last 3 soccer trials, imagery "neither helped nor hurt" their ability to stay calm (*M* = 4.16 and *SD* = 1.71) or feel excited (*M* = 4.16 and *SD* = 1.83).

Discussion

The primary aim of the present study was to examine the effects of a CS imagery intervention on the soccer skill performance of young athletes aged 11-12 and 13-14 years and determine if such performances vary with age and gender. A secondary purpose of this study was to determine if such performances were a result of imagery function (i.e., CS or MG-A). Results revealed significant gender differences with respect to soccer skill speed and accuracy, with males performing better at pre and post test than females. There were, however, no significant age group or imagery group differences exhibited in terms of overall performance

In Blair and colleagues' (1992) study, speed improvements differentiated the imagery and control groups, in that the imagery group had greater increases in performance speed from pre to post test, contrary to results from the present study. However, Blair and colleagues found no significant change in performance accuracy, from pre to post test, among the imagery groups, which supports findings from the present study. Therefore, athletes who received the CS imagery intervention did not improve in the soccer task significantly more than those who received the MG-A imagery intervention from pre to post test.

Overall Performance and the Speed/Accuracy Trade-Off

Interestingly, when all groups were collapsed (i.e., gender, age groups, and imagery groups) a significant multivariate effect for overall performance was revealed. At pre test, all athletes performed the task slower but with greater accuracy and, at post test, athletes reversed their strategy and performed the skill faster but with more errors. It would seem as though the athletes' strategy with respect to completing the soccer task changed from pre to post test. More specifically, athletes seemed to have traded speed over accuracy from pre to post test and as a result, athletes' overall performance did not improve. Therefore, since there was no overall performance change, no learning effects were demonstrated. There were, however, changes in speed and accuracy, in that athletes placed more importance on accuracy during pre testing and more emphasis on speed during post testing.

There are several practical reasons why the speed/accuracy trade off may have existed in the current study. For example, at post test, athletes were highly concerned with accuracy while performing the soccer skill because they were concentrating on becoming acquainted and familiar with the task (Gallagher et al., 1996). Because the athletes were performing a novel task, they were essentially learning the various sections of the task, as well as familiarizing themselves with the time penalties for accuracy associated with the task. In turn, athletes went about performing the task more cautiously which resulted in poorer speed and greater accuracy. Conversely, at post testing, athletes were concerned with performing the soccer skill with faster speed, which contributed to the decline in accuracy. This particular performance strategy used at post test was not related to the imagery intervention. In other words, the increase in speed could be attributed to an increase in task familiarity, a lack of motivation to perform the task as accurately as possible which resulted in rushing through the skills, or due to the athletes treating the soccer skill as a competition in order to observe which athlete could achieve the fastest speed. All in all, athletes in this particular adolescent age cohort may not have been at the ideal stage to reap the benefits of an imagery intervention because of their inability to take the program seriously, due to the many commitments and responsibilities that accompany a child at this age.

Further, knowing the speed/accuracy trade off was evident in the present study, it would have been interesting to have the athletes reveal their goals in terms of speed and accuracy, at pre and post test, on a self report measure. Item five on the post manipulation check asked athletes how concerned they were with speed and accuracy before performing the soccer task, however, this item was not broken down in pre and post test performance.

Gender Differences in Performance Speed and Accuracy

Results of the current study revealed gender differences with respect to the overall performance of the soccer task, namely speed and accuracy. There may be several reasons why the young male athletes completed the skill quicker and with greater accuracy than the female athletes.

With respect to physical strength and soccer skill ability, males may be naturally awarded an advantage in terms of physicality at this particular stage of adolescence (i.e., especially between age 13-14 years), in terms of timing of the physical growth spurt. For instance, while adolescence initially begins at approximately 9-10 years of age for females and peak growth occurs at age 12, males begin around 11-12 (pre adolescence) years of age and reach their peak growth at about 14 (adolescence) years of age (Baxter-Jones & Malina, 2001). Given male athletes (aged 11-14 years) may still be in the maturing stages, in terms of physical growth, they may still be experiencing the muscular strength increases that benefit sport performance. Alternatively, physical strength and muscular growth in females starts to level off at approximately 12 years of age, decreasing the chances of skill improvement through physical gains alone. Accordingly, gender differences become greater in motor skill activity in the early stages of adolescence (Thomas et al., 1980). For instance, with the onset of adolescence, boys' motor performances show acceleration, while females improve up to about 14-15 years of age, and then level off or improve slightly (Baxter-Jones & Malina). Overall, males show a greater increase in performance than females, with the onset of a growth spurt. Additionally, with respect to potential gender differences on gross motor tasks, such as the soccer task used in the present study, males often perform superior to females (Fagard, 1996).

Additionally, socialization through sport may also affect physical skill level. That is, since most males are introduced to sport and begin practicing sport skills at an earlier age than females (Fagard, 1996), this may, in turn, contribute to physical performance differences amongst the genders, particularly in the accuracy of motor skills. By the time the period of adolescence is reached, most males have had a greater amount of experience practicing sport skills.

Lastly, cultural expectations and practice may reinforce gender differences, since skills in which such differences are found typically lie in gender oriented activities (Fagard, 1996). For instance, males may be superior at kicking because soccer is typically a male dominated sport (Fagard). Overall, gender differences in the speed and accuracy of sport skills are to be expected, especially in a time of peak growth and individual variability, such as the years leading up to, and including, adolescence.

Applied Model of Mental Imagery Use in Sport

The applied model of imagery use (Martin et al., 1999), demonstrates how athletes use different types (i.e., functions) of imagery to achieve various outcomes across different sport situations. However, not all literature examining the imagery type-outcome relationship has exhibited clear-cut results. For example, CS imagery may lead an athlete to increasing his or her motivation and confidence, in addition to improving skill performance. This may be because images of successful skill execution might lead to an automatic increase in self-confidence since the athlete is now able to picture him or herself performing in a positive light. Imagery is an individualized skill and, as such, the significance of that imagery is quite unique to each individual athlete. Therefore, it is important to note that every imagery experience contains personal meaning for each athlete that may be incomprehensible to anyone else (Murphy, 2005).

The meaning of imagery is the least researched area of imagery studied in sport psychology, yet is has the potential to affect the athlete every time he or she uses imagery (Murphy, 2005). According to Ashen's (1984) Triple Code Theory, the meaning of a particular image is individually specific in that its function is unique and personal to the imager. Although a universal definition of "imagery meaning" has yet to be transpired in the literature, according to Lang's (1979) Bio-informational Theory, the meaning of an image represents the level of importance of the particular image to an individual. The importance of an image depends on the thoughts, feelings, and emotions that are tied to the image. Thus, it may not only be the content of the image that is important, per se, but the meaning of the image to the imager (Ashen).

Accordingly, results from the present study revealed that although the young athletes participated in two different imagery interventions (i.e., CS and MG-A), no differences with respect to overall performance emerged. In other words, all athletes increased their soccer skill speed from pre to post test, regardless of the imagery intervention they received. Contrary to the second hypotheses, athletes' performance accuracy declined from pre to post test, regardless of the specific imagery intervention. Therefore, no significant differences existed between the two imagery groups, in terms of, both, speed and accuracy. These findings are supported by a study with adult athletes conducted by Nordin and Cumming (2005), in which no differences were found between how CS and MG-M imagery affected dart throwing performance. The present study also demonstrated no significant differences between the imagery groups (CS and MG-A) from pre to post test with respect to anxiety. Support for this finding can be found in a recent study involving an elite 23-year old rugby player. The athlete reported that focusing on tactical and technical images (i.e., CS imagery) can also improve the motivational aspects involved in performance such as, increasing confidence and controlling anxiety (Evans, Jones, & Mullen, 2004).

Furthermore, Callow and Hardy (2001) suggested that the type of imagery that is most facilitative for achieving specific outcomes may vary depending on skill level. This could be of particular importance to an adolescent sport population, where it is common to observe a vast range of physical abilities. In fact, one limitation of Martin et al.'s (1999) model is that, apart from imagery ability, the model does not specify individual differences that can influence the relationships among the constructs. Thus, in the present study, although athletes came from the same competitive level, they varied in their physical abilities, which may have affected individual performance outcomes. Most importantly, with respect to the present study, future research should investigate the appropriateness of applying the model to young athletes or the potential modifications that may be necessary for imagery use with young athletes.

Imagery Use and Performance in Young Athletes

All things considered, continued modifications to the Applied Model of Mental Imagery Use in Sport may spark the development of potential variables related to young athletes' use of imagery and increase understanding for sport practitioners, coaches, and sport psychologists. However, conclusions contradicting Martin's applied model may not be completely appropriate due to the fact the athletes did not comply with their required imagery interventions. Had the athletes increased their use of imagery over the course of the intervention and yet still produced no differences in overall performance, one might conclude the applied model is limiting. However, the athletes did not increase their imagery use on any of the functions from pre to post test. Although participants completed several imagery sessions with the researcher, this limited practice may not have been sufficient in changing their behaviours. Further research in which young athletes diligently follow an imagery program will be required to test the applicability of Martin's applied model to a youth sport population.

This non-compliance to the imagery intervention is the main reason why the CS imagery intervention did not have significant effects on the performance of the soccer skill when compared to the MG-A imagery groups. The incomplete imagery log books were an indication of their poor compliance to the program. Although most athletes imaged a few times per week, only half of the participants utilized imagery prior to performing the soccer task, as indicated through the post manipulation check. Therefore, even though some athletes may have used imagery, they may not have fully understood how they could apply such images to benefit their soccer skill performance. The improvement in speed, found in all athletes pre to post test, was, more than likely, due to physical practice effects alone, rather than imagery. Accordingly, results from the SIQ-C demonstrated that the athletes' frequency of imagery use did not improve from pre to post test, which justifies why imagery did not have an effect on overall performance.

Imagery Ability and Young Athletes

Based on previous research, Martin and colleagues (1999) implied that imagery ability moderates the effects of imagery use on various outcomes. No known study has examined the relationship between all three of these constructs which include imagery ability, imagery use, and performance, for example (Gregg, Hall, & Nederhof, 2005). Hall (1998) indicated that the better the athlete is at imaging, the more effective the imagery will be in aiding his or her performance or skill acquisition. It is plausible to suggest that a circular relationship exists between imagery frequency and imagery ability (Vadocz et al., 1997). Thus, not only do better imagers use imagery more effectively in sport, when athletes increase their use of imagery, their imagery ability improves as well (Rodgers et al., 1991). Further research is necessary to determine if imagery ability moderates the effects of imagery use on performance outcome, especially in young athletes, where the range of imagery abilities may still be quite varied due to developmental differences in cognitive processing.

Given previous research has demonstrated that individual differences in imagery ability can influence the learning and performance of motor skills (Hall et al. 1998), it is important that all participants are able to image at a respectable level. The present study did not examine imagery ability as a moderator between imagery use and performance, however, athletes were given the MIQ-R prior to starting the imagery intervention, as a screening tool, to ensure they all had the ability to image. All athletes scored at least a level 3.5 (i.e., somewhat easy to see the images) or above on the visual imagery subscale of the MIQ-R, which suggested that all participants could image at an acceptable level. In summary, by identifying the potential effects of the moderators of the imagery use-desired outcome relationship, it should be achievable to develop more effective imagery interventions for young athletes in the future (Gregg et al., 2005).

Frequency of Imagery Use and Young Athletes

Results indicated no significant differences on the SIQ-C scores from pre to post test when comparing the two intervention groups. One potential explanation for this finding may be a result of the varied physical skill levels which may affect the imagery use of young athletes, just as it has been shown to do in adult athletes (Callow & Hardy, 2001). It could be argued that previous sport involvement may automatically increase imagery exposure. Given imagery is a skill that develops with practice (Cumming & Hall, 2002), perhaps a young athlete's imagery use can improve through encouraged involvement in sport, where the use of mental plans and imagery is promoted. As such, the earlier one begins to use imagery, the more proficient he/she becomes at imagery and the more benefits (e.g., increased learning and performance success) that will be derived. A study examining the effect of an imagery training program on imagery use and figure skating performance indicated that when coaches encouraged the implementation of imagery into daily physical practice sessions, skaters showed changes in their imagery use, could more easily visualize and feel certain aspects of their skating performance, and passed more skating tests than expected (Rodgers et al., 1991). In the present study, both age groups (i.e., 11-12 and 13-14) had very similar amounts of soccer experience, in that the majority of athletes had six years or more experience, in the sport. Therefore, one might conclude that similar years of soccer experience between the two age groups may have resulted in similar amounts imagery use, over the five functions, hence the insignificant differences between the two age groups and imagery groups.

Recently, Munroe-Chandler and colleagues (2006) investigated young athletes' imagery use from a developmental perspective with both male and female athletes, aged 7-14. Findings revealed the initial support needed for examining the functions of imagery use from a developmental perspective. Results indicated that all age groups reported using all five functions of imagery for both cognitive and motivational purposes, which supports results of the present study. Contrary to Munroe-Chandler and colleagues' (2006) study, however, the current study failed to find any developmental differences with respect to the five functions of imagery use. Perhaps this finding can be attributed to the different age groups examined within the two studies. Munroe-Chandler and colleagues (2006) examined athletes aged 7-14 years, unlike the present study, which involved participants aged 11-14 years. Therefore, the significant differences resulting in the study by Munroe-Chandler et al. (2006) may have been found between the two extreme age groups (i.e., 7 and 14 years of age).

Another possible explanation why the frequency of CS and MG-A imagery use did not increase between the two imagery intervention groups (i.e., CS and MG-A), from pre to post test, may be a function of meta-cognitions. Meta-cognition involves self monitoring and self regulation during a motor task, or simply "thinking about thinking" prior to performing a motor task, for instance (Singer, 1982). Therefore, perhaps the results of the present study represented a phenomenon broader than imagery use (i.e., meta-cognition). For example, pre adolescents and adolescents are at the developmental (i.e., both cognitive and motor) stage in which meta-cognition has begun to drastically improve (Gallagher & Thomas, 1984). Thus, the lack of significant increases in imagery use may be attributed to how the athletes used the imagery and what benefits they derived. The imagery intervention alone did not result in greater frequency of a particular type of imagery. However, the athletes may have improved their overall cognitive strategy use and attention focusing, through improved meta-cognition, during the minimal imagery practice (Singer).

Most importantly, there were no differences between the frequencies of CS and MG-A imagery use between the two imagery groups because athletes were simply not complying to the assigned imagery intervention. This was evident through the athletes' insufficient use and completion of their imagery logs. Therefore, the corresponding imagery function (i.e., CS or MG-A) assigned through each group's respective intervention did not significantly increase from pre to post test due to the athlete's lack of motivation to adequately comply to the imagery intervention.

Imagery Use and Competitive State Anxiety in Young Athletes

Although results from the current study were non-significant with respect to differentiating the two intervention groups (MG-A and CS) in their anxiety and confidence scores, trends illustrated that both the CS and MG-A imagery groups increased their confidence levels and decreased their cognitive and somatic anxiety from pre to post test. It is known that adult athletes use imagery to successfully enhance their confidence levels (Moritz et al., 1996). Thus, imagery interventions may improve confidence levels in young athletes which may, in turn, enhance performance.

In a study exploring audition anxiety and the role of imagery in the anxiety-performance relationship among adolescent female ballet dancers, results demonstrated that confident dancers used more mastery and less arousal imagery than less confident dancers (Monsma & Overby, 2004). The study also found that cognitively and somatically anxious dancers used less mastery and more arousal imagery. Since all athletes in the present study showed a trend toward using more MG-M imagery than MG-A imagery, despite the particular imagery intervention they received, this may lend some justification as to why the young athletes decreased their levels of cognitive and somatic anxiety from pre to post test, although not significantly.

Effects of Cognitive Maturation on Motor Skill Performance

The process of imaging, itself, may have also been affected by individual changes in growth and development at the cognitive level, in the present study. Such cognitive changes have the ability to affect performance (Gallagher et al., 1996). Moreover, athletes who have entered into Piaget's (1971) formal operational stage of cognitive development (i.e., 12-14 years of age) will generally have an increase in processing speed, attention span, mental space, spatial cognition, and memory skills which can all contribute to enhancing one's imagery use and motor skill performance (Gallagher et al.). However, because the two age groups employed in the present study were so close, there may have been an overlap, instead of a distinction, in the level of cognitive maturation occurring between the two age cohorts (i.e., 11-12 and 13-14 years). Likewise, since the age at which an athlete experiences an increase in cognitive development varies on an individual level, just as the physical growth spurt, it is difficult to distinguish whether an athlete falls into the concrete operational stage (i.e., 8-11 years of age) or the formal operational stage, according to their age alone (Piaget). As such, the above indications may provide additional rationale as to why the adolescent age cohort (i.e., 13-14 year olds) did not improve their overall performance significantly more than the pre adolescent (i.e., 11-12 year olds) age cohort.

Moreover, with respect to imagery and the cognitive demands related to motor skills, it has been found that children's ability to manipulate visual images is a function of, both, task demands and control processes that develop with age (Brandimonte et al., 1992). As such, perhaps if a simpler task was used in the present study, athletes belonging to the CS imagery group could have manipulated the image of the task with more ease, which may have resulted in greater compliance to the intervention and, in turn, overall performance improvements. Further investigation is required in order to determine the extent to which imagery is effective for children in learning the various cognitive levels of motor skills (Blair et al., 1992). Given children's cognitive functioning does not reach its full capacity until almost adulthood (i.e., late adolescence), young athletes may receive larger benefits from CS imagery when used for the acquisition or execution of one particular motor skill (Thomas et al., 2001). This may be due, in part, to the relative motor simplicity involved in one motor skill (e.g., soccer kick), compared to a more complex motor skill such as a running, dribbling, passing, shooting combination, which was used in the present study.

Effects of Puberty on Motor Skill Performance

It is known that movement performance improves during childhood, especially in the adolescent period of development (Thomas et al., 2001) and is related to the processes of growth and biological maturation which influence physical performance (Baxter-Jones & Malina, 2001). Since the athletes in the present study belonged to two developmental stages, pre adolescence (11-12) and adolescence (13-14), one can not ignore the effects of puberty on motor performance. However, due to the individual differences among the athletes with respect to when the period of peak growth occurred, no age group differences in overall performance existed. For example, a 12 year old participant may have been as physically developed as a 13 year old athlete, making the classification of development into two distinct stages clearly impossible. As such, detecting any physical differences between these two specific age cohorts in terms of performance would be quite rare, due to the sporadic timing of physical growth spurts and the narrow age groups employed.

Limitations

The present study is not without limitations. The small sample size, especially in the male 13-14 age group, is a limitation. This small sample size was a result of attrition from pre to post test and, as such, those participants were excluded from any final analyses. Additionally, post-testing occurred at the end of the soccer season and, as such, the athletes were physically exhausted, had already committed to new fall activities, and began to focus on academics, with the commencement of school and homework. Athletes may not have been motivated to perform to the best of their ability which may have affected their overall performance at post test. Also, although the eight soccer teams represented a similar competitive level, the individual athletes within the teams varied with respect to physical ability. This presents a limitation to the present study since varying physical abilities can affect consistency of the results, in that overall performance differences could have occurred, due to pure physical differences among the athletes, and not the imagery intervention alone.

Additionally, the intervention period of six weeks may not have long enough for the athletes to benefit from the imagery. A previous study, involving young table tennis players, incorporated a lengthy 18 week imagery intervention phase which contributed to significant performance improvements in the accuracy and technical quality of tennis shots, in comparison to control groups (Li-Wei et al., 1992). Moreover, three imagery sessions in which the researcher was in contact with the teams may not have been sufficient to ensure that athletes were imaging on a daily basis. In contrast, asking the young athletes to image the script three times daily may have been too arduous a task for them to adhere to the program. Perhaps, if they were only asked to image once a day, they may have been more apt to image the script on a consistent basis. Likewise, Murphy (2005) stated that, ideally, athletes should be imaging once a day, for 10-15 minutes. Also, the researcher could have ensured that the imagery log books were continually utilized by the participants, throughout the six weeks, by collecting the logs on a weekly basis and, perhaps, implementing a reward system for those athletes who completed the log. In the current study, the log books were not of use to the majority of the subjects, in that most failed to regularly complete the logs daily. This could, again, be due to the athletes being occupied with many extra-curricular activities throughout the summer months or that it was just too arduous a task for this adolescent age group to complete.

Lastly, without a true control group being evident in the present study that is "a group receiving no imagery" it was difficult to determine if performance results were due to imagery or practice effects alone. Thus, in future studies, researchers may want to include a group of athletes that receive no imagery or psychological skills intervention to ensure that the true effects of imagery on performance can be investigated.

One final limitation may lie within the scripts that were read and provided to the participants. Although both the MG-A and CS script contained purposeful images pertaining to the soccer skill and the game of soccer in general, they may have been lacking with respect to conveying a meaningful image to each and every participant. According to Ahsen's (1984) Triple Code Theory, every image imparts a meaning and no two people, even if provided with the same imagery script, will have the exact same imagery experience. The scripts used in the present study contained stimulus, response, and meaning propositions, which are all necessary for creating effective imagery scripts, according to Lang's (1979) Bio-informational Model and Ahsen's Triple Code Theory. Even though the scripts attempted to portray meaningful images, it was very difficult to convey individual meaning to the greatest extent, since it is impossible to determine which aspect of soccer is most important to each participant. It would also be quite difficult to try and convey individual meaning throughout the scripts because each script must elicit the particular function of imagery that corresponds to the specific imagery groups (i.e., MG-A and CS). Accordingly, the post manipulation check was used to ensure the participants were using the particular function of imagery that corresponded to their designated script and imagery group.

Implications/Future Directions

Studies have shown that coaches not only recognize the importance of imagery but also advocate its use in adult athletes (Hall et al., 1992; Orlick & Partington, 1988; Rodgers et al., 1991). Perhaps with increased knowledge of the effects of imagery interventions on performance with young athletes, coaches at the grassroots level will incorporate the use of imagery into weekly practice sessions. When dealing with youth, it is imperative that coaches/sport practitioners fully understand the developmental differences that exist within different age groups, both cognitively and physically (Thomas et al., 2001), before implementing any form of mental training. In order to address developmental differences throughout childhood and adolescence more clearly and in greater detail, researchers may want to increase the gap between age groups studied. Thus, sport psychologists can identify key transition points in mental and physical development, over the fragile stages of youth, in order to enhance the comprehension of how such developmental changes may impact imagery use and performance.

To increase compliance with adolescent athletes in future imagery studies, researchers may want to indirectly deliver the imagery intervention program through the coach. If the athletes observe that the coach believes in imagery as a way to improve performance, they may be more apt to comply with the imagery program and mental skills training in general. Since coaches are also responsible for allocating playing time, athletes may feel more motivated to comply with the program being advocated by the coach.

Also, with respect to incorporating individual meaning into athletes' imagery interventions, it has been suggested that researchers and practitioners ask participants their perceptions of the specific imagery content, to help ensure that their imagery interventions are consistent with their research or intervention goals (Murphy, 2005). Future studies may consider employing a talk-a-loud protocol in order to better understand athletes' perceptions and interpretations of the particular imagery being used. The present study tried to tap into these concerns in the post manipulation check however, the questions were very direct and may not have been open-ended enough for the athletes to express their full understanding of the imagery intervention and its purpose with respect to performance. In the future, children of this pre adolescent/adolescent age group may better comply with an imagery intervention if they have the opportunity to speak or write more openly about the imagery. Future research may also consider having participants design their own imagery scripts with the purpose of attaining specific outcomes, such as improving performance. Perhaps the use of generic imagery scripts that coaches and sport psychologists have employed to teams and individual athletes in the past are, essentially, too general to provide athletes with the meaningful detail necessary to aid each individual performance.

Conclusions

Numerous studies have found that athletes use imagery extensively (c.f. Hall, 2001). For many years, imagery use in elite adult athletes has been a well-researched topic. In turn, gaps in the literature have made notice of the growing need for research examining young athletes' imagery use and imagery use from a developmental perspective (Munroe-Chandler et al., 2006). Despite the limitations to the present study, there were several important implications that emerged from examining young athletes' imagery use from a developmental perspective. Studying developmental differences (i.e., both physical and cognitive) in athletes during the pre adolescent and adolescent years can be challenging, especially when trying to pinpoint how these developmental differences, if any, are contributing to imagery use and motor skill performance. Therefore, it is imperative that future researchers examining imagery use from a developmental perspective employ broad age cohorts, in order to determine if developmental differences do, in fact, exist.

Furthermore, young athletes taking part in imagery interventions or any mental skills program may require additional sources of motivation in order to achieve compliance to the program. Unlike adult athletes, children and adolescents may not truly understand the benefits of imagery and, in turn, they may not take the intervention seriously, which can ultimately impact their level of compliance to the program. Perhaps one way to increase compliance and adherence to intervention programs is to educate coaches about the benefits of imagery use and about the direct implementation of imagery sessions into weekly practice schedules. This way, young athletes will feel more motivated to practice their mental skills, as it becomes a regular part of their training.

Results of the present study offer insight to the small body of knowledge that currently exists regarding children's use of imagery and may assist in the development and proper implementation of more effective imagery intervention programs for young athletes. When successful adherence to intervention programs is achieved, imagery may have the potential to enhance the overall sport experience in young athletes by improving performance and increasing enjoyment levels, which may ultimately lead to continued participation in sport-related activities throughout the lifespan.

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Appendix A

Sport Organization Recruitment Letter

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

To Whom It May Concern:

I am writing this letter to ask for your cooperation in conducting a research study on imagery use and performance of a soccer task in young athletes aged 11-12 and 13-14. Imagery, or visualization, is creating or re-creating a specific experience in one's mind. Imagery comes naturally to children and, therefore, could be utilized in a sporting environment to enhance athletic performance in practice and competition. However, imagery has not been examined in young athletes across different age groups. I am recruiting male and female athletes of any competitive level, aged 11-12 and 13-14. Athletes will be asked to complete two short imagery questions, which should take no more than 15-20 minutes (see attached). Athletes will then be shown a visual representation of the soccer task on a laptop screen, watch a video demonstration of the soccer task by a skilled performer, and receive verbal instructions about the task. The task consists of a series of game like soccer skills including, dribbling, passing, shooting, and checking off (see attached). Before performing the task, each player will complete a short questionnaire on confidence and anxiety (see attached). The players will be tested individually on the soccer task, three times, in order to get an average score for speed and accuracy. No feedback or coaching will be provided to the players. The athletes will then meet bi-weekly for imagery training sessions over a 6-week period in which they will receive a guided imagery script dealing with soccer performance. These three meeting will occur during the athletes' regularly scheduled practice and will take no more than 10 minutes. The players in will be given a copy of the script and asked to practice the imagery on their own, three times daily, and asked to keep a diary to record their imagery practice. After the 6 weeks, all athletes will again complete the confidence and anxiety questionnaire as well as perform the soccer task three times. All players will again be asked to complete one imagery questionnaire and a debriefing questionnaire, which will focus on the training they had experienced.

If you agree to allow us to recruit athletes from your sport organization, athletes will be asked if they would like to volunteer as participants in the study. Permission and consent will be obtained from the athletes' parents. Confidentiality will be assured. A date, time, and location for the researcher to come to a practice to collect the data and set up the intervention program will be arranged in advance with yourself. There are no known or anticipated risks associated with this study.

If you are willing to participate or have any questions or concerns about the study, please contact myself, Lisa Murphy, or my adviser, Dr. Krista Chandler, at the numbers below.

Thank you for your time and consideration.

Sincerely,

Lisa Murphy (Graduate Student)
Faculty of Human Kinetics
University of Windsor

Krista Chandler, PhD
Faculty of Human Kinetics
University of Windsor (519) 253-3000 ext. 2446
chandler@uwindsor.ca

Appendix B

SPORT IMAGERY QUESTIONNAIRE FOR CHILDREN (SIQ-C)

Age: ____ **Number of Years in Sport:** ______ **Gender: Male** ____ **Female** ____

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. Any statement that explains an imagery situation that you often use should be given a high number.

The statements will be scored from 1-5. 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 at all	a little bit	sometimes	often	very often
1	2	3	4	5

In my sport of soccer….

Statement	Scale
1. I make up new game plans or routines in my head.	1 2 3 4 5
2. I see myself doing my very best.	1 2 3 4 5
3. I imagine myself being confident in competition.	1 2 3 4 5
4. In my head, I imagine how calm I feel before I compete.	1 2 3 4 5
5. I see what I would do if my game plans or routines do not work out.	1 2 3 4 5
6. I imagine myself staying calm in competitions.	1 2 3 4 5
7. I imagine other people telling me that I did a good job.	1 2 3 4 5
8. I can usually control how a skill looks in my head.	1 2 3 4 5
9. I see the audience cheering for me.	1 2 3 4 5

10. When I think of doing a skill, I always see myself doing it perfectly.	1 2 3 4 5
11. I imagine continuing with my game plan or routine even if it is not going well.	1 2 3 4 5
12. When I think of a competition, I imagine myself getting excited.	1 2 3 4 5
13. Before trying a skill, I see myself doing it perfectly.	1 2 3 4 5
14. I see myself being mentally strong.	1 2 3 4 5
15. I imagine how exciting it is to be in a competition.	1 2 3 4 5
16. I see myself as a champion.	1 2 3 4 5
17. I see myself being focused in a tough situation.	1 2 3 4 5
18. When learning something new, I see myself doing it perfectly.	1 2 3 4 5
19. I see myself being in control in tricky situations.	1 2 3 4 5
20. I see myself following the game plan or routine at competitions.	1 2 3 4 5
21. I see myself getting through tough situations with good results.	1 2 3 4 5

Appendix C

Movement Imagery Questionnaire – Revised (MIQ-R; Hall & Martin, 1997)

Instructions

This questionnaire concerns two ways of mentally performing movements, which are used by some people more than by others, and are more applicable to some types of movements than others. The first is attempting to form a visual image or picture of a movement in your mind. The second is attempting to feel what performing a movement is like without actually doing the movement. You are requested to do both of these mental tasks for a variety of movements in this questionnaire, and then rate how easy/difficult you found the tasks to be. The ratings that you give are not designed to assess the goodness or badness of the way you perform these mental tasks. They are attempts to discover the capacity individuals show for performing these tasks for different movements. There are no right or wrong ratings that are better than others.

Each of the following statements describes a particular action or movement. Read each statement carefully and then actually perform the movement as described. Only perform the movement a single time. Return to the starting position for the movement just as if you were going to perform the action a second time. Then depending on which of the following you are asked to do, either (1) form as clear and vivid a visual image as possible of the movement just performed, or (2) attempt to feel yourself making the movement just performed without actually doing it.

After you have completed the mental task required, rate the ease/difficulty with which you were able to do the task. Take your rating from the following scale. Be as accurate as possible and take as long as you feel necessary to arrive at the proper rating for each movement. You may choose the same rating for any number of movements "seen" or "felt" and it is not necessary to utilize the entire length of the scale.

RATING SCALES

Visual Imagery Scale

7	**6**	**5**	**4**	**3**	**2**	**1**
Very easy to see	Easy to see	Somewhat easy to see	Neutral (not easy, not hard)	Somewhat hard to see	Hard to see	Very hard to see

Kinesthetic Imagery Scale

7	**6**	**5**	**4**	**3**	**2**	**1**

Very easy to feel	Easy to feel	Somewhat easy to feel	Neutral (not easy, not hard)	Somewhat hard to feel	Hard to feel	Very hard to feel

1. ***STARTING POSITION*:** Stand with your feet and legs together and your arms at your sides.

***ACTION*:** Raise your knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet. Perform these actions slowly.

***MENTAL TASK*:** Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

***RATING*:** ____________

2. ***STARTING POSITION*:** Stand with your feet slightly apart and your hands at your sides.

***ACTION*:** Bend down low and then jump straight up in the air as high as possible with both arms extended above your head. Land with your feet apart and lower your arms to your sides.

***MENTAL TASK*:** Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.

***RATING*:** ____________

3. ***STARTING POSITION*:** Extend your arm of your nondominant hand straight out to your so that it is parallel to the ground, palm down.

***ACTION*:** Move your arm forward until it is directly in front of your body (still parallel to the ground). Keep your arm extended during the movement and make the movement slowly.

***MENTAL TASK*:** Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

***RATING*:** ____________

4. ***STARTING POSITION*:** Stand with your feet slightly apart and your arms fully extended above your head.

***ACTION*:** Slowly bend forward at the waist and try and touch your toes with your fingertips (or if possible, touch the floor with your fingertips or hands). Now return to the starting position, standing erect with your arms extended above your head.

***MENTAL TASK*:** Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.

***RATING*:** ____________

5. ***STARTING POSITION*:** Stand with your feet slightly apart and your hands at your sides.

***ACTION*:** Bend down low and then jump straight up in the air as high as possible with both arms extended above your head. Land with your feet apart and lower your arms to your sides.

***MENTAL TASK*:** Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

***RATING*:** ____________

6. ***STARTING POSITION*:** Stand with your feet and legs together and your arms at your sides.

***ACTION*:** Raise your knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet. Perform these actions slowly.

***MENTAL TASK*:** Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.

***RATING*:** ____________

7. ***STARTING POSITION*:** Stand with your feet slightly apart and your arms fully extended above your head.

***ACTION*:** Slowly bend forward at the waist and try and touch your toes with your fingertips (or if possible, touch the floor with your fingertips or hands). Now return to the starting position, standing erect with your arms extended above your head..

***MENTAL TASK*:** Assume the starting position. Attempt to feel yourself making the movement just performed without actually doing it. Now rate the ease/difficulty with which you were able to do this mental task.

***RATING*:** ____________

8. ***STARTING POSITION*:** Extend your arm of your nondominant hand straight out to your so that it is parallel to the ground, palm down.

***ACTION*:** Move your arm forward until it is directly in front of your body (still parallel to the ground). Keep your arm extended during the movement and make the movement slowly.

***MENTAL TASK*:** Assume the starting position. Attempt to see yourself making the movement just performed with as clear and vivid a visual image as possible. Now rate the ease/difficulty with which you were able to do this mental task.

***RATING*:** ____________

Appendix D

CSAI-2C

Name___________ Age (years)_________ Check one: Boy__ Girl__

Directions: Below are some statements about how boys and girls feel when they play games or participate in sports and physical activities, like soccer. 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- before performing the soccer task. There are no right or 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.

		Not at all	Somewhat	Moderately so	Very much so
1.	I am concerned that I may not perform the soccer task 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 the soccer task well today.	1	2	3	4
7.	I'm concerned that I will perform the soccer task poorly today	1	2	3	4
8.	My heart is racing.	1	2	3	4
9.	I'm confident that I will perform the soccer task well today.	1	2	3	4
10.	I am worried about reaching my soccer task 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 soccer task 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 E

Post Experiment Manipulation Check

Please answer the following questions. The information collected from this questionnaire will help me with the results of the study. There are no right or wrong answers.

1. During all the soccer trials:

a) How concerned were you with completing the task accurately? (Please circle one)

1 2 3 4 5 6 7
(Not concerned at all) (Somewhat concerned) (Very concerned)

b) How concerned were you with completing the task quickly? (Please circle one)

1 2 3 4 5 6 7
(Not concerned at all) (Somewhat concerned) (Very concerned)

2. While visualizing the script that was read by Lisa:

a) How easy/difficult was it to see the images? (Please circle one)

1 2 3 4 5 6 7
(Very difficult) (Neither easy nor difficult) (Very easy)

b) How easy/difficult was it to feel the images? (Please circle one)

1 2 3 4 5 6 7
(Very difficult) (Neither easy nor difficult) (Very easy)

3. When reading the script on your own:

a) How easy/difficult was it to see the images? (Please circle one)

1 2 3 4 5 6 7
(Very difficult) (Neither easy nor difficult) (Very easy)

b) How easy/difficult was it to feel the images? (Please circle one)

1 2 3 4 5 6 7

(Very difficult) (Neither easy nor difficult) (Very easy)

4. In the last 6 weeks how many times did you practice the imagery script? (Please check one)

None☐ A few times ☐ Once a week ☐ A few times a week ☐

Once a day☐ 1-2 times a day ☐ 3 times a day ☐ More than 3 times day ☐

5. Before performing the last 3 soccer trials:

a) Did you use imagery? (Please check one)

Yes ☐ No ☐

If yes, please tell me what you imaged.

b) How much did imagery help with performing the soccer task?

1 2 3 4 5 6 7
(Did not help) (Neither helped nor hurt) (Helped a lot)

c) How much did imagery help you stay calm before performing the soccer task?

1 2 3 4 5 6 7
(Did not help) (Neither helped nor hurt) (Helped a lot)

d) How much did imagery help you feel excited before performing the soccer task?

1 2 3 4 5 6 7
(Did not help) (Neither helped nor hurt) (Helped a lot)

Appendix F

Soccer Organization Permission Letter

Dear:____________________ (organization)

This letter confirms your permission in allowing the soccer teams from your organization to participate in a study being conducted at the University of Windsor entitled: "Examining the Effects of an Imagery Intervention on the Soccer Skill Performance of Young Athletes Aged 11-12 and 13-14: A Developmental Perspective."

If you have any questions or concerns about the study, please contact myself, Lisa Murphy, or my adviser, Dr. Krista Chandler, at the numbers below.

Thank you for your time and consideration.

Sincerely,

Lisa Murphy (Graduate Student)
Faculty of Human Kinetics
University of Windsor

Krista Chandler, PhD
Faculty of Human Kinetics
University of Windsor (519) 253-3000 ext. 2446
chandler@uwindsor.ca

I agree to allow teams from this organization to take part in the study.

_________________________ ______________________
Signature (head of organization) Date

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WINDSOR

Appendix G

Parent/Guardian Consent and Letter of Information

Examining the Effects of an Imagery Intervention on the Soccer Skill Performance of Young Athletes Aged 11-12 and 13-14: A Developmental Perspective

Your child is being asked to participate in a research study conducted by graduate student Lisa Murphy under the direction of Dr. Krista Chandler from the Faculty of Human Kinetics at the University of Windsor. Performance in a soccer task of young athletes, aged 11-14, will be investigated. Results will be contributed to a master's thesis and the Social Sciences Humanities Research Council funds this research.

If you have any questions or concerns about the research, please feel free to contact Dr. Krista Chandler at (519) 253-3000 x. 2446 chandler@uwindsor.ca.

Purpose of the Study
The purpose of the study is to examine the effects of imagery on the soccer skill performance of young athletes aged 11-12 and 13-14, and determine if such performances vary with age. Imagery, or visualization, is creating or recreating experiences in one's mind. It is a skill that comes naturally to children and, therefore, could be utilized in a sporting environment to enhance athletic performance in practice and competition. Previous findings have suggested that young children's sport performance can benefit from imagery use. Soccer is a complex game, which incorporates many skills, strategies, and the need for a mentally tough attitude.

Procedures
If you agree to letting your child participate in this study, we would ask he/she do the following:

Athletes will be asked to complete two short questionnaires on their imagery use in sport. Completion of these questionnaires should take no more than 15-20 minutes. They will then be shown a visual representation of the soccer task on a laptop screen followed by a video demonstration of the task by a skilled performer. Verbal instructions of the task will then be given to the players. The task consists of a series of game like soccer skills including, dribbling, passing, shooting, and checking off. Players will be asked to complete a confidence and anxiety questionnaire prior to testing and perform the soccer task individually, 3 times, to the best of their ability. They will be scored on the speed and accuracy in completing the task. Participants will be informed of the time penalties involved. No feedback or coaching will be provided to the players. Following the initial test, an imagery intervention aimed at improving soccer performance will be implemented. During regularly scheduled practices, the players will meet for their intervention over a 6-week period, meeting bi-weekly, for approximately 10 minutes per session (3 times total). The players will be taken through a guided imagery script and asked to practice imaging on their own time. They will be given a copy of the script and asked to keep a log of their imagery practice. Following the 6-week training period, all players will again be asked to complete the confidence and anxiety questionnaire and perform the soccer task 3 more times. The same procedures used in the initial test will be used again, except participants will not be receiving a video demonstration of the task. After completing the soccer task, all players will again be asked to complete one imagery questionnaire and a debriefing questionnaire, which will focus on the training they had experienced.

Potential Risks and Discomforts

There are no known or anticipated risks from completing a questionnaire about previous and current imagery use in sport or participating in the soccer task. There are also no risks associated with participating in an imagery program.

Potential Benefits to subjects and/or to Society

The information gained from this study may be used in subsequent studies. The researchers may gain valuable insight regarding young athletes' mental skills in sport. Moreover, the young athletes will have the opportunity to be given feedback on the benefits and proper use of imagery in sport that may enhance their sport performance. Also, players may benefit from an imagery intervention designed to improve mental skills, which will, in turn, enhance overall soccer performance.

Payment for Participation

Subjects will not be compensated for their involvement in the project.

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. All completed questionnaires and scores on the soccer task will be kept in strict confidentiality. The information obtained from the study will not be used for any purpose other than the present research and the communication of the results. All completed questionnaires and soccer task trial scores will be kept in a locked cabinet in the investigator's office. There is no access to this cabinet by anyone other than the investigator. The questionnaires and soccer task trial scores will be destroyed once the study is completed.

Participation and Withdrawal

Participation in this study is voluntary. Your child can choose whether to be in this study or not. If your child volunteers to be in this study, he/she may withdraw at any time. You may remove your child's data from the study. Your child may also refuse to answer any questions or participate in any part of the soccer task and imagery training and still remain in the study. The investigator may withdraw your child from this research if a situation arises which necessitates doing so.

Feedback from the Study

The primary investigator will provide feedback to the head coach or lead of your child's sport organization. Feedback will then be disseminated via the coach to you. If you have any additional concerns or questions you can email or call the primary investigator at the address or number above. Please keep this letter of information.

Subsequent use of Data
This data may be used in subsequent studies.

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 rights as a research subject, contact:

Research Ethics Co-ordinator
University of Windsor
Windsor, Ontario
N9B 3P4

Telephone: 519-253-3000, # 3916
Email: ethics@uwindsor.ca

SIGNATURE OF PARENT OR GUARDIAN

I understand the information provided for the study "Improving a Soccer Task in Young Athletes Aged 11-12 and 13-14: A Developmental Perspective" 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.

______________________________ ⇐ Sign here
Name of Child

______________________________ ⇐ Sign here
Name of Parent/Guardian

______________________________ ⇐ Sign here
Signature of Parent/Guardian
Date

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

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Appendix H

Assent Form

Examining the Effects of an Imagery Intervention on the Soccer Skill Performance of Young Athletes Aged 11-12 and 13-14: A Developmental Perspective

I am a researcher, and I am doing a study on imagery and performance of a soccer drill. Imagery is like using your imagination. For example, when you picture yourself playing a sport or winning a game, that is imagery. I would like you to fill out a questionnaire on imagery in sport and also perform a soccer drill several times. First, you will watch someone do the drill on a video and then I will explain how to do the drill. The drill has four parts; dribbling around pylons, passing to a target, shooting at a target, and checking off. I will ask you to complete the drill as best as you can. No other athlete in the study will be watching you perform the drill. The only people watching will be my self and two helpers. After you fill out the questionnaire and do the drill three times, you will be asked to take part in a six week imagery program. I will meet with you once every two weeks for 10 minutes, at the beginning of practice. I will help you try to imagine yourself performing the soccer drill. You will also need to practice imaging on your own, and write down when you're imaging in a diary. After the six weeks, I will again ask you to do the same soccer drill three more times and fill out the same questionnaire.

When I am finished getting all the questionnaires and information from the soccer drill with the kids who agree to be in my study, I will write a report on what I have learned. It might be put in a book, but no one will know who the kids are that answered my questions or took part in the drill.

I want you to know that I will not be telling your coaches, parents or any other kids what you answer or how you do. The only time I will talk to any of those people about you is if you tell me that someone has been hurting you. If I think that you are being hurt or abused I will need to tell your parents or someone else who can help you. I promise to keep everything else that you tell me private.

Your mom and/or dad have said it is okay for you to complete the questionnaire and take part in the soccer drill and imagery program. Do you think that you would like to do this? You won't get into any trouble if you say "no". Even if you decide you would like to start it you can stop at any time. You don't have to answer any questions you do not want to answer, take part in any part of the soccer drill, or do any of the imagery you do not want to do. It's entirely up to you.

I understand what I am being asked to do in this study, and I agree to be in this study.

________________________ Signature

________________________ Date

________________________ Witness

Appendix I

Cognitive Specific Imagery Group Script

See yourself standing at the first orange cone ready to begin. Feel your shoulders rise as you take a deep breath and start dribbling the soccer ball in a straight line. See the row of bright orange pylons, spaced equally apart, that awaits you as you pick up speed. Visualize yourself darting through the path of pylons ahead. Feel yourself maintaining good speed and keeping the ball directly in front of you. Feel yourself cutting around each pylon, as close as possible. Visualize each cone as a fire that can not be touched. Feel yourself kicking with the right amount of force and adjusting to each cone. See yourself make it around the first pylon, second pylon, third pylon.....etc with speed and accuracy.

Feel yourself dribbling the ball quickly, in the same straight path, as you prepare for your first pass, 11.7 meters away. Feel the sweat starting to trickle down your face. Try to imagine yourself preparing to pass before the line marker on the ground. You know you must be accurate with your pass. Imagine a teammate is standing in the narrow space awaiting your pass. As you approach the mark where the pass must be made, feel your cleat grip firmly into the grass and your leg extend backward. Feel your leg muscles contract and, with full force, imagine yourself passing the ball effortlessly and it floating perfectly between the set of orange pylons.

Imagine yourself checking off into empty space and repositioning yourself inline with the next ball. Make contact with the ball. Imagine gradually speeding up into the next dribble portion of the drill. Visualize another set of pylons up ahead. Imagine the clock ticking and you need to move quickly and accurately. Visualize yourself breezing through this portion of the task. Feel yourself weaving in and out of the pylons as though they were opponents during a game. Imagine yourself maintaining control of the ball, adjusting your speed and force when needed. You clear the first pylon, second pylon, third pylon...etc.

Imagine yourself clear from the pylons and running freely with the ball in the same straight line. Feel the grass being torn up beneath you and feel your cleats gripping the soft ground as you pick up speed. Feel your leg muscles working hard with each stride. See the second pass coming up 11.7 meters away. See yourself keeping the ball in front of you but also see the target ahead. Imagine kicking the ball. Feel yourself running faster and faster as your leg plants in the ground, directly before the passing line marker on the ground. Feel your leg extend backward as you contract your muscles. Feel your foot swinging forward and making direct contact with the ball. Imagine the ball going right between the set of pylons as you make another successful pass.

You turn and see that the last soccer ball awaits you. In the distance you can see the net about 30 meters away. Feel your chest expand as you take one last deep breath and run swiftly towards the ball. Feel yourself making contact with the ball and dribbling quickly to the shooting line on the ground. See where you want the ball to go, close to the left post. As your cleat grips the ground, you feel your leg extend backward for maximum kicking power. You feel the muscles in your legs tensing. As your foot swings forward, you enjoy the feel of it driving into the sweet spot of the ball. You see the ball pass the goal line, travel between the orange pylon and the left goal post, and get knocked right into the back of the net.

Appendix J

Motivational General-Arousal Imagery Group Script

Imagine you're about to play in the final game of the regular season. It is a very important competition. Feel yourself being pumped, energized, and ready to play. Imagine the anticipation you are feeling at this moment. Feel the butterflies in your stomach but recognize it as fuel for competition. Your body feels warmed up and you can't wait to get on the field and take your position. Feel yourself getting energized as the group huddles prior to the game beginning. Feel your heart pounding and your pulse racing fast. Imagine the excitement you're feeling as well as the nervousness. Visualize yourself using the nervous energy to play your hardest and perform your best. You step out onto the field ready to play.

Imagine the game at half time. Feel your heart rate slowing as you take a quick break and catch your breath. Imagine yourself conserving every last drop of energy for the second half of the game. Feel the liquid move down your throat as you take a cool drink to stay hydrated on this hot summer day. Imagine wiping the dripping sweat off your forehead. Feel the muscles in your body as you sit down on the grass to take a break. Feel your heart rate slowing down. Imagine yourself being relaxed but also excited for the second half. The break is just enough time to get you re-energized. Feel the shoulders rise and lower as you breathe deeply to get enough oxygen in your lungs for the second half. Imagine yourself calming any butterflies or nerves you may have and using them to your advantage.

As you step on to the field for the second half you feel the heat of the sun on your body. Imagine yourself blocking out any tired thoughts and focusing on the game. Visualize yourself battling through the fatigue. Imagine still pushing your body even though you're feeling tired. You can really feel your sore and tired muscles with every stride you take but you overcome it. Visualize yourself in the final minutes of the game. Imagine using every last drop of energy you have to keep going. Imagine your body as a machine, pumping the energy to finish the job. See yourself continuing through the final seconds of the game. Feel your chest expand with each breath, as you attempt to get more air into the lungs. Feel the sweat on your face. You're almost there. Ten seconds left on the clock. Five seconds left....4....3....2....1. It's over! You feel great knowing you pushed through to the last second in the game.

Vita Auctoris

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