European Journal of Sport Science, March 2005; 5(1): 41–49

Taylor & Francis
Taylor & Francis Group

ORIGINAL ARTICLE

Using cognitive general imagery to improve soccer strategies

KRISTA J. MUNROE-CHANDLER[1], CRAIG R. HALL[2], GRAHAM J. FISHBURNE[3], & VANESSA SHANNON[4]

[1]*Department of Kinesiology, The University of Windsor, Windsor, Ontario, Canada,* [2]*School of Kinesiology, The University of Western Ontario, London, Ontario, Canada,* [3]*Elementary Education, The University of Alberta, Edmonton, Alberta, Canada, and* [4]*Department of Sport and Leisure Studies, University of Tennessee, Knoxville, TN, USA*

Abstract
Athletes use imagery for both cognitive and motivational functions (Paivio 1985). The cognitive function involves the rehearsal of skills (cognitive specific) and strategies of play (cognitive general). To date most of the imagery research has been concerned with skill rehearsal (cognitive specific), and there have been no controlled studies investigating the effects of cognitive general imagery on the learning and performance of game plans or strategies of play. The purpose of this study was to determine the effectiveness of a cognitive general imagery intervention on three distinct soccer strategies in a young elite female soccer team. Participants were 13 competitive female soccer players with a mean age of 12.54 years. Imagery scores were determined via the Sport Imagery Questionnaire (SIQ; Hall, Mack, Paivio, & Hausenblas, 1998) prior to, during, and after the intervention. A staggered multiple baseline design across behaviors was used to evaluate the effect of imagery on three distinct soccer strategies (defending a direct free kick, taking a direct free kick, and defending a corner kick) which were introduced at weeks 2, 4 and 6. Results indicated that cognitive general and cognitive specific imagery use as well as motivational general-arousal imagery use significantly increased from baseline to post intervention. Based on the present study's findings, the execution of soccer strategies was not significantly enhanced with the implementation of a cognitive general intervention. Additional research should be conducted in order to reach clearer conclusions that will have implications for young athletes and their learning strategies.

Keywords: *Imagery, intervention studies, soccer, youth, sports*

Key points:

- Imaging the execution of soccer strategies encompasses images relating to both skills and strategies
- Female soccer players increased their use of CG, CS and MG-A imagery from baseline to post-intervention
- The execution of soccer strategies was not significantly enhanced with the implementation of a cognitive general intervention.

Previous research has demonstrated that imagery helps athletes learn new skills and strategies, and has been shown to increase motivation (for review see Hall, 2001). "Imagery is an experience that mimics real experiences...It differs from dreams in that we are awake and conscious when we form an image" (White & Hardy, 1998, p. 389). 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 no controlled studies examining the effects of imagery in the learning and performance of game plans and strategies of play.

Strategies are an important aspect of all sports. From a coaching perspective, strategies are refined in practice and then implemented in games. Imagery (e.g., seeing oneself perform a specific strategy, imaging one's position in a full court press) is one way to enhance strategies. Because effective execution of strategies is important in soccer, the overall purpose of this study was to increase a youth soccer

Correspondence: Krista J. Munroe-Chandler, Human Kinetics, The University of Windsor, 401 Sunset Av., Windsor, ON, N9B 3P4, Canada. E-mail: chandler@uwindsor.ca

ISSN 1746-1391 print/ISSN 1536-7290 online
DOI: 10.1080/17461390500076592

team's use of imagery and see whether it improves their execution of specific strategies.

Much of the imagery research in the last 15 years has stemmed from Paivio's (1985) analytic framework in which imagery is shown to play both cognitive and motivational roles, each operating at a specific or general level. The cognitive specific function of imagery involves the rehearsal of specific sport skills, and controlled studies have shown that it is an effective technique for enhancing learning and performance (see Cumming & Ste-Marie, 2001 for a review). Zhang, Ma, Orlick, and Zitzelsberger (1992) conducted one of the only experimental studies to examine the effects of cognitive specific imagery on sport performance in children. The players (aged 7–10) were divided into three groups; 1) mental training group consisting of relaxation, imagery and table tennis video sessions, 2) video only group, and 3) control group. Results indicated that those athletes using the metal training program, which included imagery scripts incorporating a series of skills resulting in a forehand attack in table tennis, experienced significantly greater improvement in their accuracy and technical quality of their table tennis shot than players not using the mental training program. This finding suggests that even relatively young children's sport performance can benefit from cognitive specific imagery use.

Athletes report using imagery not only for the development and execution of specific skills (cognitive specific imagery), but also for the development and execution of game plans, strategies of play and routines (cognitive general imagery) (Munroe, Giacobbi, Hall, & Weinberg, 2000). Case study reports, however, have supported the performance benefits of cognitive general imagery for rehearsing canoe slalom races (MacIntyre & Moran 1996), American football plays (Fenker & Lambiotte, 1987), and artistic gymnastic routines (White & Hardy, 1998).

In addition to these cognitive functions, imagery also serves a motivational function (Munroe et al., 2000). The motivational specific function involves imaging the achievement of goals, and has been shown to increase motivation in athletes (Callow & Hardy, 2001). The motivational general function is subdivided into arousal and mastery functions (Hall et al., 1998). Motivational general-arousal imagery has been shown to benefit performance through the regulation of arousal (Hecker & Kaczor 1988) and anxiety levels (Vadocz, Hall, & Moritz, 1997) and motivational general-mastery has been shown to enhance athletes' capability for modifying cognitions such as self-efficacy (Feltz & Riessinger, 1990) and self-confidence (Callow, Hardy, & Hall, 2001).

One variable that has been found to have an effect on the frequency of athletes' imagery use is time of season. Munroe, Hall, Simms, and Weinberg (1998) investigated the use of imagery over the course of an athletic season for a variety of varsity sports, including soccer. Results indicated that all functions of imagery increased from early in the season to late in the season with cognitive general imagery showing the most consistent increase across sports.

Researchers have argued that imagery is a skill that can be improved through regular deliberate practice (Hall, 2001). Although there is a paucity of research on the development of imagery in young children there is some evidence to suggest that imagery ability does improve as children develop (Hall, Buckolz, & Fishburne, 1992; Kosslyn, Margolis, Barrett, Goldknopf, & Daly, 1990). Therefore, it is not unreasonable to believe that with continuous practice imagery can be improved upon throughout the lifespan. Further, it might be suggested that the earlier one begins to use imagery, the more proficient he/she becomes at the skill. Child development researchers have stated that the early years leading up to adolescence is a sensitive time in terms of both cognitive development (Piaget, 1970) and motor development (Fishburne, 1988). It would appear therefore to be sound educational practice to involve young children in cognitive and motivational imagery practices not only to gain in performance of specific activities but also to help these children develop and improve their imagery skill. Indeed researchers have emphasized the importance of mental skills training with young athletes (Orlick & Zitzelsberger, 1996; Weinberg, Butt, Knight, Burke, & Jackson, 2003). Weiss (1991) also reported that children and adolescents use mental imagery to rehearse skill sequences and strategies in many sports. Moreover, Weiss indicated that getting children to imagine performance strategies is a natural transfer because in all likelihood these children will have used some form of imagery in the learning and practicing of the sport skills. Fishburne and Hall (1987) also support the use of imagery by young children and Partington (1990) found positive performance effects with matched pairs of 8–11 year old gymnasts and 10–14 year old figure skaters who engaged in mental imagery rehearsal.

The type of sport, team versus individual, may also be a potential moderator in the imagery function—desired outcome relationship. As indicated by several imagery researchers (Hall et al., 1998; Munroe et al., 2000; Munroe et al., 1998; Weinberg et al., 2003), a better understanding of this variable is warranted. Munroe and colleagues (1998) found that imagery use could be dependent upon the sport. Previous imagery studies with young athletes (Zhang et al., 1992; Partington, 1990) have been limited to individual sporting activities. Clearly there is a need to examine 'team' game activities to determine if children and youth experience the

same positive benefits of imagery use in a team game setting, as they are capable of experiencing with individual type sports. For that reason, the present research program has focused on the team sport of soccer. Soccer was chosen since it is the largest youth participation sport in Canada with over 644,000 youths (19 years and under) registered in 2000 (Canadian Soccer Association, 2000). Furthermore, previous research has successfully examined imagery use in soccer (Salmon et al., 1994), although not with youth athletes.

Therefore, the specific purpose of the present study was to determine the effectiveness of a cognitive general imagery intervention on three distinct soccer strategies in a young elite female soccer team. Many goals are scored and conceded in soccer when set plays occur (Franks, 1997). A set play occurs when the game is stopped and restarted. For example, when there is a corner kick or free kick these would be considered set play opportunities. In these situations a particular play strategy would be set by the team taking the free kick or the corner kick in order to try to create a goal scoring opportunity. The defending team would also employ a particular strategy to set up their play to defend against the free kick and corner kick. The three strategies chosen in this study were a strategy to defend against a direct free kick, a strategy to create a goal scoring opportunity when taking a direct free kick, and a strategy to defend against a corner kick. Using game strategies during set plays is a very important part of the game of soccer and must be considered by coaches. Although a number of sport psychology studies have investigated the effectiveness of an imagery intervention on athletes' performance, the results have been equivocal. Wollman (1986) argued that it is difficult to determine whether or not the imagery (mental practice) is the cause of the improved performance due, in part, to analytical and methodological limitations. More recently, researchers have used a single subject multiple baseline design procedure in which the program is individually isolated and purposefully manipulated in order to determine its impact on performance (Kendall, Hrycaiko, Martin, & Kendall, 1990; Shambrook & Bull, 1996). Due to the nature of the present study's purpose (i.e., to improve a team's soccer strategies), a multiple baseline design collapsed across the group was used. In order for a team to successfully execute a soccer strategy, all players on the field must perform. As such, individual performance improvements were not computed, rather scores for the team as a whole were computed. Moreover, it has been suggested that a multiple baseline design be used for studies in which withdrawal of the intervention would be unethical (Kazdin, 1982). Implementing an imagery intervention with only half of the team or hoping that subjects would refrain from using the technique once withdrawn was not possible. This line of research has important implications in the development of effective interventions programs aimed at improving the sporting experience of young athletes, especially in team sports such as soccer.

Method

Participants

The participants were members of a competitive (elite) traveling Under-13 local girl's soccer club in the Southwestern Ontario area (mean age = 12.54 years, s.d. = 0. 66). The team was comprised of 13 female athletes who have been playing soccer for an average of 6.54 years (s.d. = 1.81).

Measures

Sport Imagery Questionnaire. Baseline as well as post-intervention imagery use by the players was measured using the Sport Imagery Questionnaire (SIQ, Hall et al., 1998), which assesses the five functions of imagery (i.e., cognitive specific, cognitive general, motivational specific, motivational general-arousal, and motivational general-mastery). It is a 30-item self- report questionnaire, which has athletes rate on a 7-point scale (1 = rarely and 7 = often) how frequently they employ the five functions of imagery. A principle components factor analysis has supported the five-factor structure of the SIQ (Hall et al., 1998). Research has also shown the SIQ has acceptable internal consistency estimates for the five functions (factors) with alpha coefficients ranging from 0.70 to 0.88 (Hall et al., 1998). For the present study, all alphas were above the acceptable level at 0.70 except motivational general-arousal at post intervention at 0.69.

Shortened version of Sport Imagery Questionnaire. Because the purpose of the research was to enhance the execution of strategies of play through cognitive general imagery interventions, there was no need to examine all five functions of imagery every week. However, since strategies are usually comprised of a series of specific skills, both cognitive general and cognitive specific imagery were assessed using the shortened version of the SIQ. Thus, this 12-item questionnaire assessed the frequency of cognitive general (strategies of play) and cognitive specific (skills) imagery using the same response scale as the SIQ. This 12-item questionnaire was pre-tested on three soccer athletes between the ages of 10–13 years to determine whether the wording was age-appropriate. No revisions were necessary. Athletes completed the questionnaire in approximately 5

minutes. The shortened version of the SIQ has adequate internal consistency for the two functions ranging from 0.76 to 0.92.

Imagery Assessment Questionnaire. In order to investigate individual athlete's ongoing and previous week's imagery use, an Imagery Assessment Questionnaire was administered on a weekly basis immediately prior to the guided imagery intervention. This questionnaire served as a manipulation check that has been strongly recommended as part of your design when using imagery interventions (Cumming & Ste-Marie, 2001; Moritz, Hall, Martin, & Vadocz, 1996; Shambrook & Bull, 1996). As was suggested by Wollman (1986), if the intervention involves a form of imagery, then the athletes' use of imagery should be monitored to determine if they are using it as instructed. The questionnaire consisted of four items: 1) Are you using the imagery outlined in the script? 2) In the last week how many times did you practice the imagery script? 3) On a scale from 1 to 10 how effective was your imagery session? And 4) Did you change the imagery script to suit your individual need and if so, what did you image? In order to answer these questions, athletes were asked to keep track over the course of the week either by memory of by keeping a log. Shambrook and Bull (1996) argued that self-monitoring, through the use of a diary, will encourage and promote adherence to the imagery strategy.

Execution of strategy rating scale. In order to assess the effectiveness of the executed strategy, two expert raters were used. One rater was a qualified national level soccer coach and professional soccer player who had seven years of experience coaching girls' soccer teams at the novice and elite levels. He was also a qualified teacher and coaching examiner with 30 years of experience observing and assessing children in team game activities. The other rater played competitive soccer for 13 years and coached both high school girls and club soccer and coached at a soccer goaltending camp for young athletes (a week long camp emphasizing skills specific to soccer goaltenders). Both raters were provided with a full description and videoed examples of the three soccer strategies under review. The raters were fully aware of the three set play strategies and had an agreed upon rating scale for assessing the effectiveness of strategy implementation. The raters were not made aware of the imagery intervention being used in the study. They were merely asked to rate the effectiveness of the three set play strategies used by the girls' during their competitive league games. After watching the videotaped games, which were randomly ordered, the raters were asked to rate the effectiveness of the team's execution of the three soccer strategies. The two raters watched (independently) the videotapes and rated implementation of each strategy on a scale from 0 to 4, with 0 = "no execution" and 4 = "complete execution" on each of four items: 1) How well did the team prepare for the strategy (e.g., getting into position), 2) How well did the team organize the execution of the strategy (e.g., properly setting up), 3) How well did the team communicate during strategy implementation, and 4) Overall Rating: How well did the team execute the strategy. The two raters did not confer on their assessments but made individual rating assessments based on their own observations and the criteria provided.

Experimental design

In order to evaluate the team's execution of soccer strategies, a staggered multiple baseline design across behaviors was used. A multiple baseline design was chosen for two reasons; 1) it allows for the examination of competitive athletes in a competitive environment thus improving the ecological validity, and 2) it allows the research to be conducted without a control group thus reducing the ethical concerns related to withdrawing an intervention. Most multiple baseline designs that have been used in sport psychology research examined individual performance effect rather than group performance effects (e.g., Allison & Ayllon, 1980; Callow et al., 2001; Koop & Martin, 1983; Shambrook & Bull, 1996). Because the three soccer strategies examined in this study require the involvement of all players, it was necessary to use a group design rather than an individual design in order to examine treatment effects. The three soccer strategies examined in this study were; defending a direct free kick (strategy #1), taking a direct free kick (strategy #2), and defending a corner kick (strategy #3). The three strategy imagery interventions were introduced to the athletes at various times (weeks 2, 4 and 6, respectively) throughout the investigation thereby eliminating the need for a control group. It was expected that the team's performance for each of the three strategies would be enhanced in the weeks following the delivery of the script (e.g., improvements in defending a direct free kick in weeks 2 and 3; improvements in taking a direct free kick in weeks 4 and 5; improvements in defending a corner kick in weeks 6 and 7).

Procedures

The study spanned a 7-week period, with participants involved in a weekly imagery session guided by the lead author. On Thursday of week 1 and week 2,

all athletes completed the Sport Imagery Questionnaire (SIQ, Hall et al., 1998), thus providing baseline imagery data (the SIQ is described above). On the first Saturday of week 1, the participants' soccer match was videotaped in order to provide the experts with baseline data with respect to the execution of the three strategies of play prior to receiving any intervention. The imagery intervention began with weeks 2–3 consisting of imagery script #1 (defending against a direct free kick), while weeks 4–5 were imagery script #2 (taking a direct free kick), and weeks 6–7 were imagery script #3 (defending against a corner kick). These imagery sessions were conducted at the beginning of their practice on the soccer pitch and were physically practiced by the players later during that training session. Only on the days where the participants were guided through the imagery script did they physically practice the strategy. The imagery scripts were developed with the help of the soccer coaching staff. The coaches provided the researchers with the three set play strategies of play used by the soccer team. From this, the researchers devised the three distinct imagery scripts[1], which were then edited for clarity by the coaching staff. The content of the scripts was based on Lang's Bio-informational Theory (1979) in which athletes were emotionally involved in the image. Lang's (1979) Bio-informational Theory suggests that mental images are comprised of two main parts: stimulus propositions and response propositions. Stimulus propositions are the characteristics of the skill or scenario to be imaged, while response propositions are the physiological and affective responses that the individual experiences when imaging that particular skill or scenario. Since the purpose of the study was to enhance soccer strategies, cognitive general and cognitive specific were the two functions of imagery that were the foci of the imagery scripts. The inclusion of Lang's Bio-informational Theory is evident in the imagery script aimed at taking a direct free kick. Athletes were asked to imagine "the referee has signaled a free kick in our favor [stimulus propositions]. Your heart starts to beat a little faster with excitement [response proposition]". Another example athletes were asked to image from the script: "Jenni takes position just inside the left corner of the 18 yard box on the same line as the wall [response stimulus]. Her body is half turned. Her body feels loose. She feels the sensation of being on her toes ready for the play [response proposition]. By mentally replicating the actual task, *including* the feelings and emotions associated with it, an individual is more closely imaging the task as it would occur in real life.

Two guided imagery sessions (1 session per week, 2 weeks per strategy) lasting 10–15 minutes were used for each of the three strategies (6 guided imagery sessions total). As Weiss (1991) suggested, it is important to keep the sessions short and interesting for the young athletes. The imagery sessions took place on the soccer field. No other teams were on the field at that time and therefore there were few distractions. Athletes were asked to sit in a circle and to focus on listening to the imagery script. During the session, all participants were read the same imagery script. The imagery script incorporated each player's position on the field thereby allowing each athlete to be mentioned by name in the script. Copies of the imagery scripts were then distributed to the players. They were asked to practice (i.e., read and image) the imagery script on a daily basis for approximately 10 minutes any time during the day. When young athletes are familiar with imagery, it becomes easy to get them to practice these extended skills at home or school (Weiss, 1991). Prior to receiving the intervention, athletes were asked to complete a shortened version of the SIQ in order to evaluate their frequency of cognitive general and cognitive specific imagery use for the previous week.

After receiving the two guided imagery scripts for each strategy, the researcher videotaped the participants' soccer games (weeks 3, 5, and 7) in order to have experts evaluate the execution effectiveness of the particular strategies of play. At the end of the 7 weeks, all athletes completed the SIQ a second time in order to compare these scores with their baseline scores. Over the course of the investigation, normal team activity took place. The participants practiced 2 days a week with 2 games on the weekends. The entire season was 15 weeks. The team competed in a regional league for the first 8 weeks and a provincial league for the remaining 7 weeks. The intervention lasted the first 7 weeks of the season.

Results

Assessment of imagery use by players

Results from the Imagery Assessment Questionnaire indicated that all athletes ($N = 13$) used the imagery outlined in the scripts. When asked how often they practiced the imagery scripts, athletes reported using it between 3 and 5 times per week. Athletes rated the effectiveness (whether or not they felt the imagery was working for the particular strategy) of their imagery as a seven (on a scale from 1 to 10 with 1 = ineffective and 10 = very effective). Few athletes

[1] Imagery scripts available upon request from the lead author.

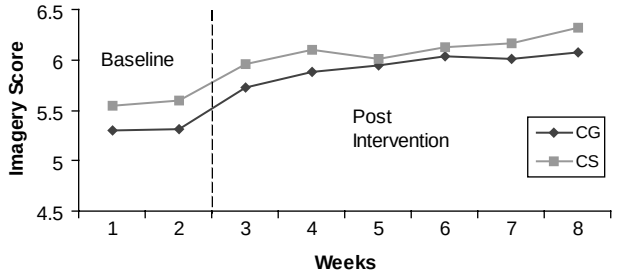

Figure 1. Cognitive specific and cognitive general imagery over time.

reported changing the imagery scripts to suit individual needs. If they did, however, athletes reported imaging themselves communicating during the strategy as well as imaging various scenarios that could potentially occur.

Imagery functions

A repeated measures ANOVA with weeks as the independent variable was used in order to determine whether there was an intervention effect for cognitive specific and cognitive general imagery use. Results indicated that cognitive specific and cognitive general imagery use both significantly increased from baseline to post intervention (CS; $F=12.59$, $p=0.00$ and CG; $F=9.91$, $p=0.01$). These intervention effects are graphically represented in Figure 1.

A repeated measures ANOVA was also conducted on the additional three functions of imagery (motivational general-mastery, motivational general arousal, and motivational specific) in order to determine if there was a significant increase in their use from baseline to post-intervention. While the players indicated using all three functions more by the end of the study, there was only a significant effect for motivational general-arousal imagery ($F=7.80$, $p=0.02$). The means for all the imagery functions at baseline and post-intervention are provided in Table I.

Table I. Means and standard deviations for all functions of imagery at baseline and post intervention.

Imagery function	Average baseline		Post-intervention	
	Mean	S.D.	Mean	S.D.
CG*	5.29	0.92	6.07	0.45
CS*	5.53	0.74	6.32	0.60
MG-M	5.96	0.69	6.35	0.44
MG-A*	5.50	0.98	6.33	0.45
MS	5.83	0.85	6.32	0.46

Note. * Significant difference between baseline and post intervention at $p<.05$.

Video analysis

Intra-class correlations were conducted for the two raters' overall scores on each executed strategy and no significant differences were found. In total, the experts had to rate 24 videotaped strategies (randomly assorted on the video) over the course of the seven weeks (4 games total). Although the researchers had only anticipated videotaping 3 games, one after each strategy was introduced (weeks 3, 5, and 7), 4 games were in fact videotaped. In game 1a that was videotaped at week 3, no strategies occurred, therefore a second game (1b) was videotaped at week 4. The ratings for each strategy were then collapsed across games and across raters. There were 7 instances of strategy #1 (defending a direct free kick), which occurred in only 2 games, 3 instances of strategy #2 (taking a direct free kick), which occurred in 2 games, and 14 instances of strategy #3 (defending a corner kick), which occurred in 3 games. No single strategy occurred in all four games. Although the intent of the study was to report on all three strategies, only strategy #3 was used in any further analyses because of the limited number of data points for the other two strategies. Although there were no significant changes in strategy #3 across time, the trend showed a small increase in the mean rating of performance from 2.5 at baseline to 2.57 at game 3.

Discussion

The present study examined the effectiveness of a cognitive general imagery intervention on the performance of three distinct soccer strategies in a young elite female soccer team. As would be expected, players increased their use of cognitive general imagery over the course of the study (from baseline to post-intervention). However, they also increased their use of cognitive specific imagery. Given that soccer strategies are comprised of various specific skills, it is probably natural for players to increase their use of cognitive specific imagery as they increase their use of cognitive general imagery. Furthermore, Munroe and colleagues (2000) found that both cognitive general and cognitive specific imagery are comprised of a) the development and b) the enhancement of sport strategies and skills, respectively. Given that the purpose of the study was to enhance the execution of soccer strategies by using cognitive general imagery, it follows that the execution of specific soccer skills through the use cognitive specific imagery use would occur in parallel.

Munroe and colleagues (1998) examined varsity soccer players and reported that the mean scores for cognitive general imagery early (4.60) and late

(5.03) in the competitive season were lower than the mean scores for the young elite athletes found in the present study (baseline = 5.30, and post intervention = 6.08). The same trend is found when cognitive specific imagery scores are compared in the two studies. In Munroe et al.'s (1998) study, the cognitive specific imagery scores for varsity soccer players increased from 4.70 to 5.10 over the competitive season, whereas in the present study the cognitive specific imagery increased from 5.54 to 6.32 (baseline to post intervention). These findings suggest that younger soccer players in the present study more frequently used cognitive general and cognitive specific imagery than the older sample from Munroe and colleagues' (1998) study. Researchers have suggested that young children have the capabilities to be great imagers (Hogg, 1997; Orlick & McCaffrey, 1991) thereby perhaps engaging in more frequent use of imagery than adults. On the other hand, imagery use appears to increase with experience (e.g., Hall et al., 1998). Future research needs to investigate the use of imagery by athletes from a developmental perspective.

The present study also found that motivational general-arousal imagery significantly increased from baseline to post intervention. This is surprising considering the desired outcome of the study was not to reduce anxiety or induce excitement but rather to enhance strategies of play.

This increase in motivational general-arousal imagery may be a result of the imagery scripts. Given the content of the scripts were based on Lang's (1979) Bio-informational Theory, the response propositions may have elicited feelings and emotions thereby requiring the athlete to use more motivational general-arousal imagery. Perhaps athletes increased their use of this function of imagery in order to relax or reduce anxiety just prior to executing the strategy. Defending against a direct free kick and defending against a corner kick can produce much anxiety in a team. Since game analysis has revealed that many goals are conceded from the 'set plays' of a corner kick or a free kick (Franks, 1997) it is not surprising to see anxiety raised when defending against these 'set plays'. The athletes in the present sample may have used motivational general-arousal imagery as a means of coping with the possibility that a goal may be conceded if they do not execute their 'set play' strategy effectively. This supports the findings from a study conducted by Fish, Hall, and Cumming (in press) in which they examined the images of ballet dancers found that dancers who used cognitive specific imagery to image their skills perceived their anxiety symptoms as being facilitative towards their performance. They suggested the dancers might experience high levels of anxiety when imaging a dance sequence especially if the dancers questioned their ability to perform the dance. The same may hold true for the young soccer players. Imaging the execution of the three strategies may be anxiety provoking for some and therefore may result in an increased use of motivational general-arousal imagery to reduce this feeling of anxiety. Furthermore, the use of motivational general-arousal imagery is likely to be important throughout the season in order to stay mentally tough and cope with competitive stress (Munroe et al., 2000). Contrary, there is a possibility that conceding to a goal may have triggered images of anxiety, and that these images may have been impeded performance. Rather than MG-A imagery operating as a coping strategy, it is possible that these images were hurtful for those athletes who viewed increased anxiety symptoms as debilitative to the execution of the soccer strategy.[2] Given that limited research has been investigated using MG-A imagery as a coping strategy, either interpretation could be possible.[3]

The present study used a staggered multiple baseline design in an attempt to determine if a cognitive general imagery intervention program would enhance a team's execution of soccer strategies. A limitation of the study was that not all strategies were executed in all games leading to the analysis on only one strategy. This made it very difficult to assess the raters' scores on strategy execution, therefore forcing the elimination and subsequent analyses in two of the three strategies. The one strategy for which sufficient data was collected, defending against a corner kick, provided only weak support for the effectiveness of the imagery intervention. Perhaps greater effects would have been evident had the intervention continued for the remainder of the season. In the present study 'actual' games were used to study the effectiveness of strategy implementation. However, only a limited number of occurrences of the strategies took place during the four full games observed. Perhaps modified games could be used to better study imagery and strategy intervention. Instead of regular league games a series of exhibition games or drills could be arranged where the desired set play conditions are created. For example, every five minutes of play a whistle is blown, the play is stopped and a direct free kick is awarded to the team closest to the opponents' goal. Forcing these conditions into the play would enable the observer to witness a minimum number of occurrences of the strategies under review, thus

[2] Thank you to an anonymous reviewer for presenting this interpretation.
[3] Thank you to an anonymous reviewer for offering this alternative explanation.

providing a research data set that is not left to chance occurrence.

Assessing the execution of strategies in almost any sport is very difficult. In particular, the caliber of the opponent can influence the number of set play strategies executed, as well as the effectiveness of their execution. Examining set plays in soccer, such as those considered in the present study, would seem to be a promising approach since the players have time to organize themselves and have specific assignments to carry out. Therefore, strategy execution can be more easily rated. As the present study demonstrated, however, even assessing very set strategies can be problematic. Research (see Hall, 2001 for a review) has clearly demonstrated the value of using cognitive specific imagery for learning and executing specific sport skills, and case study reports have supported the performance benefits of cognitive general imagery (Fenker & Lambiotte, 1987; MacIntyre & Moran, 1996; White & Hardy, 1998). Further empirical evidence supporting the benefits of using cognitive general imagery is needed (Martin, Moritz, & Hall, 1999), suggesting that it is important to develop better methods of assessing strategies of play in sport.

The current study had several limitations. First, the use of a multiple baseline design proved to be problematic. This may have been a result of not achieving a more stable baseline over a longer period of time as well as not observing an adequate number of strategies within the games. Unfortunately, as a result of a short outdoor regional soccer season, more data points (i.e., games) in the baseline phase and intervention phase were not possible. Additionally, Shambrook and Bull (1996) stated: "With imagery training, it should not be expected that the results are going to be evident immediately, as the imagery skill itself has to be perfected" (p. 40). Therefore a longer season may have allowed for performance effects to be viewed. Moreover, it is possible that no positive performance effects were garnered from the study due to the masking effect of a group analysis (Bryan, 1987; Shambrook & Bull, 1996). Future research should analyze the data from an individual perspective rather than the group perspective regardless if target task or strategy is individually or group based. Another limitation is that developmental differences may have resulted in discrepancies in the imagery abilities of the young athletes. Although sport imagery research is lagging with respect to developmental differences, there is evidence in mainstream psychology to suggest that these differences do occur (Kosslyn et al., 1990). Without having examined the participants' imagery ability, it is difficult to discern whether the athletes were in fact imaging accurately (i.e., vivid and controlled). Lastly, the athletes in the present study were elite, ranking first in their city and provincial division. It has been suggested by Shambrook and Bull (1996) that there is less likelihood of large performance gains from an imagery intervention with elite athletes rather than novice athletes. Additional research needs to examine the differences in imagery interventions and performance effects between novice and elite athletes.

Overall, the present findings indicate that a) young athletes use imagery quite extensively, and b) their use of imagery increased over the 7 weeks, most probably as a result of their imagery intervention. Although no performance effects could be determined from the present study, the team still showed the potential to improve in the soccer strategies over the course of the season. To strengthen the findings from the current study, mandatory logbooks or journals from all participants outlining their daily use of the imagery script and any additional strategies used to perform or imagine the soccer strategy would have been an asset. This is important since the value of cognitive and motivational imagery in sport, at least with adults, has been well documented (Hall, 2001). Unfortunately, it cannot be concluded from the multiple baseline design that a cognitive general imagery intervention will facilitate or improve the execution of soccer strategies. Future research should incorporate the suggestions from the present study in order to reach clearer conclusions. Once this is done, the findings will have important implications for young athletes and their learning strategies. As Zhang et al. (1992) have argued, the use of imagery with young athletes is very promising. Children can use imagery to learn skills faster and more easily, thereby creating more sport success in the future.

Acknowledgement

We would like to thank the athletes and coaches of the Under-13 girls soccer team for their time and assistance.

References

Allison, M. G., & Ayllon, T. (1980). Behavioral coaching in the development of skills in football, gymnastics, and tennis. *J Appl Behav Anal*, *13*, 297–314.

Bryan, A. J. (1987). Single-subject designs for evaluation of sport psychology interventions. *Sport Psychol*, *1*, 283–292.

Callow, N., & Hardy, L. (2001). Types of imagery associated with sport confidence in netball players of varying skill levels. *J Appl Sport Psychol*, *13*, 1–17.

Callow, N., Hardy, L., & Hall, C. (2001). The effects of a motivational general-mastery imagery intervention on the sport confidence of high-level badminton players. *Res Q Exercise Sport*, *72*, 389–400.

Canadian Soccer Association (2000). *2000 Soccer Demographics*. http://www.canadasoccer.com.

Cumming, J., & Ste-Marie, D. M. (2001). The cognitive and motivational effects of imagery training: A matter of perspective. *Sport Psychol*, *15*, 276–287.

Feltz, D. L., & Riessinger, C. A. (1990). Effects of in vivo emotive imagery and performance feedback on self-efficacy and muscular endurance. *J Sport Exercise Psy*, *12*, 132–143.

Fenker, R. M., & Lambiotte, J. G. (1987). A performance enhancement program for a college football team: One incredible season. *Sport Psychol*, *1*, 224–236.

Fish, L., Hall, C., & Cumming, J. (in press). Investigating the use of imagery by elite ballet dancers. Avante.

Fishburne, G. J. (1988). Sensitive periods during brain development: Implications for the development of motor abilities. In D. McNair (Ed.), *Proceedings of the 1986 ICHPER World Conference* (pp. 170–188). London: Foresee Enterprise Ltd.

Fishburne, G. J., & Hall, C. R. (1987). Visual and kinesthetic imagery ability in children: Implications for teaching motor skills. In G. T. Barrettee, R. S. Feingold, C. R. Rees, & M. Pieron (Eds.), *Myths, models and methods in sport pedagogy* (pp. 107–112). Champaign, IL: Human Kinetics.

Franks, I. M. (1997). The use of feedback by coaches and players. In T. Reilly, J. Bangsbo, & M. Hughes (Eds.), *Science and football III* (pp. 267–278). London: E & F.N. Spon.

Hall, C. R., Buckolz, E., & Fishburne, G. J. (1992). Imagery and the acquisition of motor skills. *Can J Sport Sci*, *17*(1), 19–27.

Hall, C. R., Mack, D., Paivio, A., & Hausenblas, H. A. (1998). Imagery use by athletes: Development of the Sport Imagery Questionnaire. *Int J Sport Psychol*, *29*, 73–89.

Hall, C. R. (2001). Imagery in sport and exercise. In R. N. Singer, H. A. Hausenblas, & C. M. Janelle (Eds.), *Handbook of sport psychology*, 2nd edition (pp. 529–549). New York: Wiley.

Hecker, J. E., & Kaczor, L. M. (1988). Application of imagery theory to sport psychology: Some preliminary findings. *J Sport Exercise Psy*, *10*, 363–373.

Hogg, J. M. (1997). *Mental skills for young athletes: A mental workbook for athletes 12 years and under*. Edmonton, AB: Sport Excel Publishing.

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. Oxford: Oxford Press Publishing.

Kendall, G., Hrycaiko, D., Martin, G. L., & Kendall, T. (1990). The effects of imagery rehearsal, relaxation, and self-talk package on basketball performance. *J Sport Exercise Psy*, *12*, 157–166.

Koop, S., & Martin, G. L. (1983). A behavioral coaching strategy to reduce swimming errors with beginning age-group swimmers. *J Appl Behav Anal*, *16*, 447–460.

Kosslyn, S. M., Margolis, J. A., Barrett, A. M., Goldknopf, E. J., & Daly, P. F. (1990). Age differences in imagery ability. *Child Dev*, *61*, 995–1010.

Lang, P. J. (1979). A bio-informational theory of emotional imagery. *Pyschophysiol*, *17*, 495–512.

MacIntyre, T., & Moran, A. (1996). Imagery use among canoeists: A worldwide survey of novice, intermediate and elite slalomists. *J Appl Sport Psychol*, *8*, S132.

Martin, K. A., Moritz, S. E., & Hall, C. R. (1999). Imagery use in sport: A literature review and applied model. *Sport Psychol*, *13*, 245–268.

Moritz, S., Hall, C. R., Martin, K., & Vadocz, E. (1996). What are confident athletes imaging? An examination of image content. *Sport Psychol*, *10*, 171–179.

Munroe, K., Giacobbi, P., Hall, C., & Weinberg, R. (2000). The four w's of imagery use: Where, when, why and what. *Sport Psychol*, *12*, 440–449.

Munroe, K., Hall, C., Simms, S., & Weinberg, R. (1998). The influence of type of sport and time of season on athletes' use of imagery. *Sport Psychol*, *12*, 440–449.

Orlick, T. D., & McCaffrey, N. (1991). Mental training with children for sport and life. *Sport Psychol*, *5*, 322–334.

Orlick, T. D., & Zitzelsberger, L. (1996). Enhancing children's sport experiences. In F. L. Smoll, & R. E. Smith (Eds.), *Children and youth in sport: A biopsychosocial perspective* (pp. 330–337). New York: WCB/McGraw-Hill.

Paivio, A. (1985). Cognitive and motivational functions of imagery in human performance. *Can J Appl Sport Sci*, *10*, 22–28.

Partington, J. (1990) Personal knowledge in imagery: Implications for novice gymnasts, figure skaters and their coaches. Paper presented at the annual conference of the Canadian Society for Psycho-Motor Learning and Sport Psychology, Windsor, ON.

Piaget, J. (1970). Piaget's theory. In P. H. Mussen (Ed.), *Carmichael's manual of child psychology* (3rd edition, Vol. 1). New York: Wiley.

Salmon, J., Hall, C. R., & Haslam, I. (1994). The use of imagery by soccer players. *J Appl Sport Psychol*, *6*, 116–133.

Shambrook, C., & Bull, S. (1996). The use of single-case research design to investigate the efficacy of imagery training. *J Appl Sport Psychol*, *8*, 27–43.

Vadocz, E. A., Hall, C., & Moritz, S. E. (1997). The relationship between competitive anxiety and imagery use. *J Appl Sport Psychol*, *9*, 241–252.

Weinberg, R., Butt, J., Knight, B., Burke, K. L., & Jackson, A. (2003). The relationship between the use and effectiveness of imagery: An exploratory investigation. *J Appl Sport Psychol*, *15*, 26–40.

Weiss, M. R. (1991). Psychological skill development in children and adolescents. *Sport Psychol*, *5*, 335–354.

White, A., & Hardy, L. (1998). An in-depth analysis of the uses of imagery by high level slalom canoeists and artistic gymnasts. *Sport Psychol*, *12*, 387–403.

Wollman, N. (1986). Research on imagery and motor performance: Three methodological suggestions. *Sport Psychol*, *8*, 135–138.

Zhang, L., Ma, P., Orlick, T., & Zitzelsberger, L. (1992). The effect of mental-imagery training on performance enhancement with 7-10-year-old children. *Sport Psychol*, *6*, 230–241.