

The Effect of an Ecological Imagery Program on Soccer Performance of Elite Players

Tohid Seif-Barghi^{1,2}, MD; Ramin Kordi^{1,2}, MD, PhD; Amir-Hossein Memari^{*1}, MD; Mohammad-Ali Mansournia¹, MD, PhD; Majid Jalali-Ghomi³, BS

Authors' Affiliation:

1. Sports Medicine Research Center, Tehran University of Medical Sciences, Tehran, Iran
2. School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Faculty of Sports Sciences and Physical Education, University of Tehran, Tehran, Iran

* Corresponding Author:

Address: Sports Medicine Research Center, No 7, Al-e-Ahmad Highway, Tehran, P.O Box: 14395-578, Iran

E-mail: amirmemari@farabi.tums.ac.ir

Received: Oct 10, 2011

Accepted: Jan 01, 2012

Key Words: Imagery training; Ecological approach; Soccer performance

Abstract

Purpose: Despite the acknowledged impact of imagery on performance, ecologically sound studies investigating imagery and its effects on performance subcomponents in real games are surprisingly limited. The aim of this study was to investigate the effects of imagery training on passing improvement in elite soccer players.

Methods: Sixty nine soccer players taking part in the national championship leagues in four age categories including U16, U19, U21 and over 21 were randomly assigned to the imagery and control groups. Interventional group participants completed an 8 week video-aided, cognitive imagery program on how to make a perfect soccer pass.

Results: Performance analysis through close video analysis showed that successful pass rate increased significantly in the intervention group compared to control (OR=1.19, $P=0.002$, $^{95\%}$ CI=1.06-1.33). Further analysis revealed that the results are statistically significant in U16 and U21 but not other categories.

Conclusions: We concluded that successful soccer passing through real competitions as a multidimensional and critical open skill could be enhanced by an ecologically sound method of mental imagery.

Asian Journal of Sports Medicine, Volume 3 (Number 2), June 2012, Pages: 81-89

INTRODUCTION

The concept of imagery is applied in different behavioral and cognitive disciplines [1]. In sports, imagery is depicted as the “central pillar of applied sport psychology” [2] and defined as using all senses to create or re-create a sport experience in the mind with the goal of enhancing sport performance during training and competition [3-5]. That’s a common way to facilitate learning in a sports or exercise setting, demonstrated when athletes recall and retrieve the information stored in their memory to build meaningful images, they would then practice and develop some motor skills beyond the information [1,6,7].

Studies showed that many of the world’s highest-level athletes use the imagery routinely with regard to improve the performance with various degrees of success [8]. Although previous studies have indicated that athletes can benefit from using imagery in sport to enhance performance [3,9], in the highly demanding field of open sports with unpredictable circumstances as seen in soccer, the challenges players face can be diverse [10,11]. Cross-sectional studies recently have revealed that soccer players are involved with different types of cognitive and motivational imagery due to their cognitive abilities and specific situational demands as well. Numerous studies have used novices and few have looked at elite professional players.

Besides, few ones have been able to demonstrate positive effects of imagery interventions in real world situations beyond the laboratory setting ^[12].

Previous literature indicated that theoretical conceptualization of imagery use is an important basis for each real world intervention seeking effectiveness on motor performance ^[13]. Several theories and models of imagery have been described to support how imagery can enhance the athletes' skills ^[7]; those have focused on skill acquisition as well as strategic and motivational imagery functions. This study has applied an ecological approach but also considered the fundamentals of motor imagery among soccer players ^[6,14].

Real world competitions are a complex of different stimuli and perceptual cues including opponents, referee and ball position in an offensive or defensive situation which obligate players to apply different cognitive strategies for the best accomplishment. In order to learn more about how elite soccer players perform in real game situations, Jordet has recently adapted and examined an ecological approach through imagery training in soccer players ^[15]. The authors tried to describe environmental information, cues and opportunities, and specific cognitive-behavioral processes which are necessary to use the information in order to select the target and complete the action (i.e. passing). The imagery could facilitate the participants' prospective control and execution in all types of actions with the ball in situations where they aimed to pass. With reference to motor imagery models, various imagery speeds might respectively result in different movement outcomes ^[7,13] (i.e. performance with the ball); therefore it is recommended to integrate the imagery techniques in mental training programs according to the specific context and objective of the course. In this study we were trying to use real-time imagery to simulate mentally motor actions (i.e. passing) in the same speed and timing of real game movements.

Although passing is a technique needing precise action on the ball, in many situations, it is critical that the player could orient to other environmental cues and target the right person, the right way. Besides, it is important to perform the technique perfectly under match pressure which needs clearer picture related to

the action. Therefore, it is recommended to focus on an ecological approach, which means how skill performance is regulated in real world situations. Accordingly, it seems useful, if we could recruit an ecologically validated method for performance evaluation as well. Today, performance analysis in soccer plays an important role in the development of players and team strategies; the essence of analysis is to investigate the observable part of athletic performance. It has been suggested that close video analysis will provide very informative data from soccer games ^[16].

The past decade has seen the rapid development of imagery literature to answer questions about imagery applications for athletes such as "why use" ^[17], "when to use" ^[18] and "how to use" ^[13]. However, there is no reliable evidence on how imagery could work in complex changeable team sports like soccer, specifically in real game competitions. It is also well documented that findings through multiple baseline studies with no classical control group could not produce strong conclusions ^[19,20]. We therefore aimed to investigate the main hypothesis through the real world competitions. It was that whether an ecological imagery intervention could increase the rate of successful passing in elite soccer players.

METHODS AND SUBJECTS

Participants:

A volunteer sample of 88 elite male soccer players aged 13 – 32 years were enrolled in the study with different years of soccer playing experiences. All were affiliated with professional soccer clubs taking part in the national championship leagues in four age categories including U16, U19, U21 and over 21. Twenty two in each age class were equally and randomly assigned to the imagery group and neutral-task control group. First of all, they underwent careful examination by an expert sport physician in order to rule out any health problems which may interrupt game participation.

However, nineteen players from both imagery and control groups dropped out of the study at the end of the program because they did not participate in games which underwent match analysis either as pre or post test occasions. This might be due to coach decision regarding who could enter the competition. Sixty nine athletes completed this study which was approved by the ethics committee of Tehran University of Medical Sciences and all players provided the consent forms before attending in the study. The sampling design followed previously established selection criteria [21] shown in figure 1.

Imagery Assessment interview:

Given that the previous studies have frequently suggested using a manipulation check as part of any imagery intervention, we were going to assign all participants to an interview to examine individual

athlete’s ongoing and previous imagery use. Interviews were programmed based on the “imagery assessment questionnaire” which is repeatedly used in imagery research [19, 22]. Interviews were conducted by the first author on a weekly basis instantly before the supervised imagery training. On the other hand, it is recommended to monitor the athletes who are to use any imagery programs if they are using it as instructed. The script of interview included simple questions as suggested by chandler [23] as “Are you using the imagery outlined in the script?”, “how many times did you practice the imagery script in the last week? And “Did you change the imagery script or create a new script to outfit your individual need and if so, please explain what you imagined”?

We believe that interviewing could help the athletes and researchers to find more about quality and quantity of imagery practices while self reports might be

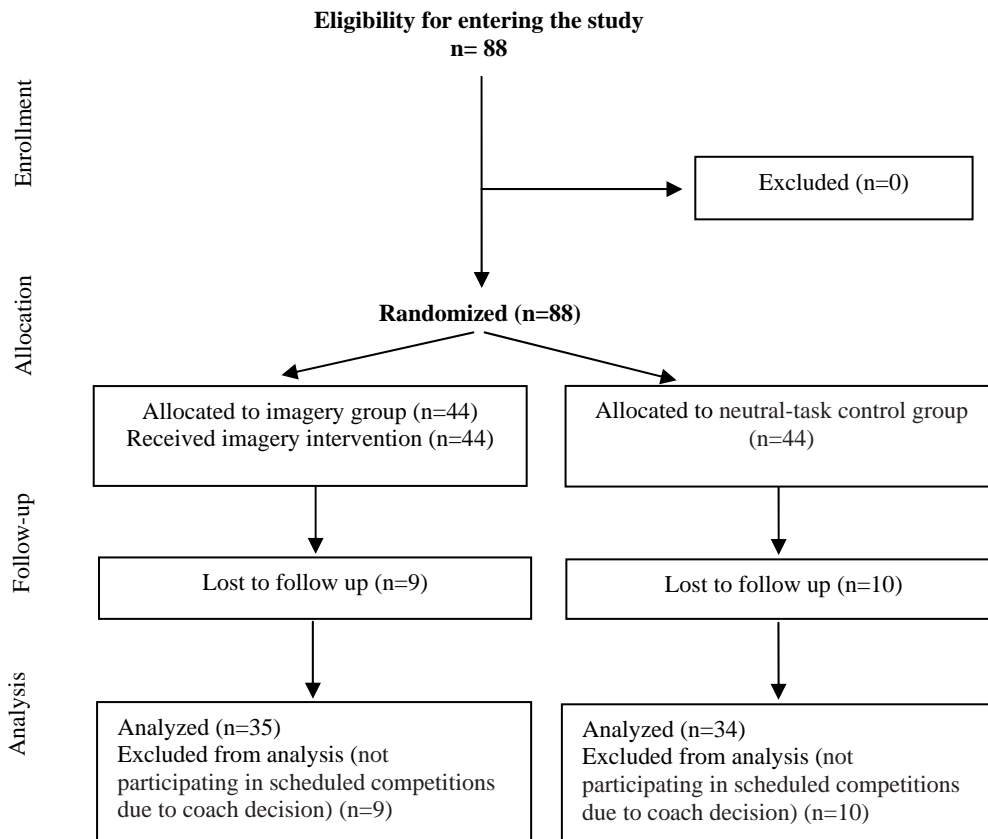


Fig. 1: Flow diagram of the progress through the phases of the imagery study (enrollment, intervention allocation, follow-up, and data analysis).

criticized due to memory biases and deficiencies as well as ambiguities and additional issues which are not addressed in questionnaire checklist.

Passing performance:

Actions that led to directing the ball to the recipient (teammate) by a proper passing technique were labeled good performance or successful passing against actions that led to loss of the ball after sending it to a recipient were labeled low performance or failed passing. Successful passes were counted as rate index after dividing by total passing counts throughout the minutes of playing. They are simply presented as percentile ranks rather than base rates.

The performance criteria have been acknowledged by two sport scientists and two elite level soccer coaches as sufficient trustworthy to support practice with elite players. Performance data were collected using match analysis procedures ^[24] for each competitive league game over the three-match period (270 min) for both groups; in baseline and post intervention phase. All soccer matches before and after intervention, were videotaped and performance variable evaluated through a close-up video analysis by a professional coaching board that consisted of four certified coaches working in national football leagues. Game analysis consisted of full and careful inspection of videotaped real competitions by the coaches' board which resulted in a single record for every pass as successful or failed. They were blind to players' conditions at all. Good performance defined as if the ball was sent to the recipient successfully during a game; it is different from experimental passing tests which the players are scored on a scheduled protocol for short or long passes in a laboratory setting. Furthermore, passing performance was considered to have the same value in every soccer field zone.

Procedure:

A prospective interventional study was conducted in order to test efficacy of an ecological imagery intervention on soccer performance during league competitions. Players in imagery group were invited to participate in the course including both Cognitive specific and cognitive general imagery training about passing performance. They first underwent an

interview to evaluate any history of mental imagery training in the baseline. As mentioned above we have repeated the interviews for imagery group on a weekly basis. All players reported little previous training in imagery for soccer passing. Meanwhile, interviews revealed that players were able to produce appropriate images related to skill performance and have followed the training program guidelines during the intervention phase. The course of imagery training spanned an 8-week period during which participants were involved in a weekly imagery session guided by the lead author. Educational classes were conducted in their clubs in a private room setting.

Imagery training program:

Imagery training program consisted of an introductory session for defining and explanation of sport imagery and its application in soccer. Players completed exercises to first develop external and then internal imagery, real time speeds of images and create images applying all senses to experience a perfect skill performance. They were recommended to practice imagery with their eyes closed to start with; by increasing in experience of imagery practice they could continue with eyes either open or closed. We explained and taught them mental imagery regarding how to 1- Relax the mind and concentrate on here and this time 2- Imagine a scene of a soccer game as the field of practice 3- Put themselves in the picture 4- Orient to the environmental cues like the others' positions and movements and 5- Start the practice in the mind to do the best of performance. Then we discussed specifically about passing during a real soccer game. We showed them some examples of perfect passing skills by expert models through competitions, but did not obligate them to only use these pictures; they were also taught to memorize their best practice in passing performance and then rehearse in their mind over and over again. We were trying to provide a training program according to the environmental basis of soccer performance. Players were taught to orient to the advance cues in images of real games including opponents, teammates, sounds and voices and search for the best candidate for passing (as components of cognitive general imagery). They also practiced to do a perfect passing technique; They remembered to focus

on foot movements, angles, velocity, point of the ball stroke, kick force and finally following the ball toward the recipient (as components of cognitive specific imagery).

We have asked our soccer expert committee to develop the imagery script. They provided researchers with a passing performance scenario during a real soccer game. From this, the researchers work the imagery script. Imagery script included specific and general cognitive elements of imagery functions specific for soccer passing. Furthermore, to benefit the learning and development of imagery skill, each player was encouraged to recreate and develop a game-specific imagery script similar to the main template provided by expert committee, including cognitive aspects of passing imagery.

We kept the weekly training before daily soccer practice sessions. When one works on mental skills, it is important to keep the sessions short and interesting for the soccer players. The imagery sessions conducted in about 10-15 minutes in each session. Moreover, participants were asked to practice and use the imagery according to the script on a daily basis; before and after training or competitions to find more about how to perform better and better.

They were informed and randomly called back and asked questions about the training course from researchers every time of the study. We conducted the feedback sessions at the end of each supervised training session in order to help athletes update their imagery skills. Furthermore, to provide a homogenous training program, we focused on facilitating but not debilitating aspects of imagery during training sessions and through imagery scripts. We have followed the players through feedback sessions and interviews to conduct the imagery only for successful passing throughout the program.

Analytic Approach:

Our measurements revealed that participants played unequal times in either pre or post test occasions; as their records showed various total passing counts per game. Thus, the data can be assumed as “Unbalanced”. Whereas ANOVA has some limitations especially when you worked on unbalanced data, generalized estimating equation (GEE) approaches have several advantages, including the ability to handle unbalanced data without some of the pathologies of ANOVA methods. For the main analyses to estimate the strength of the effectiveness of imagery intervention on passing performance, we computed odds ratio (OR) and 95% confidence intervals (CI) in the total sample by Using GEE population-averaged model. We then performed subgroup analysis on the effects of imagery training on different age categories. All statistical analysis was performed by the package of Stata 9. The statistical significance level was set at 0.05.

RESULTS

Table 1 shows the distribution of participants across 4 age categories (mean ± SD).

Baseline Analyses:

The results from baseline measurement for both intervention and control groups, had similar scores (66.0±4.1 vs. 66.8±4.5). Further analysis for age categories revealed that there were not significant differences between performances of players in each imagery or control subgroups ($P>0.05$) (Table2).

Table 1: Age and number of participants assigned to the imagery and control groups from different age categories

Groups (n= NI: NC)	Age	
	Imagery	Control
U16 (n= 9 : 8)	15.04 (0.94)	14.93 (0.63)
U19 (n= 9 : 9)	17.72 (1.16)	17.31 (1.46)
U21(n= 9 : 8)	19.58 (1.26)	19.00 (1.46)
Over 21(n= 8 : 9)	24.21 (4.54)	26.92 (2.46)
Total (n= 35 : 34)	18.99 (4.24)	19.80 (4.90)

NI: number of imagery group participants, NC: number of control group participants

Table 2: Successful pass rate (%) in imagery and control groups for pre- and post-testing

Age categories	Groups	Successful pass rate (%)		Odds Ratio	95% Confidence Interval
		Pre-test Mean (SD)	Post-test Mean (SD)		
Under 16	Imagery	66.5 (4.5)	73.6 (3.9)	1.22* (0.039)	1.01-1.48
	Control	67.1 (4.1)	68.1 (5.1)		
Under 19	Imagery	63.2 (5.6)	68.8 (5.4)	1.18 (0.130)	0.95-1.46
	Control	64.2 (4.3)	66.2 (4.6)		
Under 21	Imagery	65.7 (4.3)	74.6(4.9)	1.41‡ (0.000)	1.17-1.69
	Control	66.1 (2.9)	65.6 (3.3)		
Over 21	Imagery	65.9 (2.7)	69.1 (5.3)	1.07 (0.573)	0.82-1.40
	Control	66.6 (6.1)	66.5 (5.4)		
Total	Imagery	66.0 (4.1)	71.8 (5.1)	1.19‡ (0.002)	1.06-1.33
	Control	66.8 (4.8)	66.9 (4.6)		

* $P < 0.05$, ‡ $P < 0.01$; SD: Standard Deviation

Outcome analysis:

GEE analysis on post intervention records indicated that successful pass rate increased significantly in the intervention group compared to control (OR=1.19, $P = 0.002$, 95% CI=1.06-1.33) (Fig. 2). In addition, different age categories were also analyzed which demonstrated an enhancement in performance index in the imagery compared to control subgroup in U16 (OR=1.22, $P = 0.04$, 95% CI=1.01-1.48) and U21 (OR=1.41, $P < 0.001$, 95% CI: 1.17-1.69) as well (see Fig. 2).

DISCUSSION

Although previous research has shown the effectiveness of using mental imagery to affect performance of soccer players [15,25,26], it has rarely

been examined in elite athletes through well-controlled studies. Whenever the participants had not experienced any imagery training programs before entering the study, results showed that players in the imagery group could observe an increase in the successful pass rate compared to control group. This improvement may have been attributed to a number of factors. First, the players have been exposed to a main psychological technique (i.e. imagery) and taught how to use its various aspects and combinations which could be easily incorporated into daily training programs [27].

Second, the utilization of different types of imagery allowed participants to make a choice regarding their abilities and also according to the scenarios they had experienced before. So they could learn to use the imagery in a practical way [15]. Besides, supervised training and feedback sessions not only enabled players to apply the concept of imagery but also encouraged them to think about how they can use imagery in or off-field situations.

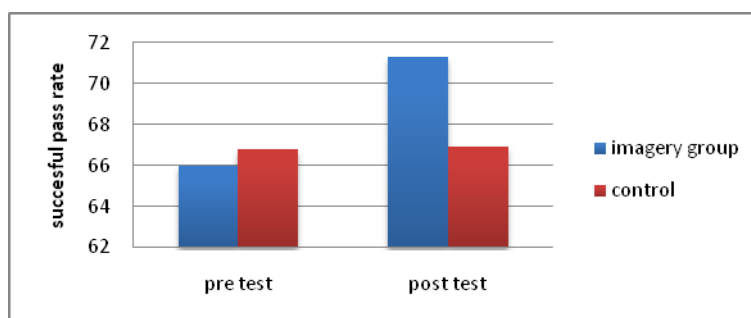


Fig. 2: Differences in Performance between imagery and control groups

The most interesting finding was that the effectiveness of imagery could be practical in an open skill, team sport setting and in real world competitions. Strategies applied in all live scenarios of soccer are comprised of various specific skills; therefore it may be natural for players to use cognitive specific imagery in combination with cognitive general imagery in order to accomplish complex tasks (i.e. passing) throughout a real-world game^[28].

This result appears to be consistent with G.Jordet findings who reported that soccer players can benefit from using imagery when trying to optimize searching for and perceiving relevant information in real games^[15]. Furthermore it is the first time that a controlled study could show significant improvement in real performance of soccer players by a specific imagery program.

Our results also provided more support for preliminary findings of Thellwell's study which showed soccer players making at least small improvements on each of the dependent performance variables through an imagery intervention^[26].

There are concerns over the adoption of objective measures within a team setting due to the number of uncontrollable variables, since for example; the passing is defined as a two-tailed behavior between the player and the recipient. It seems possible that a correct pass is identified by the player, but not read or anticipated by the recipient and consequently leads to a failure. In such cases some researchers recommend integrating subjective measures into assessment in order to reduce this misunderstanding^[15]. However, someone could argue that use of subjective methods in combination with objective assessments is hardly applicable in large sample trials.

While a recent study by a 7-week experimental period of imagery in young females showed an increase in using several types of imagery; the implementation of soccer strategies was not significantly enhanced^[23]. The reason for this is not clear but it may have something to do with the sampling method, outcome measure and the duration of imagery training. Thus it is possible that our preferred intervention package was more specific and compatible to outcome measurements of real soccer games (e.g. passing).

Previous studies examined specific tasks which may be limited to a determined zone or infrequently

repeated throughout the game. Consequently observations on each variable might not be satisfactory. Moreover, soccer strategies as outcome measurement were faced with very difficult assessment by the raters^[15,23]; It is worthwhile to note that our study focused on passing which is a clear-cut and assessable measure. It is a repetitive action in all zones of the soccer field that may provide sufficient observations for the match analysis.

Another important finding was related to developmental perspective and age characteristics of athletes in using imagery. Our findings in two young categories corroborate the ideas of Munroe and colleagues, who suggested that younger soccer players more frequently used cognitive general and cognitive specific imagery than the older counterparts^[27,28]. Researchers have suggested that young athletes have the capabilities to be great imagers^[22,29] thereby perhaps engaging in more frequent use of imagery than adult players. On the other hand, it was evidenced that imagery use would increase with experience^[6,30]. Our results raise a question that will continue to prompt controversy; to what extent young players or adult counterparts may be affected by a specific combination of different types of imagery?

Although the overall results were suggesting that generally, imagery group participants have improved their performance, we found an inconsistency in different age categories. Younger soccer players showed promising improvement in passing performance. Munroe et al argued that young athletes used more imagery with dominant cognitive function; they would probably utilize more from cognitive imagery programs than adult participants^[29]. The observed finding can also be attributed to the frequency of imagery training as a very important factor in learning and benefits of the program; thus young athletes might be more motivated to involve themselves in training sessions than older players.

When considering potential Hawthorne effects and level of experience, it was suggested that the intervention was not hopefully successful in increasing the performance of the adult soccer players.

Another possible explanation for this is that more experienced players may be more interested in motivational rather than cognitive aspects of mental imagery; hence they need complex and multidisciplinary imagery programs in which they will

be trained to create and organize motivational elements and cognitive properties of real soccer scenarios, parallel or in combination^[12].

Shambrook et al^[19] 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” but less is documented on exactly how many sessions are needed for player to experience the imagery as an impressive and potent instrument of performance enhancement. Our findings could shed more light on the scheduling of imagery in soccer training. Although, our results should be generalized carefully to other samples and team sports; future researchers could use our training time frame as a trustable base for psychological intervention programming.

Implications:

One of the issues emerging from this finding relates specifically to great advantages of environmental approach for imagery training supervised by close observation. This could help athletes to experience more objective actions and consequences through the live sport scenarios.

Moreover, new video types and models should be made available to prime the athlete’s mind for engaging and practicing the imagery skills. There is, therefore, a definite need for feedback sessions on imagery training especially for young players; this may help them to develop the imagery abilities and improve the processing like imagery perspective and direction.

Another important practical implication is that other types of imagery could include trainers working with adults and experts, since they need a more comprehensive program of mental training in combination with their routine physical practice.

Limitations and future direction:

A number of caveats need to be noted regarding the present study. First, we used a three-match period for analysis in both baseline and post-test occasions and it might accompany missing some useful data from players whom have less chance of playing in those competitions. So, future research should recruit more extended time for assessment of performance in real league games. One more, there was the probability of cross-contamination between some imagery and control group participants due to recruitment of the

players from the same regions.

Another limitation lies in the fact that we assumed all passes had the same value and were not differentiated according to the nature of pass, zones of soccer field and times of a game; In future investigations it might be possible to use different methods of match analysis in which performance could be examined in different local and temporal circumstances.

It is worth mentioning that differences in findings may be suggestive for differences in the imagery abilities of the soccer players. Without having investigated the athlete’s imagery ability, it is difficult to differentiate whether the athletes were exactly imaging accurately (i.e., vividly and well-controlled). Knowing that one should interpret the findings cautiously, it should be considered that this ecological investigation could not draw together all complex data around performance in real soccer games, so numerous co-variables (e.g. home vs. guest situation, game difficulty and ranking in league table) should be examined by future studies respectively.

The current research was not specifically designed to evaluate many factors related to efficacy of imagery programs; future research should therefore concentrate on the investigation of mediator and moderator variables of imagery training response in soccer players.

CONCLUSION

In conclusion as discussed, current research suggests that combination of two types of cognitive imagery training has a positive influence on soccer performance during real competitions.

ACKNOWLEDGMENTS

This study is based on part of a medicine dissertation submitted to Sports Medicine Research Center, Tehran University of Medical Sciences.

Conflict of interests: None

REFERENCES

1. Taktek Kh. The effects of mental imagery on the acquisition of motor skills and performance: A literature review with theoretical implications. *J Ment Imagery* 2004;28:79-114.
2. Perry C, Morris T. Mental imagery in sport. *Sport psychology: Theory, applications and issues*. 1995; Pp:339-85.
3. Morris T, Spittle M, Watt AP. *Imagery in sport*. Champaign, IL: Human Kinetics Publishers. 2005; Pp:124-95
4. Taylor J, Wilson GS. *Applying sport psychology: four perspectives*. Champaign, IL: Human Kinetics Publishers. 2005; Pp:51-86
5. Weinberg R. Does imagery work? Effects on performance and mental skills. *J Imagery Res Sport Phys Activ* 2008;3:1-20.
6. Hall CR. Imagery in sport and exercise. In: Singer RN, Hausenblas HA, Janelle Ch (eds). *Handbook of Sport Psychology*. New York: Wiley. 2001; Pp: 529-49.
7. Guillot A, Collet C. Construction of the motor imagery integrative model in sport: a review and theoretical investigation of motor imagery use. *Int Rev Sport Exerc Psychol*, 2008;1:31-44.
8. Jones MV, Bray SR, Mace RD, et al. The impact of motivational imagery on the emotional state and self-efficacy levels of novice climbers. *J Sport Behav* 2002;25:57-73.
9. Hall CR, Munroe-Chandler KJ, Cumming J, et al. Imagery and observational learning use and their relationship to sport confidence. *J Sports Sci*, 2009;27:327-37.
10. Arvinen-Barrow M, Weigand DA, Thomas S, et al. Elite and novice athletes' imagery use in open and closed sports. *J Appl Sport Psychol* 2007;19:93-104.
11. Coelho RW, De Campos W, Da Silva SG, et al., Imagery intervention in open and closed tennis motor skill performance. *Percept Mot Skills* 2007;105:458-68.
12. Williams AM, Ward P, Chapman C. Training perceptual skill in field hockey: Is there transfer from the laboratory to the field? *Res Q Exerc Sport* 2003;74:98-103.
13. Holmes PS, Collins DJ. The PETTLEP approach to motor imagery: A functional equivalence model for sport psychologists. *J Appl Sport Psychol* 2001;13:60-83.
14. Moran AP. *Sport and exercise psychology: A critical introduction*. New York: Routledge. 2004.
15. Jordet G. Perceptual training in soccer: An imagery intervention study with elite players. *J Appl Sport Psychol* 2005;17:140-56.
16. Groom R, Cushion C, Nelson L. The delivery of video-based performance analysis by England youth soccer coaches: towards a grounded theory. *J Appl Sport Psychol* 2011;23:16-32.
17. Martin KA, Moritz SE, Hall CR. Imagery use in sport: A literature review and applied model. *Sport Psychol* 1999;13:245-68.
18. Driskell JE, Copper C, Moran A. Does mental practice enhance performance? *J Appl Psychol* 1994;79:481-92.
19. Shambrook CJ, Bull SJ. The use of a single-case research design to investigate the efficacy of imagery training. *J Appl Sport Psychol* 1996;8:27-43.
20. Blair A, Hall C, Leyshon G. Imagery effects on the performance of skilled and novice soccer players. *J Sports Sci* 1993;11:95-101.
21. Moher D, Schulz KF, Altman DG. The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomised trials. *Clin Oral Investig* 2003;7:2-7.
22. Cumming J, Hall C. Deliberate imagery practice: the development of imagery skills in competitive athletes. *J Sports Sci* 2001;20:137-45.
23. Munroe-Chandler KJ, Hall CR, Fishburne GJ, Shannon V. Using cognitive general imagery to improve soccer strategies. *Eur J Sport Sci* 2005;5:41-9.
24. Reilly T, Gilbourne D. Science and football: a review of applied research in the football codes. *J Sports Sci* 2003;21:693-705.
25. Thelwell R, Weston N, Greenlees I. Examining the use of psychological skills throughout soccer performance. *J Sport Behav* 2010; 33:109-27.
26. Thelwell RC, Greenlees IA, Weston NJV. Using psychological skills training to develop soccer performance. *J Appl Sport Psychol* 2006;18:254-70.
27. Munroe-Chandler K, Hall C, Fishburne G. Playing with confidence: the relationship between imagery use and self-confidence and self-efficacy in youth soccer players. *J Sports Sci* 2008;26:1539-46.
28. Munroe KJ, Giacobbi P, Hall CR, Weinberg RS. The four Ws of imagery use: Where, when, why, and what. *Sport Psychol* 2000;14: 119-37.
29. Munroe-Chandler KJ, Hall CR, Fishburne GJ, Strachan L. Where, when, and why young athletes use imagery: An examination of developmental differences. *Res Q Exerc Sport* 2007;78:103-16.
30. Hall CR, Mack DE, Paivio A, Hausenblas HA. Imagery use by athletes: Development of the Sport Imagery Questionnaire. *Int J Sport Psychol* 1998;29:73-89.