Effect of positive and negative dimensions of mental imagery and self-talk on learning of soccer kicking skill

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Abstract

Purpose: Mental imagery and self-talk are two important mental skills that are used for improvement of performance and learning of motor and sport skills. This study aimed to investigate the effect of positive/negative mental imagery and positive/negative self-talk on learning of soccer kicking skill.

Material: Participants included 48 young soccer player students. Participants were soccer player students with mean age 18.44 and SD=.88 years. After selecting the sample and filling out the personal detail form, the imagery and self-talk instructions, the method of completing mental imagery questionnaire, Moore-Christine kick-skill test instructions, and principles of free kick at soccer were explained to participants. Then, the mental imagery test and kick-skill test were run in 4 blocks of 4 attempts and the results were recorded. Based on their pre-test scores, the participants were divided into 4 groups. The acquisition sessions were held for 3 weeks and 2 sessions per week, with 8 blocks of 4 trials (32 trials) per session. The data was analyzed using one-way ANOVA, mixed ANOVA, and two-way ANOVA tests at different learning stages (significance level=.05).

Results: The results of data analysis showed that positive imagery and positive self-talk groups performed significantly better than negative imagery and negative self-talk groups. Also, due to the significance of interactive effect of imagery × training sessions, it was found that the positive imagery groups performed significantly better than negative imagery groups from the third session onwards.

Conclusions: According to the results, it was recommended that trainers use this aspect of self-talk at early stages of training. Also, the positive imagery can be emphasized by increasing the training sessions in more skilled individual.

Keywords: mental imagery, self-talk, acquisition, retention, transfer, soccer.

Introduction

Athletes spend a lot of time training skills in different situations to promote their performance. Meanwhile, stress is a factor that always affects performance; athletes should do mental and cognitive trainings to coping with anxiety and control their arousal to promote their performance, especially at those skills that need focus and attention. There are many factors such as personal problems, exercise needs, fear of failure, and emotional issues that cause anxiety and prevent the athlete from achieving his/her performance goals. Thus, various mental and physical interventions are run on athletes. The psychological methods and control of athlete's mind are interventions that the psychologists run to help the athlete overcome his/her fear of failure, cope with his/her worries and obstacles, and improve his/her performance [1].

The mental trainings include self-talk, mental imagery, relaxation techniques, and goal setting. In recent decades, the psychologists have developed various definitions for mental imagery; one of them defined it as "using senses to create or recreate an experience in mind" [2].

Self-talk is one of the most important cognitive strategies used by athletes. Self-talk includes statements that a person says to him/herself, whether loudly or

repeatedly in his/her mind [3]. Using appropriate keywords, the self-talk helps athletes' control and organize their thoughts, focus on key areas of skill, and motivate themselves to work harder during training [4]. The researchers recently combined self-talk with psychological skills and found that it impacts positively on student performance [5].

The sport psychologists have found that the cognitive skills may improve performance; control anxiety, fear of failure, worry, and arousal; and impact positively on self-confidence and success of athletes. Meanwhile, self-talk and mental imagery are mental skills that athletes apply before, during, and after performance or training of skill. Therefore, it is possible that the combination of main cognitive strategies such as mental imagery and self-talk have an effect on learning free kicks at soccer [6].

Cognitive strategies such as mental imagery and self-talk are the best interventions to improve the performance of athletes. Mental imagery is an intervention that leads to desirable results such as increased focus and attention, improved self-confidence, and improved performance. The mental imagery is applied to improve focus, promote self-confidence, fix performance weakness, control emotional responses, training and learning sports skills and strategies, and cope with pain and injury [7]. The sports psychology researchers have highlighted weaknesses in mental training methods, including mental fatigue [8].

Balance at performance is not effective in relaxing the body and it even seems to be completely inconsistent with physical condition of athletes during the performance. They believe that the mental imagery is more effective when all senses are involved and kinesthetic senses are experienced during actual skill performances [9]. According to researchers, the mental imagery is used to simulate movements by exercising areas of brain that are common between physical performance and mental imagery; this can facilitate performance and speed up learning [10]. The mental imagery also helps prepare mentally to perform skills and creates focus for performing skills.

The theory of arousal regulation is one of the mental imagery effectiveness theories. Based on this theory, the imagery improves performance in two ways: First it adjusts the level of arousal to have optimal performance; and second it conducts the attention to current tasks. If athlete focuses on task-related images in mental imagery, it is less likely that unrelated stimuli distract him/her. However, if the imagery is used for negative communication, it would lead to undesirable results [6].

Self-talk is a constant conversation between individuals and themselves that affects their feelings and behavior. There are different types of self-talk including positive self-talk (in the form of instructional or motivational self-talk), negative self-talk, and neutral self-talk. Positive self-talk encompasses a wide range of inner thoughts; it helps a person focus on positive phrases of a desired outcome or goal. In particular, positive educational self-talk focuses on providing technical training to athlete [11].

A good addition to improving the efficiency of technical training to athletes is: monitoring of athletes' motor actions [12]; psychological climate in the team [13-15]. In this context, soccer should attach great importance to the development of rational self-talk [16] and the search for effective methods to activate it [17]. It may be considered that sufficient performance of the soccer players results from self-completion, motivation, belief in themselves and desire to act for success by using their skills [18].

There are some applied theories which are used to understand the structure of self-talk such as Nideffer's theory of attentional underpinning [19] and Bandura's self-efficacy theory [20]. Nideffer [21] details how initial stressors such as real/imagined dangers, competitive environments, or unknown situations cause both a physical response (increased heart rate, changes in respiration, muscle tension, increased perspiration) and a psychological response (feeling confused, loss of focus, mental rigidity, inner directed attention and tunnel vision). Bandura [22, 23] situates self-efficacy within a theory of personal and collective agency that operates in concert with other sociocognitive factors in regulating human well-being and attainment.

Due to lack of appropriate theories, researchers have suggested to examine effects of self-talk by conducting individuals' attention [24]. Like mental imagery, self-talk is used often to improve focus, have continued learning,

increase motivation, and reduce anxiety. Self-talk, like mental imagery, can be both positive and negative [6].

From theoretical perspective, the interaction between mental imagery and self-talk is explained by dual coding theory and action - language - imagery model. Both theories assume that information is acquired through two independent channels; one system is allocated to non-verbal information (such as mental imagery and observing what is displayed) and the other is for verbal information [25, 26].

Since performance and learning sports skills require high focus and reflect thoughts and feelings, research is needed to find out which strategies athletes should use to cope with challenges.

The present research is necessary, because most of research on effect of mental imagery and self-talk on performance of various skills is qualitative and individuals have expressed the extent of using these strategies. Also, the research has mostly considered the positive aspect of these psychological interventions and have ignored their negative effects on acquisition of skills.

There is also little research on applying combination of these skills as intervention to improve attention and focus. So, it is important to examine the compensatory, weakening, and reinforcing effects of such cognitive strategies on acquiring and memorizing attention and focus skills.

It is necessary to use scientific methods other than traditional trainings in order to create better conditions for performance of these skills. Since trainers and athletes try to improve attention skills performance by using a variety of methods, the self-efficacy and mental imagery may have a positive effect on learning it. This method can be used to prevent stress and anxiety during competition and improve the performance of athletes while performing attention and focus skills.

However, the research questions are as following: if learning of skills that require attention and focus, such as free kicks, is weakened by negative mental experiences, can positive self-talk help to improve it? Whether improved learning by positive mental experiences can be weakened by negative self-talk experiences? Whether the improved learning by positive mental experiences can be improved more by positive self-talk experiences? And, Whether the weakened learning by negative mental experiences can be impaired more by negative self-talk experiences?

Material and Methods

Participants. The participants included 48 volunteered experienced soccer player students that were tested for imagery ability and footedness. Participants were soccer player students with mean age 18.44 and SD=.88 years. Then, they were tested by Moore-Christine kick-skill test. Based on acquired scores, the participants were divided into 4 homogenized groups of 12.

Research design. This was an applied research and was semi-experimental research based on executive method. Data were gathered at field study and because of

two independent variables, a factorial design were used.

Task: To run Moore-Christine kick-skill test, the goal was divided into two parts, 120 cm in diameter. In total, 4 identical circles were located on either side of goal. The participants would have the opportunity to kick in four stages and each stage with 4 kicks, each kick toward one of circles alternatively (16 kicks) from a distance of 16 meters. The score 10 was awarded to kicks which enter the ball to the goal circle and the score 4 was awarded to kicks which enter the ball to the other circles. The balls that were rolled on the ground were not awarded points. So far, no specific norm has been proposed for it [27].

Procedure: In research process, the subjects were first trained on correct way to kick the goal. Then, the soccer kick performance pre-test was run and the imagery ability questionnaire was completed by participants. At this stage, the average score (total score divided by number of kicks) was used. The study was conducted at two stages; it lasted 2 weeks and 3 sessions per week. The stages included general training and special training. After training sessions, the soccer kick performance was tested by 32 kicks, 16 shots from the right and 16 shots from the left. At this stage, also, the average score (total score divided by number of kicks) was used.

Movement Imagery Questionnaire (MIQ-R) was used to assess movement imagery ability; it includes eight self-report items: visual imagery (four items) and kinetic imagery (four items). Individuals evaluated the resolution of their mental representation using seven-point Likert scale. The participants were classified into two scales: (a) ability of visual imagery (1= very difficult to see, 7= very easy to see) and ability of kinetic imagery (1= too hard to feel, 7= too easy to feel). Hall and Martin found a

significant correlation between MIQ and MIQ-R in both visual and kinetic imagery subscales. They concluded that MIQ-R was an acceptable modification of MIQ [28].

Statistical Analysis. One-way ANOVA were used for comparing groups in pre-test, the mixed ANOVA with repeated measures on training sessions were used for analysis of acquisition phase, and two-way ANOVA were used for analysis of retention and transfer stages. The data was analyzed at significance level, $p < 0.05$, using SPSS software, version 22.

Results

The mean of performance scores of all 4 groups at pre-test, acquisition (6 sessions), retention, and transfer stages are summarized in figure 1.

Based on results of Levene's test, the homogeneity of variances was confirmed. The results of Shapiro-Wilk test showed that the data had a natural distribution at all research stages. One-way ANOVA test was used to compare the mean scores of kicks at pre-test stage and it was found that there was no significant difference between groups, also the one-way ANOVA was used to compare the mean scores of mental imagery ability at pre-test stage; the homogeneity of groups was confirmed.

In order to evaluate the acquisition phase, a 2 (imagery) $\times$ 2 (self-talk) $\times$ 6 (training sessions) mixed ANOVA with repeated measures was used. The results are summarized in table 1.

Considering the table results, the main effect of imagery, the main effect of self-talk and interactive effect of imagery $\times$ sessions were reported to be significant; other main effects and interactive effects were not significant.

Considering the significance of main effect of imagery

Figure 1. Mean of performance in different stages

Table 1. Results of mixed ANOVA with repeated measures in acquisition phase

Source	SS	df	MS	F	Sig.
Imagery	24.89	1	24.89	18.21**	0.001
Self-talk	8.87	1	8.87	6.49*	0.014
Sessions	2.04	3.51	0.58	1.50	0.21
Imagery * Self-talk	0.16	1	0.16	0.12	0.734
Imagery * Sessions	6.80	3.51	1.93	5.01**	0.001
Self-talk * Sessions	1.89	3.51	0.54	1.39	0.243
Imagery * Self-talk * Sessions	1.99	3.51	0.57	1.47	0.221

Note: *significant at 0.05 level; **significant at 0.001 level

and main effect of self-talk, referring to mean values, it was found that at acquisition stage, the positive imagery and positive self-talk groups performed significantly better than negative imagery and negative self-talk groups. Also, considering the significance of interactive effect of imagery $\times$ sessions, independent t-tests (alpha adjustment to 0.008) and repeated measures tests were used for follow up. The independent t-tests were run to compare the performance of both positive and negative imagery groups at each training session and the results showed that from the third session onwards, positive imagery groups performed significantly better than negative imagery groups.

The results of Bonferroni post-hoc test showed that at positive imagery groups, there was a significant difference between mean scores of first session and other sessions; however, there was no significant difference between mean scores of second, third, fourth, fifth, and sixth sessions. The results of mixed ANOVA with repeated measures showed that the effect of training sessions on negative imagery group was not significant.

Discussion

The findings showed that at self-talk acquisition stage, the effect of imagery and sessions was significant; positive self-talk and positive imagery groups performed better. Also, the difference between positive and negative imagery groups was significant from the third session onwards. At positive imagery groups, there was significant difference between first session and other sessions in terms of performance; this difference was not significant at negative imagery groups. The results of imagery acquisition stage are consistent with results of Lotfi et al. [27], Tolul et al. [29], and Ghorbani et al. [30]. Also, the results of studying imagery are consistent with results of Parvizi [6], Nicholas et al. [31], and Taylor and Shaw [32]; they showed that learning according to type of task or skill may weaken acquiring imagery skills. This approach in teaching motor activities in soccer must be perceived as Practice in Mind (PIM) Training.

It is a combination of imagery and physical training program which consists of seven PETTLEP components (i.e. Physical, Environment, Timing, Task, Learning, Emotion, Perspective) [17]. This fact proves that soccer players adapt their movements to opportunities within the surrounding environment by engaging in visual exploratory activity (VEA) to pick up information [33].

Matassis and Doganis showed that mental training skills such as imagery reduce cognitive and physical anxiety and increase self-confidence in adolescent athletes [34]. However, the results were inconsistent with results of Fathi et al. [35]; they found that negative mental imagery in individual with social anxiety disorder could be associated with their better performance. So, it can be said that depending on psychological conditions of individuals, the negative imagery may improve performance. It seems that this type of imagery does not affect athletes [35].

The results of studying self-talk were consistent with results of Chang et al. [36], Lotfi et al. [37], Van Raalte et al. [38], Kloveonis et al. [39], Kruni et al. [40], and Ghorbanzadeh [41]. Lotfi et al. [42] showed that at positive motivational self-talk group, the anxiety was significantly lower than pre-test and negative group post-test performance. There was no difference between groups at retention and transfer tests [42].

These results can be explained by Action - Language - Imagination (ALI) model of movement imagery; this model suggests that there is a relationship between imagery and verbal system for movement processing and information. According to Annette, movement imagery forms a bridge between independent information and coding system. Thus, the movement system is responsible for coding human actions through observation, while the verbal system is responsible for obtaining information through talking or writing. The language-action bridge operates through movement imagery and allows actions to be seized and taken, and it also allows individuals to be able to respond to verbal instructions [6].

Conclusions

Considering the findings, it was suggested that the soccer coaches use positive imagery to teach free kick skills to more skilled individual. Also, considering the effect of self-talk on motivation of individuals, it was recommended that trainers use this aspect of self-talk at early stages of training. Also, the positive imagery can be

emphasized by increasing the training sessions; it has a significant effect on learning of free kick skill in more skilled individual.

Conflict of interest

The authors declare no conflict of interest.

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