The Effect of Self-talk and Mental Imagery on Self-efficacy in Throwing Darts in Adolescents

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ABSTRACT: The current study examined the effect of varying combination of positive and negative imagery and self-talk (ST) on self-efficacy in adolescents. Seventy-five adolescents boy with an age range of 12-16 and a mean age of 13.9 years (SD=1.45) volunteers and after completed the Movement Imagery Questionnaire- Revised (Hall & Martin, 1997) randomly allocated to one of the five evenly sized conditions (n=15/condition), namely (1) negative imagery & positive ST, (2) positive imagery & negative ST, (3) positive imagery & positive ST, (4) negative imagery & negative ST, or (5) control group. Standard dartboard used for this research that include 0-100 scores, and participants’ self-efficacy was determined by questionnaire of dart throwing. A self-efficacy questionnaire assessing participants’ expectations about their subsequent performance on the dart-throwing task. Mixed-design ANOVAs revealed that self-efficacy did not change over time as a function of the assigned experimental condition.

Keywords: mental imagery, self-talk, self-efficacy, adolescents

Introduction

The use of psychological methods in performance domains is associated with successful accomplishment of tasks. It is well known that mental skills such as self-talk and mental imagery are highly related to successful accomplishment of tasks. Mental imagery is an intervention, which may bring about favorable outcomes including better self-confidence and improved performance (Hall et al., 1998). Hall et al. (1998) divides the functions of mental imagery into two categories: motivational and cognitive. Though several studies have been conducted on Hall’s categorization of mental imagery, recent studies have mainly focused on comparing the effects of positive and negative mental imagery (Short et al., 2002; Smith & Holmes, 2004). Woolfolk et al. (1985) contend that the orientation of mental imagery can be either positive or negative. One of the marked cognitive techniques used by athletes is self-talk which refers to what individuals tell themselves either loudly so that it could be heard or subvocally as it occurs in the mind (Anderson, 1997). Researchers consider different categorizations of self-talk as positive, negative, instructional and motivational. Weinberg (1984) defines positive self-talk as a technique that allows the individual to maintain their focus on the task at hand while ignoring the past failures and looking forward to future. Theoretically, the interaction between mental imagery and self-talk may be accounted for in terms of dual coding theory and action-language- imagination view. Either theory propose that information is obtained through two independent channels one of which is specialized for non-verbal information, such as mental imagery and observation of displays, while the other relates to verbal information (Annet, 1996; Lawrence, 1995). According to Bandura’s social-cognitive theory (1997), psychological skills including mental imagery and self-talk are considered as the sources of
self-efficacy. Bandura (1997) introduced a theory that is suited for self-talk studies. He defines self-efficacy as belief in one’s own abilities to organize and practice a particular action to achieve particular goals. Self-efficacy may be measured through three components including the level, which is associated with the individual’s expectations; the strength, which refers to the confidence with which the individual may reach different levels of performance; and the generality, which refers to the effectiveness of situations in which people understand each other. Bandura (1997) counts a number of sources that foster the belief in one’s effectiveness including previous performance accomplishment, vicarious experience, verbal persuasion, and interpretation of physiological and affective states. Vicarious experience is particularly associated with self-talk. As verbal persuasion may be used by others or by the individual themselves, the authority of the source of persuasion is of crucial importance. Bandura (1997) contends that the most persuasive strength relates to the sources that are comprehensible and relevant to the task. Few studies have yet been conducted on self-talk in terms of self-efficacy theory. Weinberg et al. (1984) reported that tennis coaches often assert that positive self-talk improves self-efficacy in the athletes. Landin and Hebbert (1999) also reported the positive effects of self-talk on self-efficacy in tennis players, though they did not carry out statistical analysis. Self-efficacy theory guarantees the research into its relationship with self-talk. The reason is that self-talk may not only help improve self-confidence in the athletes, but it may also help the athletes accomplish their athletic goals. Bandura (1977) explains that how mental imagery and other cognitive techniques relate to successful performance. He contends that mental imagery helps individuals visualize themselves as having accomplished the task. He suggests that individuals visualize positive images so that they can improve their self-efficacy and discard negative images. In a review on 200 studies on mental imagery, Martin et al. (1999) found that the findings mostly indicate that imagery improves athletic performance. Since 1999, several studies have been conducted on the issue and reported that different techniques of imagery may be used to improve athletic performance (Smith& Holmes, 2004). Variation in self-efficacy is one of these techniques. Research has shown that mental imagery may improve self-efficacy in the athletes (Lawrence, 1995; Annet, 1996; Beauchamp et al., 2002). Research has also confirmed the positive effect of mental imagery and self-talk on self-confidence and self-efficacy (Hinton et al., 2004; James Lawther et al., 2002; Mammasis & Doganis, 2004; Taylor& Shaw, 2002).

Although mental imagery and self-talk are considered as sources of self-efficacy, few studies have been conducted on the effect of mental imagery and self-talk on self-efficacy. Studies have mostly examined the relationship between these factors; however, little attention has been paid to whether these techniques may affect self-efficacy. James Lawther et al. (2002) investigated the relationship of mental skills and self-efficacy with athletic performance in the players participating in Disabled Soccer World Cup. The results showed a significant relationship between self-efficacy and mental skills in the participants. Jones et al. (2002) investigated the effect of mental imagery on affective states and self-efficacy in novice mountaineers. They reported that the individuals who did imagery training showed higher levels of self-efficacy comparing with those who did not perform the training. Mills et al. (2001) studied the imagery relevant to self-efficacy in the athletes. The results showed that the athletes who maintained high levels of self-efficacy in competitions more often used motivational imagery. Shearer et al. (2007) investigated the relationship between imagery and social self-efficacy in the athletes. The results showed that the athletes who used motivational imagery of general competence displayed high levels of self-efficacy. Concerning the theory proposed by Bandura (1997) and considering the fact that both self-talk and mental imagery may improve self-efficacy and based on the interaction between dual coding and action-language-imagination theories, the researcher aims to investigate whether the combination of these factors may contribute to self-efficacy either positively or negatively. Previous studies have mostly focused on mental skills packages and scarcely considered making interventions. Besides, the research has scarcely addressed the combination of these factors as either facilitative or debilitating in adolescents. For example, Mammasis & Doganis (2004) investigated the effects of mental skills training including imagery and relaxation on pre-competition anxiety, self-confidence and performance in the adolescents. The results showed that the experimental subjects achieved higher levels of self-confidence and suffered from lower levels of cognitive and physical anxiety (Mammasis & Doganis, 2004). Cumming et al. (2006) investigated the effect of the direction of self-talk and mental imagery on self-efficacy in adults. They used different combinations of self-talk and positive and negative mental imagery. The results showed improved performance in the experimental subjects though their self-efficacy did not change significantly. Both athletes and coaches intend to achieve improved self-confidence and self-efficacy through different psychological techniques to attain improved performance. Thus, if the compensatory
orientation of positive self-talk and mental imagery proves to exert positive effects on self-efficacy while the negative orientation of these techniques shows to be detrimental to self-efficacy, the positive orientation may then be used to prevent anxiety and improve performance in athletic competitions so that the coaches and athletes may be recommended to avoid negative cognitive techniques.

**Materials and methods**

**Participants**
The population of the study consisted of adolescent athletes in the darts club of Tehran municipality district 12. From among the population, a number of 75 athletes volunteered to participate in the study. All the participants were in good physical health and were novice athletes.

**Instruments and tasks**
The instruments used in the study included standard dartboard (made in China, Model X-D3 with aluminum body) and standard darts (made in China, Model X-D3 with aluminum body). The scoring procedure is such that the darts hitting Bull’s eye receive 100 scores, the darts landing on the circle 9 obtain 90 scores and so on and finally the darts to hit the circle 1 receive 10 scores. The darts, which do not strike the board, receive zero score. A TDK headphone Model MMP-200, made in Japan, was also used in the study. Smith and Holmes (2004) reported that mental imagery through audio-visual records may better improve performance than written forms. Headphones are used to help define the steps of imagery for the participants so that they can proceed accordingly, avoid distractions and reduce the effects of interfering thoughts. Records of positive and negative mental imagery are presented to the individuals step by step. The revised movement imagery questionnaire (MIQ-R) developed by Hall and Martin (1997) was used to collect the data. Sohrabi et al. (2009) have validated the questionnaire in Iran so that the internal consistency and test-retest reliability of the questionnaire were shown to be 0.73 and 0.77, respectively. The questionnaire is used to assure that the individual’s imagery competence does not influence the imagery intervention. Darts Throwing Self-Efficacy Questionnaire developed based on Bandura theory by Shafizadeh (2007) was used to examine self-efficacy in the participants. The questionnaire consists of 5 items on a 10-point Likert scale. The reliability of the questionnaire was calculated by Safizadeh (2007) to be 0.90 using Cronbach alpha formula. The first item of the questionnaire reads:

1. To what percent are you sure that you can at least score 20 out of every throwing?

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10     20  30 40 50 60 70 80 90 100
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**Procedure**

In group 1, every participant was first to sit on a chair in front of the dartboard and complete the self-efficacy questionnaire. Then they stood up and had 15 throws. The participant had to sit back on the chair and complete the same questionnaire again. Afterwards, the individual had to put on the headphones and listen to the instructions. The record instructed the individual to produce negative imagery step by step. Upon the completion of this stage, the individual was to stand up again and make 15 throws, and before every throw, the participant made negative imagery. Research has shown that imagery has its strongest impact immediately before every throw (Smith& Holmes, 2004). Then the participant had to sit back on the chair and complete the same questionnaire for the third time. Before the next step was started, the tester himself performed the task to help the participants understand the procedure for the new stage. In this step, the participant had to repeat the positive self-talk phrase “I will hit the bull’s eye” loudly before every throw. The participant was to perform 15 throws in this step using positive self-talk.

In group 2, the same procedure was followed. However, in this group, positive imagery was used instead of negative imagery and negative self-talk- I will miss the bull’s eye- was substituted for positive self-talk. In group 3, the participants used both positive imagery and positive self-talk. In group 4, the participants used both negative imagery and negative self-talk. The control group used the same procedure. However, instead of going through the imagery stage, they performed backward counting filler task. In this regard, the control subjects were given a number before every throw out of total 15 throws (15,30,60,75,90,105,120,135,150,165,180,195,210,225). They had to count down from the assigned number by threes as many as five numbers. This mental task has no impact on the test results and was solely used to produce the same test time as that of experimental subjects. It was also used to prevent the individual from...
making imagery. When the participants had difficulty counting down the assigned numbers, the tester would help them.

**Data analysis**

One-way ANOVA was run to make sure that self-efficacy was not significantly different among the groups in the first step. Repeated measures ANOVA 3 (stage) × 5 (groups) was also used to analyze the data. LSD pairwise comparison was run to examine the effect of time in each group. SPSS 16 was used to do the statistical analysis (P<0.05).

**Results**

The mean and standard deviation of participants’ age was 13.9±1.45. The results of one-way ANOVA showed no significant difference among the mean scores of the five groups in the first step (F=1.079, P>0.05). Thus, the results confirmed that there was no significant difference in self-efficacy among the participants in different groups in the first step. The results of repeated measures ANOVA revealed no significant difference in the mean scores of self-efficacy among the groups over time (F=1.55, P>0.05). The results, however, showed the main impact of time to be significant (F=7.88, P<0.05).

<table>
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<tr>
<th>Variance</th>
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<th>df</th>
<th>Mean square</th>
<th>F</th>
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</tr>
<tr>
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<td>2011.77</td>
<td>2.02</td>
<td>991.65</td>
<td>7.88</td>
<td>0.001</td>
</tr>
</tbody>
</table>

The results illustrated in Figure 1 shows that the better the performance, the higher the self-efficacy and vice versa.

![Figure 1. Mean scores of self-efficacy in different stages](image)

The results of post hoc LSD test for paired comparison of self-efficacy scores over time in group 1 (negative imagery & positive self-talk) revealed that, with negative imagery during dart throwing, the participants had lower levels of self-efficacy compared with throwing without any intervention (MD=-6.400, P=0.017). Besides, they had higher levels of self-efficacy when they had made throwing attempts with negative imagery comparing with the attempts they had made with positive self-talk (MD=-8.533, P=0.003). The results of post hoc LSD test for paired comparison of self-efficacy scores over time in group 2 (positive imagery & negative self-talk) showed that the participants had higher levels of self-efficacy in the first step before making throwing attempts comparing with the attempts they made with negative self-talk (MD=15.200, P=0.003). Besides, they had lower levels of self-efficacy when they did their throwing attempts without intervention comparing with the attempts accompanied by negative self-talk (MD=-9.375, P=0.001). When doing their throwing attempts using negative self-talk, they had higher levels of self-efficacy comparing with the attempts accompanied by positive imagery (MD=-11.375, P=0.001). The results of post hoc LSD test for paired comparison of self-efficacy scores over time in group 3 (positive imagery and positive self-talk) showed that the participants had higher levels of self-efficacy when they did their throwing attempts with positive self-talk comparing with the attempts that entailed no intervention (MD=-10.00, P=0.004). With positive self-talk,
they had higher levels of self-efficacy comparing with the attempts they made with positive imagery (MD= -6.533, P=0.016). The results of post hoc LSD test for paired comparison of self-efficacy scores over time in group 4 (negative imagery and negative self-talk) revealed that the participants had higher levels of self-efficacy before they did any attempts in the first step comparing with the throwing attempts they did without intervention (MD=2.400, P=0.009). Besides, they showed higher levels of self-efficacy before they did any attempts in the first step comparing with the attempts made using negative imagery (MD=4.267, P=0.001). In addition, they had higher levels of self-efficacy before they did any attempts in the first step comparing with the attempts made using negative self-talk (MD=6.133, P=0.008). The results of post hoc LSD test for paired comparison of self-efficacy scores over time in the control group showed no significant difference in different steps.

Discussion and conclusion

The present findings showed that the combination of self-talk (both positive and negative) and mental imagery (both positive and negative) do not influence self-efficacy in the adolescents. This is consistent with some studies (Taylor & Shaw, 2002; Cumming et al., 2006) but inconsistent with some others (Hanton et al., 2004; James Lawther et al., 2002; Mammasis & Doganis, 2004). The ineffectiveness of the combination of self-talk and mental imagery on self-efficacy in Cummings and colleagues (2006) may relate to the fact there were few attempts in each step (9 throwing attempts in each step). Even when the number of attempts increased to 15 in the present study, the results were the same. Feltz & Lirgg (2001) contend that measurement problems may render the interventions on self-efficacy ineffective. Thus, the inappropriate procedure of intervention may have rendered the combination of self-talk and mental imagery ineffective. The present findings do not correspond to the findings of James Luther et al. (2002) who studied the relationship between mental skills, self-efficacy and performance in the players participating in Disabled Soccer World Cup. Their results showed a significant correlation between self-efficacy and mental skills. However, the present findings revealed that the combination of self-talk and mental imagery do not affect self-efficacy in the adolescent athletes. According to Bandura’s social-cognitive theory (1997), self-talk and mental imagery are considered as the sources of self-efficacy. The ineffectiveness of the combination of self-talk and mental imagery in the present study may relate to the fact that, as Bandura (1977) proposes, there should be time before the skills can begin to influence self-efficacy. However, the participants had no time to internalize the skills in the present study so that self-efficacy was immediately measured. The present study was experimental while James Luther and colleagues (2002) made no intervention and solely investigated the correlation between mental skills and self-efficacy. The correlational study might have helped them consider the lapse of time that could have resulted in a relationship between self-efficacy and cognitive skills. Therefore, future studies may need to consider the role of time and investigate self-efficacy over a longer time interval. The present findings do not correspond to the findings of Mammasis and Degannis (2004) who investigated the effects of mental skills training including imagery and relaxation on pre-competition anxiety, self-confidence and performance in the adolescents. The results showed that the experimental subjects achieved higher levels of self-confidence and suffered from lower levels of cognitive and physical anxiety. However, the combined effect of cognitive skills on self-efficacy was not statistically significant. This ineffectiveness may relate to the fact that experimental procedures were applied immediately during the throwing attempts in the present study so that they could not influence self-efficacy in the participants. Though the group effect was not significant in the present study, the effect of time was. This implies that the combined effect of mental imagery and self-talk may not contribute to self-efficacy, rather these techniques may be more effective individually. Research has shown that positive, successful imagery of task performance increases self-efficacy (Short et al., 2002; Taylor and Shaw, 2002).

The present findings are consistent with the findings of Taylor and Shaw (2002) who studied the effects of positive and negative imagery on performance in golf shot. The results showed that positive mental imagery exerts a positive impact on performance and self-confidence, but negative imagery has an adverse impact on these two factors. The present findings showed that, with positive imagery, the participants showed higher levels of self-efficacy comparing with their basic self-efficacy. However, with negative imagery, they displayed lower levels of self-efficacy. This is consistent with Bandura (1977) who suggested that individuals visualize positive images so that their self-efficacy could be improved.
The present findings revealed that a combination of self-talk and mental imagery do not affect the self-efficacy in throwing darts in adolescents. However, whenever imagery and self-talk were presented in the positive form, the individuals showed higher levels of self-efficacy. This may be discerned via the significance of the effect of time. Considering the fact that the present participants were novice adolescent athletes, it is recommended that future studies use elite athletes as well. It is also recommended that longer-term training be used to investigate the effect of treatments on self-efficacy.

References


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