

The impact of Mindfulness and Mental Skills Protocols on Athletes' Competitive Anxiety

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Abstract

Study aim: This study aims at examining the impact of Mindfulness and mental skills on competitive anxiety in athletes.

Material and methods: The present study is quasi-experimental with a pretest-posttest design. Participants were 45 19–30 years old male shooters randomly assigned to three groups with 15 people. The test consisted of six 60-minute mindfulness training/ Mental skills/control that lasted six weeks. Measurements included competitive state anxiety based on the competitive state anxiety inventory in two pretest and post-test stages. Data were analyzed using statistical software at a confidence level of 0.05 using the Statistical Package for the Social Sciences (SPSS).

Results: The results showed that cognitive interventions of Mindfulness and mental skills reduced competitive state anxiety ($P < 0.05$), but there was no difference between the effectiveness of these methods. ($P < 0.05$).

Conclusions: Six weeks of mindfulness and mental skills training can help improve athletic performance by reducing anxiety levels.

Keywords: Anxiety – Mindfulness – Mental skills – Sports performance – Shooting

Introduction

Competitive anxiety is a mental challenge experienced by most athletes in competitions and potentially harms sports performance [13]. When an athlete is in a competitive environment, their optimal performance may be impaired. This makes the athlete for performance to optimal levels under competitive anxiety. This reaction has three areas: First, cognitive anxiety, which is a mental component of anxiety affected by negative thoughts; Second, physical anxiety, which is a physical component of anxiety based on physiological signs of anxiety and distress; And third, self-confidence, which means the ability to achieve results and success [23]. State anxiety refers to temporary emotions accompanied by anxiety and stress. Competitive state anxiety indicates the amount of anxiety that a person experiences at the moment of competition and determines success in performance [6]. Passer [19] cites sources of competitive anxiety as worries about making mistakes, not playing well and losing, feeling embarrassed and confused about failure, parents waiting, and worries about being evaluated by parents and team members. The results of

studies show that if competitive state anxiety occurs, harmful mental effects on focus, arousal, and performance are accompanied [1, 2]. Therefore, for athletes to perform best in a competitive situation, their anxiety must be controlled. On the other hand, to increase performance and deal with adverse factors, one needs adequate self-confidence in this field; Because one of the practical components in the interaction between the person and the environment is self-confidence.

One of the new approaches introduced in increasing the performance of athletes is mindfulness-based interventions. Mindfulness means paying attention to the present in specific, purposeful, and judgment-free ways and is a way to communicate with all experiences, including positive, negative, and neutral experiences, and reduces resentment and increases cognitive health. These techniques teach people to identify involuntary and rumination habitual patterns of the mind and turn them into conscious and voluntary patterns so that negative feelings and thoughts are considered transient and straightforward events in the mind [25]. For treatment, mindfulness interventions, known as the acceptance-based models, are applied. One of these therapies is acceptance-based

models; Such as mindfulness-based cognitive therapy, metacognitive therapy, and acceptance and commitment therapy. In these therapies, the mental relationship with thoughts and feelings is enhanced instead of changing the cognitions [22].

The second and relatively newer approach to controlling mental factors affecting athletic performance is to practice mental skills. Mental skills can moderate the direction and severity of competitive anxiety symptoms [17]. The concept of mental skills is defined by Vealey [1988] as the ability to maintain and regulate mental qualities such as self-confidence, calmness, and peace of mind. Mental skills training includes implementing goal setting, relaxation, positive self-talk, arousal regulation, and imagery. These techniques help a person better understand their mental state and control their thoughts and emotions before and during exercise [11]. Mental skills training can change the way athletes evaluate the competitive environment and change the identification of competitive positions [5]. Studies have shown that cognitive Restructuring techniques such as focus, Restructuring, thought control, and self-talk effectively reduces cognitive anxiety during the competition [12]. Such strategies encourage athletes to avoid and control negative thoughts and, conversely, to cultivate positive and motivating thoughts. On the other hand, physical anxiety trains the athlete's mental skills to automatically adjust arousal levels by identifying physiological symptoms associated with high arousals, such as increased heart rate and respiration. After these training, athletes can use these techniques to reduce arousal to the desired level, which is a good level for motor performance [5].

In literature, no studies examine the effectiveness of the interventions, but in the study of Samadi et al. [24], cognitive-behavioral interventions and mindfulness intervention on anxiety and shooting performance were examined. The results of this study showed that mindfulness intervention is superior to cognitive-behavioral interventions in reducing anxiety. However, mental skills intervention did not reduce athletes' anxiety [18]. Therefore, it is likely that the type of intervention is effective on the type of skill or sport and has different effects in each discipline that needs to be examined. Given previous discussions on the effectiveness of training, Mindfulness, and mental skills-based interventions, despite the few inconsistencies reported in the research literature, are effective interventions in Controlling anxiety and improving athletic performance. However, complete information is not available on the differences in the effectiveness of these two methods. Therefore, the objective is to determine and compare the effect of Mindfulness and mental skills-based protocols on competitive state anxiety and athletic performance in male shooters.

Material and method

The study's statistical population included all 19–30 years old shooters (84 people) in Gorgan, Iran. 52 people were ready to participate in the research. 45 people were selected based on the research consent form, mental and physical health form, and activity history. All athletes had at least 5 years of regular activity in shooting and experience of participating in provincial competitions and were in perfect physical and mental health. 45 people were selected as a sample and randomly assigned to the control group (15 people), mental skills intervention group (15 people), and mindfulness intervention group (15 people).

Research tools

The Competitive Anxiety Inventory was used by Martens et al. [16] to assess anxiety. This inventory has 27 questions divided into three subscales of cognitive anxiety, physical anxiety, and self-confidence, each with 9 questions. The questions of this questionnaire are scored by Likert 4-point scale as follows: not at all = 1, low = 2, medium = 3, and very high option = 4 points. Questions 1-4-7-10-13-16-19-22-25 related to the cognitive factor, questions 2-5-8-11-14-17-20-23-26 are related to the physical factor (question 14 is scored in reverse), and questions 3-6-9-12-15-18-21-24-27 are related to self-confidence. The range of points for each subscale is between 9 and 36. The Concurrent construct and content validity of this questionnaire has been reported as very desirable in several studies. The reliability coefficient of each subscale using Cronbach's alpha coefficient for cognitive anxiety is 0.81, physical anxiety 0.83, and self-confidence 0.90 [16].

After selecting the volunteers, the individuals were randomly divided into groups of 15 people (two experimental groups and one control group). In this study, competitive state anxiety and shooters' performance were studied as a dependent variable. The sports performance of the shooters was by the reviewers (pre – and post-intervention). After applying the desired mental skills intervention and mindfulness intervention, which was 6 sessions in 6 weeks, the researcher again performed the competitive state anxiety inventory and performed the same function as the pretest. A specialist before the competition measured physiological parameters such as heart rate, blood pressure, and respiration to ensure anxiety.

Mindfulness intervention protocol

An intervention program similar to the intervention protocols related to anxiety and performance enhancement was prepared by [14]. The content of the mindfulness program included the following. **Session 1:** Concepts of the workshop, concepts related to anxiety and Mindfulness

and its effect on performance, familiarization and formation of small groups, sitting meditation focusing on breathing and discussion, summarizing and presenting homework; **Session 2:** Discussing homework, practicing Body scan mediation, meditating with a focus on breathing and discussion, presenting homework, summarizing and discussing; **Session 3:** Discussion about homework, practicing yoga, sitting meditation focusing on breathing and body, and discussion, summarizing, presenting homework; **Session 4:** Discussion on homework, practicing yoga, walking meditation and discussion, short sitting meditation focusing on breathing and body and discussion, summarizing, presenting homework; **Session 5:** Discussion on homework, meditation focusing on breathing, body and voice, and then group discussion, walking meditation, exercise-specific meditation, short sitting meditation focusing on abdominal breathing, summarizing, presenting homework; **Session 6:** Discussion on homework, exercise-specific meditation, Body scan mediation, short sitting meditation focusing on abdominal breathing, summarizing and conclusion about the workshop

Mental skills protocol

In this section, mental skills including goal setting, relaxation, self-confidence, positive self-talk, attention, imagery, and arousal were presented, and the basic principles of these skills were implemented under the researcher's supervision. Goal setting is to achieve a certain standard of skills in a task, usually over some time. This skill helps the athlete and the coach know the goal and the successful way to reach the goal. Short-term and simple goals are especially effective because they receive immediate rewards and feedback and increase the athlete's confidence [32].

Relaxation: High-level sports competitions occur in environments with severe stress, and the ability to cope with stress is essential. Players use a variety of strategies and skills to adapt to the situation around them. One of the most appropriate solutions is relaxation. **Self-confidence** is defined as the degree of confidence in one's ability to act [16]. Given the importance that professional athletes place on self-confidence, Confident athletes believe in their ability to acquire competencies and learn mental skills. Self-confidence is always accompanied by more expectations of oneself, increasing effort, creating positive emotions, facilitating focus, goal setting, and knowing oneself. However, self-confident people can make positive changes and reverse negative ones; Especially when the situation is to their detriment [31]. **Positive self-talk:** Hardy and Parfitt [9] state the importance of self-talk: what athletes think or say; Which is essential for execution. We all spend much time talking to ourselves. Most of the time, we are not even aware of this inner dialogue, let alone its content; these thoughts directly affect our feelings and, ultimately, our actions. Inappropriate or negative thoughts often cause negative feelings and poor performance. The importance of recognizing inappropriate self-talk and thought patterns and reconstructing them as mental and practical skills in sports has been raised. **Attention and Focus.** It is a cognitive activity to maintain mental and physical attention to perform a motor task. It is also said to focus the mind on the source of information, such as (paying attention to the movement of the opposing player) and discarding other information (crowd noise). It has been shown that eight characteristics are associated with excellent performance, three of which are related to focus. In particular, successful athletes describe themselves as a) immersed in the present

Table 1. The primary and essential exercises of this training program

Chocolate practice, which is a form of raisin exercise used by Kabat Zayn (1990) and Segal et al. (2002), teaches the concept of focus and awareness on using all the senses when eating raisins (chocolate).
Sitting meditation, which lasts from 10 to 25 minutes during the course, instructs athletes to focus first on breathing, then on the emotions in their body, and finally on the surrounding sounds.
A Body scan mediation in which athletes are trained to focus their attention on different parts of their body, from head to toe. At the same time, they are guided to become aware of and accept the feelings that have arisen.
Yoga exercises include a series of yoga postures and movements that allow the athlete to practice mental awareness of their body and mind while moving.
The Walking meditation guides the athlete to become fully aware of the sensations the body is experiencing so that they slowly change from standing to walking at different speeds.
Special sports meditation allows athletes to apply mindfulness skills and experience their actual movements and feelings while participating in sports. The order in which these exercises are taught progressively moves the athlete from the stationary mindful exercises (performing Body scan mediation in a quiet room) to active ones (standing behind the shooting line). This progression (sequence) from stationary to active for sport-specific meditation aims to bridge the mindfulness development and mindfulness application gap during exercise.

(without thinking about the future or the past), b) having a calm mind and at the same time highly focused, and c) having an extraordinary awareness of their body and the outside environment [32]. **Imagery and Mental training:** imagery is the symbolic encoding of information and thinking about performance and feeling in the form of an image in mind. Imagery is one of the main components of execution readiness for any athlete. Mental training is an act of using imagery to mentally train, so mental training is a technique rather than a mental process [10]. For athletes, imagery creates a variety of performance techniques such as self-confidence, relaxation, learning new skills, Mindfulness, and controlling emotional responses [30].

Data analysis

In this study, descriptive statistics were used to categorize the information and present the mean and standard deviation, and inferential statistics were used to analyze the data. Shapiro-Wilk test was used to check the normality of data distribution, and Levene's test was used to check

the homogeneity of variances. Appropriate statistical test according to the research design, analysis of variance test was used to compare the mean score of pretest and paired t-test to evaluate the effect of the intervention. In all tests, the confidence level was considered 0.05. Research data were analyzed by SPSS software.

Results

According to the research design, the data collected at the level of descriptive statistics include the mean and standard deviations of different test periods by groups. Therefore, the scores obtained for performance and anxiety as variables related by test period and group are presented in Table 2.

The one-way analysis of variance in Table 3 shows a significant difference between the groups in the post-test scores ($P \leq 0.05$). In other words, there is a significant difference between the research groups in the anxiety post-

Table 2. Descriptive information about research variables by test period and group

Variables	Group	Pre-test	Post-test
Cognitive anxiety	Mindfulness	3.5 ± 60.22	6.4 ± 87.18
	Mental skills	47.4 ± 67.22	56.5 ± 2.17
	Control	54.4 ± 73.23	17.4 ± 47.23
Physical anxiety	Mindfulness	46.5 ± 47.23	32.5 ± 8.17
	Mental skills	76.4 ± 73.23	74.5 ± 13.17
	Control	96.5 ± 93.21	72.5 ± 4.22
Self confidence	Mindfulness	02.6 ± 33.23	68.4 ± 53.18
	Mental skills	12.5 ± 27.23	47.5 ± 87.16
	Control	02.6 ± 47.22	41.5 ± 07.21
Competitive state anxiety	Mindfulness	95.15 ± 4.69	11.14 ± 2.55
	Mental skills	18.13 ± 67.69	5.15 ± 2.51
	Control	71.14 ± 13.68	43.13 ± 93.66
Sports performance	Mindfulness	47.6 ± 13.524	55.6 ± 07.536
	Mental skills	83.5 ± 87.521	33.7 ± 47.535
	Control	84.6 ± 00.523	24.7 ± 87.522

Table 3. Results of analysis of variance test to compare post-test scores of groups

Variable	Sum of squares	DOF	Mean square	F	p-value	Effect size
Cognitive	316.04	2	158.02	6.83	0.003	0.25
Physical	246.71	2	123.36	3.94	0.027	0.16
Self confidence	134.18	2	67.09	2.43	0.1	0.10
Competitive state anxiety	2006.04	2	1003.02	4.86	0.013	0.19

test scores. Therefore, for pair-wise comparison between groups in anxiety post-test scores, the Tukey post hoc test was used to determine the location of pair differences between groups.

The post hoc test results show that although mindfulness and mental skills protocols were able to reduce anxiety (compared to the control group), no significant difference was observed between the two types of intervention in the research variables. Therefore, there is no superiority between the two types of mindfulness protocol and mental skills for the competitive anxiety variable.

The analysis of variance in Table 5 showed a significant difference between the groups in the post-test scores ($P \leq 0.05$). In other words, there is a significant difference between the research groups in the post-test scores of performances. Therefore, for pair-wise comparison between groups in anxiety post-test scores, Tukey post hoc test was used to determine the location of pair differences between groups.

The post hoc test results in Table 6 show that although mindfulness and mental skills protocols were able to increase performance (compared to the control group), no significant difference was observed between the two types of intervention for the performance variable. Therefore, there is no superior method for the performance variable given the two types of mindfulness and mental skills protocols.

Discussion and conclusion

The present study results showed the effectiveness of mindfulness intervention protocol on reduced anxiety and increased performance. It seems that Mindfulness changes variables, including positive emotions, anxiety, and relaxation, which can lead to increased performance. Research also suggests that Mindfulness is closely related to disburdenment and self-confidence, and as mentioned

Table 4. Tukey post hoc test results

Variable	Group	Group	Mean difference	Standard error	p-value
Cognitive	Mindfulness	Mental skills	1.67	1.76	0.613
		Control	-4.6	1.76	0.032
	Mental skills	Control	-6.27	1.76	0.003
Physical	Mindfulness	Mental skills	0.67	2.04	0.943
		Control	-4.06	2.04	0.030
	Mental skills	Control	-5.27	2.04	0.035
Self confidence	Mindfulness	Mental skills	1.67	1.92	0.663
		Control	-2.53	1.92	0.392
	Mental skills	Control	-4.2	1.92	0.034
Competitive state anxiety	Mindfulness	Mental skills	4.0	5.25	0.450
		Control	-11.73	5.25	0.031
	Mental skills	Control	-15.73	5.25	0.005

Table 5. Results of analysis of variance test to compare post-test scores of groups

Variable	Sum of squares	DOF	Mean square	F	Sig.	Effect size
Performance	1666.8	2	833.4	16.77	0.001	0.44

Table 6. Tukey post hoc test results

Variable	Group	Group	Mean difference	Standard error	Sig.
Performance	Mindfulness	Mental skills	0.6	2.57	0.971
		Control	13.2	2.57	0.001
	Mental skills	Control	12.6	2.57	0.001

earlier, these two factors are essential in promoting athletic performance [21]. For example, many components and dimensions of disburdenment (challenge-task balance, awareness in action, clear goals, lack of self-awareness) are characteristics of Mindfulness. The results are consistent with [8, 24, 29]. Research shows that mindfulness exercises are associated positively with positive emotions and negatively with negative emotions. Although some studies have observed a reduction in perfectionism and anxiety following mindfulness intervention, some have not significantly reduced this program [21].

Researchers believe that the mindfulness training program has successfully helped athletes interpret their anxiety symptoms practically and functionally because they have paid less attention to the anxiety symptoms and accepted the anxiety states. However, some researchers believe that differences in research may be due to the nature of the intervention, the type of program used, the location and duration of the program, etc. New research suggests that trying to control or avoid negative internal experiences (emotions) often has contradictory effects that lead to the intensification or repetition of these experiences. Mindfulness allows the person to make any judgments, both positive and negative, and guides athletes to non-judgmentally view their anxiety as a feeling that does not necessarily reflect reality [8]. The mindfulness exercise program can allow related thoughts to pass through and reduce the occurrence of negative thoughts, leading to a reduction in task-related anxiety and task-unrelated thoughts. In addition, these exercises open the door to experiences and satisfaction to experience adverse internal events. Findings suggest that the desire and satisfaction to experience task-related concerns and implicit focus disorders can reduce destructive negative thoughts [29]. In this study, the acceptance of negative experiences and little attention to anxiety symptoms may have helped reduce pre-competition anxiety. Some evidence suggests that the mindfulness protocol may be associated with structural changes in parts of the brain that process sensory and cognitive emotions, which reduces negative emotions through the stigma of negative emotional stimulation [15]. Findings are similar to the Thompson et al. [29] and Samadi [24]. In this research, the effectiveness of mindfulness protocol on reducing competitive anxiety has been pointed out.

Attention and focus are the key elements of athletic performance. It is common to lose focus on irrelevant signs or tasks during competition. Garner and Murray [8] state that people with self-doubt and people who focus excessively on non-task-related symptoms perform poorly. Mindfulness as a metacognitive skill aims to increase non-judgmental awareness, increase acceptance of experiences, enhance attention to the present moment, and awareness of internal and external stimuli and sense of movement to bring the athlete to peak performance [29]. Shapiro et al.

[26] also state that Mindfulness helps promote relaxation responses, improve attention self-regulation, and view stress as a challenge rather than a threat. Also, mindfulness exercises reduce the experience of negative thoughts, which can effectively reduce destructive thoughts and thus improve performance.

The present study results showed the effectiveness of the Mental Skills Intervention Protocol on reducing anxiety and increasing performance. As mentioned earlier, athletes at any level may experience anger and anxiety, especially before the competition. Anxiety is a particular problem for many athletes, increasing attention span and increasing confusion. The results of the present study are consistent with [3, 7, 28] on reducing competitive state anxiety following a mental program period; while inconsistent with [20] Pavlidou and Doganis [20] did not observe a significant decrease in their research following the mental intervention. They argued that athletes might have been able to control their anxiety well to increase performance. Researchers believe that traditional mental skills training such as relaxation and imagery help the athlete master the autonomic nervous system to some extent and gain sufficient awareness of the body's internal changes and thus self-regulate them in difficult competition conditions.

Given that shooting does not require high activation levels, this technique seems suitable for these athletes. Other techniques were imagery and mental training. Imagery, according to researchers, is mental imaging in which different senses are involved and used to reduce anxiety. This method creates a more positive attitude towards the competition and corrects and controls the pre-competition stressful conditions. By creating images of a pleasant situation, anxiety is reduced. Mental training is associated with an increase in the alpha wave in the parietal region, indicating that these exercises increase relaxation in athletes. Researchers have also shown that blood flow to the brain increases in certain motor cortex areas at imagery. Researchers believe that mental training can change the function of various organs in the body, such as heart rate, blood pressure, respiration, and muscle tension, which are generally controlled and regulated by the autonomic nervous system. In addition, researchers mention imagery as an energizing and motivating factor [4].

The present study results showed no difference in the effectiveness of the mindfulness and mental skills intervention protocols on anxiety and performance. The results showed that although both types of Mindfulness and mental skills interventions have positive effects on anxiety and athletic performance, they are not significantly different in terms of impact. Since no similar study was found to compare the two effects of the two types of intervention, Soltani et al. [27] showed that attention to mental factors such as Mindfulness affects athletes' success [27]. The results of the mindfulness-based intervention group showed

a significant difference in the level of anxiety following this program in the post-test stage. Although mental skills programs use emotion control and regulation strategies to help athletes control anxiety and negative emotions, the mindfulness program focuses on non-judgmental acceptance of inner experiences, significantly negative inner states. Mindfulness encourages the acceptance of stress more than avoiding it and can provide valuable tools to facilitate coping with frightening stimuli and awareness and resilience when responding to emotional experiences. These exercises lead to a state of mental relaxation, reducing stress and physical symptoms and complaints. Although the primary goal of Mindfulness is not relaxation, observing the acceptance of adverse internal events without making any judgments about them can reduce anxiety and increase relaxation. Conventional mental skills interventions such as imagery, self-talk, and goal-setting were generally intended to facilitate optimal performance, which Gardner and Moore [8] believed that affect athletes by helping internal control and mental factors. Although these techniques have received support and have been used worldwide, the study of these interventions has yielded conflicting results.

Finally, cognitive protocols to improve performance and increase mental factors in sports are very obvious, and most sports teams have been put on their agenda by expert psychologists. For this purpose, the protocol of Mindfulness and mental skills has been used and studied in different teams and sports, and it has always been debated which type of intervention is more effective. According to the present study results, Mindfulness and mental skills interventions can both be effective in increasing mental functions and shooting performance and in the age range of young people, and coaches and psychologists can use both types of intervention depending on interest and circumstances.

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