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Comparison of the effectiveness of psychological intervention based on cognitive-behavioral modeling and mindfulness-based intervention on sport performance of shooters: Two months follow-up

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Abstract

Introduction: There are few studies on the effect of cognitive-behavioral interventions and mindfulness on sport performance in athletes. The aim of this study was to investigate the effectiveness of 6 weeks training on cognitive-behavioral strategies and mindfulness exercises on shooter performance with 2 months follow-up.

Materials and Methods: The statistical population of this research included all male shooters in the Yazd province with a range of age from 17 to 22 years old. To conduct the research, 24 professional shooters were randomly assigned into three groups: cognitive-behavioral strategies, behavioral-mindedness-control, and control groups (each group was 8). Specific forms were used to measure exercise performance. The variance analysis with repeated measurements and one way analysis of variance was used to evaluate the performance variations in the three groups. Data were analyzed using SPSS 20 software.

Results: The results showed that although the experimental groups had a positive effect on exercise performance scores in the post-test phase, this effect was eliminated in the follow-up phase. Comparison of the groups in the post-test and follow-up exercises shows that there is a significant difference between the mind and body group with the control group and the cognitive-behavioral group, but between the control and cognitive-behavioral groups only in the post-test There is a significant difference.

Conclusion: The findings suggest that mindfulness exercises can be used as a new and promising way to increase the performance of shooters.

Keywords: Cognitive behavioral, Mindfulness, Sport performance

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Introduction

Considering the importance that today's societies are trying to provide optimal performance in sports competitions is one of the reasons why athletes seek advice from sports psychologists (1). In recent years, many sports psychologists have proven that mental skills are the most important variables affecting the success of professional athletes. Gusiardi et al. suggest that today with the progress of psychology, the discussion of the effect of mental skills on the implementation of sports skills has become very important, and the investigation of psychological factors effective in increasing sports performance has become the interest of athletes, coaches and sports psychologists (2). Therefore, psychologists try to teach their athletes to perform optimally and at the highest possible level under stressful and unfavorable conditions. Optimal sports performance means that athletes can provide 100% of their performance at a given time. Functional sports behavior should include the highest quality of actions and movements and focus on signs related to performance or valuable long-term goals (1).

Applied sports psychology has used cognitive-behavioral methods and techniques that focus on developing self-control of internal states, mainly as psychological skills training (PST), to help increase or maintain the functional sports behavior of athletes. (3). Athletes often use common techniques in traditional psychology, including self-talk, imagery and mental training, control and reconstruction of thoughts, arousal control, behavioral preparation, etc. (4,5). The approach of traditional psychology is based on the assumption that negative internal states such as negative thoughts, negative emotions, and physical feelings prevent optimal performance and that they should be controlled, stopped, or stopped through an increase in positive thoughts and self-confidence (6). According to these hypotheses, an increase in positive internal states leads to optimal performance and allows the athlete to perform in the best way (7). One of the first researches on the effectiveness of cognitive-behavioral interventions in sports was conducted by Sharon et al. They researched the effectiveness of cognitive behavioral training on basketball free throw performance. Their cognitive-behavioral

exercise program included mental review, and relaxation, identifying negative self-expression, and developing positive self-expression. The results showed this program's positive effect on the players' correct throwing percentage (8). In a study, Holm et al. used a package of traditional psychological interventions, including self-talk, visualization, and goal setting in college athletes. Their research showed that with the program's continuation, state-competitive anxiety in the intervention group was significantly lower than in the control group. However, they did not report a significant difference in sports performance between the two groups (5). Sports psychology has shown the benefit of cognitive strategies in increasing performance in athletics, cycling, sailing, etc. For example, Diaz-Osjo et al.'s research entitled psychological intervention to increase performance in 3000 meters hurdle runners using the strategy of self-talk and segmentation (strategies to increase focus on task components) increased the athletes' performance in the final 1/4 of the course. Two showed up after six weeks of training (9). The results were similar to Osjo and Merida's findings of increasing pedaling accuracy in cycling and Hatzigorgiadis on increasing swimmers' performance using self-talk (10,11).

However, in recent years, the literature emerging from a series of sub-disciplines of psychology has questioned the assumption that negative internal experiences always lead to negative behavioral consequences. Some scientific studies suggest suppressing and controlling negative thought patterns can increase unwanted cognitive activities (12). Gardner and Murray suggest that although most studies look for change mechanisms to control negative internal states, there is not enough research regarding the effectiveness of these approaches in relation to performance enhancement, and studies using PST methods have not been very successful. Mindfulness-based interventions (MBI) have been proposed as an alternative approach to traditional psychological interventions in sports. Mindfulness means paying attention to the present in a specific, purposeful, and non-judgmental way (13), and it is a way to communicate with all experiences, including positive, negative, and neutral experiences. These techniques teach people to

identify involuntary habitual patterns and ruminations of the mind and transform them into conscious and voluntary patterns so that negative feelings and thoughts are considered simple and transient events in the mind (14-16).

Although the experimental data on the effect of mindfulness on sports performance and its related variables are different, most researchers have reported an increase in sports performance and variables such as agility, sports self-confidence, and attention following a mindfulness training program (17). For example, in his research, Achli showed the effectiveness of mindfulness on the focus of attention related to the task and performance of runners who participated in athletics training for three sessions of 30 minutes a week (18). In their research, Thompson et al observed the long-term (one-year) effects of Kaufman and Glass's mindfulness program on the performance of archery and athletics athletes, but this effect was not observed in golf (19,20).

In research comparing the effectiveness of music therapy and mindfulness meditation on the performance of professional shooters, Jan et al. showed an increase in performance in two experimental groups compared to the control group.

The music therapy intervention group showed more improvement in pre-test performance scores than the mindfulness group (21). Also, research by Hamilton et al. investigated the role of mindfulness exercises on the anxiety and depression of professional cyclists. The cyclists completed an eight-week mindfulness program (the cycling component). The covariance results showed significant effects on sports cynicism and pessimism compared to the control group (13). In their study, Roslin et al. showed that the intervention based on the Akahi mind positively affects the functional sports behavior of elite athletes (1).

Although the research conducted in the field of using mindfulness interventions shows a significant growth in the last two decades, not much time has passed since the practical application of these methods, and such interventions are still in their infancy (22). In addition, according to the studies carried out, no research has been done comparing the effect of traditional psychological interventions and interventions based on mindfulness on sports

performance. Therefore, it seems necessary to carry out new interventions in the field of sports. In addition, despite the need to investigate the long-term effects of interventions, few psychological studies have followed up on their training programs and have only reported the immediate effects of their programs.

Another important point is that mostly non-valid tools have been used in previous research to measure sports performance (use of self-report or mental scale by coaches and athletes, etc.) (17,23). Therefore, the present research tries to get closer to the field conditions by using the direct performance measurement method and, more precisely, investigating the effectiveness of training cognitive-behavioral strategies and mindfulness interventions on the sports performance of shooters.

Materials and Methods

The statistical population of the research included all male shooters (rifle and pistol) of Yazd province with an age range of 17-22 years, who were invited to participate in the research voluntarily after obtaining official permission from the Sports and Youth Department of Yazd province. The consent form for participating in the research was used to select the research samples, the mental and physical health form, and the activity history.

All athletes had the experience of at least three years of regular activity in the field of shooting and experience of participating in provincial and national competitions, and they were in perfect physical and mental health.

According to the information obtained from the coach and athletes, none of the people had a history of attending psychological classes, and it was their first experience. After selecting the eligible people according to the information obtained from the questionnaire and explaining the purpose of the present study to the subjects, a written consent form and a commitment form to participate in the class and test were taken from them.

Twenty-four subjects were randomly assigned to three intervention groups cognitive behavioral strategies training (8 people), intervention based on mindfulness (8 people), and a control group (8 people). The training program on traditional mental skills and mindfulness was carried out

under the researcher's supervision and with the help of an experienced clinical psychologist. The experimental group participants participated in 6 specified training sessions (one session of 75-90 minutes each week). they did Psychological skills training intervention program Traditional psychological skills training intervention program with the help of a clinical psychologist and similar to the intervention protocols of Patrick and Herikaiko, Mamasi and Doganis, and Trolaw to increase sports performance including stopping strategies Thoughts, mental practice, and visualization, self-talk, relaxation prepared (24-26).

Also, the mindfulness intervention program was similar to the performance enhancement intervention protocol of Depriello et al., including raisin and discussion exercises, sitting meditation focusing on breathing, body inspection exercises, walking meditation, yoga exercises, and special exercise meditation and homework (27).

In this research, judges evaluated the shooters' performance as a dependent variable on three occasions (before and after the end of the two-month intervention and follow-up period) using special forms.

In this research, descriptive statistics were used to calculate the mean, standard deviation, and graphs, and one-way and repeated analysis of statistical variance methods were used to examine the data in different groups and stages. The confidence level of 0.05 was considered in all tests. The research data were analyzed by SPSS version 20 software.

Shapiro-Wilk test was used to check the normality of data distribution according to the number of samples, and in all research variables, a significance level greater than 0.05 was obtained, which indicates the normality of data distribution.

Also, using Lon's test, the variance between the groups in each period of the test has homogeneity ($P < 0.05$). Therefore, parametric statistics, including one-way and repeated variance analysis, can be used to test research hypotheses, considering the normality of data distribution and homogeneity of variances.

Results

The results of performance data analysis using ANOVA with repeated measures 3 (group) * 3 (stage) showed the main effect of group ($P = 0.005$ and $F_{2,21} = 6.847$) and stage ($P = 0.001$ and $F_{2,42} = 14.544$) and also the interaction effect between the group in the stage ($P = 0.001$ and $F_{4,42} = 7.151$) is significant. Considering that the interaction of the group in the stage was significant, therefore, in order to examine the difference between the groups in different stages (the main effect of the group) and also to examine the difference between the stages in each of the groups (the main effect of the stage), the interaction between the groups was broken in the stage. The results of examining the difference between the groups showed that there was no significant difference between the groups in the pre-test stage ($P = 0.923$ and $F_{2,21} = 0.080$), but in the post-test stage ($P = 0.001$ and $F_{2,21} = 19.164$) and follow-up ($P = 0.001$ and $F_{2,21} = 9.062$) there was a significant difference so that in the post-test stage, both mindfulness and cognitive groups performed significantly higher than the control group ($P = 0.001$ and $F_{2,21} = 0.012$). Also, the mindfulness group had a higher performance than the cognitive group ($P = 0.003$). In the follow-up phase, only the mindfulness group was significantly different from the control group ($P = 0.001$). Suppose there was no significant difference between the cognitive and control groups ($P = 0.192$). Also, there was a significant difference between the mindfulness and cognitive groups, so the mindfulness group showed higher performance ($P = 0.010$) (Chart 1). The results of examining the difference between the stages showed that in the mindfulness group, the difference between the stages ($P = 0.013$ and $F_{2,14} = 10.051$) was significant, so the difference between the pre-test and post-test ($P = 0.001$) and The difference between the post-test and follow-up stage is significant ($P = 0.001$). In the cognitive group, the difference between stages ($P = 0.001$ and $F_{2,14} = 14.676$) was significant, so both the difference between pre-test and post-test ($P = 0.002$) and the difference between post-test and Follow-up ($P = 0.01$) is significant. In the control group, the difference between stages ($P = 0.502$ and $F_{2,5} = 0.620$) was insignificant (Chart 1).

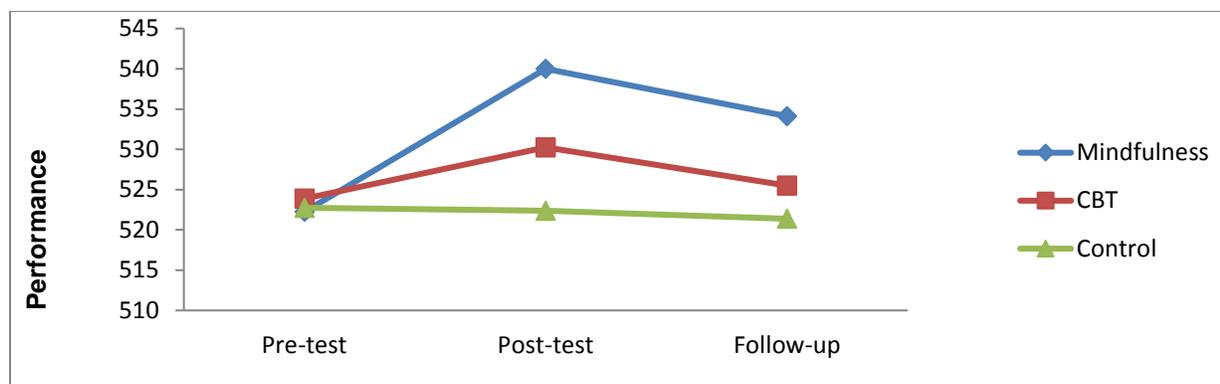


Chart 1. The difference between groups in three phases

Discussion

The present research was conducted to compare the effectiveness of a psychological intervention based on the cognitive-behavioral model and mindfulness on sports performance of shooters with a two-month follow-up. The present study is the first to compare the effectiveness of traditional psychological interventions and mindfulness on sports performance with a two-month follow-up. The results in the variable of sports performance showed that, unlike the control group, both experimental groups showed an increase in performance after the 6-week intervention, and this increase was greater for the mindfulness group. The interesting point was the reduction of performance scores in the follow-up phase for the experimental groups. In the follow-up phase, although the mindfulness group showed a significant difference in performance scores from the control and follow-up groups, no difference was observed between the cognitive-behavioral strategy training group and the control group.

Researchers say that increasing sports performance may be achieved through modulating arousal, reducing anxiety, increasing self-confidence, focusing attention on the task, etc. Researchers believe that cognitive-behavioral strategies can increase the athlete's adaptation to the competitive environment and lead the athlete to achieve the desired level of competition and sports performance. Mental exercises are an effective tool for athletes to manage their thoughts and emotions, leading to an increase in sports performance (28). Although

the results are consistent with the findings of Sharon et al., Diaz-Osjo, and Hatzigorgiadis, they are not consistent with the results of Helm et al. (5,8,9). In explaining the opposite findings, the researchers suggest that trying to stop thoughts can have the opposite effect and lead to an increase in the occurrence and repetition of unwanted thoughts and emotions and ultimately increase attention to oneself rather than the task at hand that this issue can lead to the destruction of performance or the inability to perform skills (12). Of course, in explaining the findings of this research, it can be stated that most previous researchers have used one or two components of psychological skills in their interventions, while the current research includes a multi-component package. It was with homework. In addition, some researchers believe that multi-component interventions are relatively more effective than interventions using one component (5).

One of the important components used in training psychological skills based on the cognitive-behavioral model in this research was self-talk. Self-talk can be used as a means to regulate effort more efficiently and trigger automatic execution. Research also shows that self-talk leads to an increase in motivation and self-confidence and ultimately leads to the beginning of the experience of lightness and focus on the task regardless of the result (7,9). Other components used are relaxation and visualization exercises. Talul et al. and Murphy and Judy believe these two components are important elements in modulating anxiety and can help strengthen performance (29,30).

Researchers also state that visualization is one of the key cognitive-behavioral strategies used to increase performance, and considering that increasing anxiety leads to narrowing attention and concentration and increasing confusion, athletes can focus better with visualization exercises. As a result, he controls his confusion during the competition (31). Weinberg and Gold believe that psychological interventions through the practice of psychological skills should be through standard methods and the use of various psychological skills and strategies, including visualization, relaxation, and goal setting, to have the necessary impact on sports performance (32). In the current research, a multi-component intervention package was used to increase performance, which is more effective than single-component or two-component interventions. The important point is that researchers believe that multi-component interventions are more effective for anxiety and relatively less effective for performance (33). In the current research, although the results showed an increase in performance in the post-test phase, this increase disappeared in the follow-up phase. According to the conducted studies, no similar research was found with which the results can be compared, so this issue needs more research and investigation. However, the results are contrary to the opinion of Gardner and Murray, who believe that traditional psychological skills do not lead to increased performance (5).

Although researchers suggest strategies to increase athlete performance that focus on cognitive-behavioral techniques, it may not always be the most effective strategy to optimize performance (5). As mentioned recently, interventions based on mindfulness have been proposed as an alternative approach to traditional psychological interventions in sports. Regarding the effectiveness of mindfulness exercises on sports performance, it should be said that although some researchers did not observe an increase in performance following the mindfulness exercise program (34) and this difference is due to the nature of the program, the time, and place of the program, the size scales. However, taking - the use of mental scales instead of direct measurement of performance - and even the motivational cases of the participants, etc. attributed, most researchers show an increase in

variables such as lightness, self-confidence, and sports performance following a program have reported mindfulness practice.

The goal of mindfulness as a metacognitive skill is to increase non-judgmental awareness, increase acceptance of experiences, strengthen attention to the present moment and awareness of internal and external stimuli, and the sense of movement to bring the athlete to the peak of performance (17). Shapiro et al. also state that mindfulness helps promote relaxation responses, improves attention self-regulation, and makes people see stress as a challenge rather than a threat. Kabat-Zinn and colleagues also suggest that mindfulness is effective because it promotes physiological relaxation and great cognitive-behavioral changes used in common methods (35).

In this research, the increase in the performance of the mindfulness group was greater than that of the cognitive-behavioral strategies training group in the post-test and follow-up stages. As mentioned earlier, new research suggests that attempts to control or avoid negative internal experiences (emotions) - similar to cognitive-behavioral approaches focusing on controlling and stopping thoughts - often have contradictory effects that lead to exacerbation or repetition. These experiences become Also, Gardner and Murray suggested that the process of stopping thoughts causes disruption of the IMA model and thus causes a drop in performance. Murray concluded that the traditional methods of improving performance are not effective enough and should be replaced by a new method - models of mindfulness, acceptance, and commitment - to increase performance. It seems that mental techniques include justifying disturbing thoughts rather than stopping thoughts as a more logical alternative (5).

Recent results suggest that increasing performance with mindfulness exercises may be achieved through acceptance and awareness of the present moment and not through controlling internal states (20).

Some researchers state that mindfulness training based on acceptance and commitment may be more effective for athletes who can focus sufficiently on the task at hand (such as golf and bowling, or shooting) compared to athletes who need to respond more quickly to stimuli respond to external needs and situational needs

(basketball, baseball, etc.) to be more useful (7). In addition, researchers believe that trying to stop negative thoughts tends to emphasize the challenge rather than helping them, while mindfulness approaches improve lightness and attention to the task at hand. Perhaps, for this reason, mindfulness exercises have led to a greater increase in performance than the cognitive-behavioral strategies training group.

According to the studies conducted, only Thompson et al.'s study has investigated the effectiveness of the mindfulness program in the follow-up phase. The findings are similar to the results of Thompson et al. on the performance of athletics athletes and contrary to the performance of golfers. Thompson et al. did not observe an increase in the performance of golfers in the one-year follow-up phase using the mindfulness training program. They stated that the failure to observe the expected findings may be due to inaccurate performance evaluation methods (average annual grades).

The present study calculated performance scores using a direct and accurate method. Another reason for the inconsistency of the present study with Thompson et al.'s findings may be that the follow-up phase of the present study was two months, while Ahern et al.'s study examined the one-year follow-up phase, which may not be possible to make an exact comparison. However, examining follow-up procedures for longer times requires more studies (20).

Although there was a significant difference in the performance scores of the mindfulness practice compared to the control group and cognitive-behavioral strategies training, the important point of observing the relative decrease in the efficiency of the mindfulness program (in the follow-up phase) is the same as the cognitive strategies training group.

It is a behavior in the subjects' performance compared to the post-test stage. Of course, it is important to mention that, unlike the cognitive-behavioral group, the performance scores of the post-test and follow-up stages are significant for the mindfulness group.

The follow-up phase of the research was during the academic year, and perhaps because most of the research participants were final-year high school students and students, they did not have enough time to continue the exercises. According

to the oral self-report, most of the subjects used the exercises sporadically, and for this reason, in both types of exercises, a relative decrease in performance was observed in the two-month follow-up phase compared to the post-test phase, and maybe if the time of the If the follow-up was longer, this effect would disappear. However, this needs further research in the future. Carmody and Bauer found that time spent on home exercise was significantly related to the degree of change in psychological aspects and that people who were more motivated to exercise were likely to show more success.

In addition, Kabat-Zinn emphasized the importance of mindfulness exercises in strengthening positive mental and behavioral outcomes and recommended that mindfulness exercises be practiced at least 45 minutes a day and six days a week. Kabat-Zinn states that the attitude you have in the practice of paying attention to the present moment is vital and important and explains that if a person's commitment to the practice is low, the success of the mindfulness training program will decrease. As a result, the improvement and strengthening of the performance will likely be observed if the participants are committed to the training and continue the mindfulness exercises carefully after the workshop. However, Kabat-Zinn believes that even during self-treatment and without continuing the exercises, attention and concentration will take over life, and this issue may remain for a long time (36).

Considering that the current research is one of the first researches in the field of the impact of traditional psychological programs and mindfulness on sports performance, future research requires that researchers evaluate the effectiveness and efficiency of these programs on the performance of other disciplines.

Also, comparing the cortisol levels of beginners and experts is another issue that should be considered. In addition, researchers in the future should use their efforts to achieve the best intervention program to increase performance and consider the effectiveness of these programs in the follow-up phase.

Also, considering that functional sports behavior is important for any sport, future studies should address the effectiveness of PST and MBI

in interfering with or facilitating variables of functional sports behavior.

Conclusion

The research results showed that increasing sports performance using mindfulness exercises is more effective than traditional methods. Anyway, considering the increasing progress of physical education science, it is vital to use newer

psychological interventions for athletes to ensure the effectiveness and efficiency of these interventions in increasing sports performance.

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