

Effectiveness of a Mindfulness-Based Skill Development Program on Elite Archers' Mental Skills and Mindfulness Levels*

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Abstract

The aim of this study was to investigate the effectiveness of a mindfulness-based skill training program on elite archers' mental skills and mindfulness levels. This study comprised 11 elite archers from the Rio Preparation Camp 2016, ranging in age from 16 to 25 years. Five of the participants were female and six were male. The design of this study was one-group pretest-posttest design and Wilcoxon signed rank test was used for analyzing the data. Mental ability of participants was measured using The Ottawa Mental Skills Assessment Tool-3 and the Five Facets Mindfulness Questionnaire measured the mindfulness levels of the elite archers. The program upon which the study was conducted was an 8-week mindfulness-based skill training program, presented in 90 minute sessions. This study found that, in terms of mental skills, elite archers' scores in refocusing, competition planning, activation, and relaxation significantly increased on completion of the program. According to the findings that there was also a significant increase in archers' scores in four subscales of mindfulness: observe, acting with awareness, describe, and nonreactivity to inner experience. These results indicate that an 8-week mindfulness-based skill training program contribute to improvements in elite athletes' mental skills and mindfulness. On completion of the program, participants experienced increased energy levels, were more focused on competition planning and found it easier to refocus.

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Farkındalık Temelli Beceri Geliştirme Programının Elit Okçuların Mental Becerileri ve Farkındalık Düzeyleri Üzerindeki Etkililiğinin İncelenmesi

Öz

Bu çalışmanın amacı, farkındalık temelli beceri geliştirme programının elit okçuların mental becerileri ve farkındalık düzeyleri üzerindeki etkililiğini incelemektir. Araştırma Rio 2016 Hazırlık Kampında yer alan yaşları 16 ile 25 arasında değişen 11 elit okçudan oluşmuştur. Katılımcıların 5'i kadın ve 6'sı erkektir. Bu araştırmanın yönteminde tek grup öntest-sontest kontrol grupsuz deney deseni kullanılmıştır. Araştırmada veriler, Wilcoxon işaretli sıralar testi ile analiz edilmiştir. Katılımcıların mental yetenekleri, Ottawa Mental Yetenek Değerlendirme Ölçeği – 3 ve farkındalık düzeyleri Beş Boyutlu Bilinçli Farkındalık Ölçeği kullanılarak ölçülmüştür. Çalışmada, 90 dakikalık oturumlar halinde sunulan 8 haftalık Farkındalık Temelli Beceri Geliştirme programı uygulanmıştır. Bu çalışmada, mental beceriler açısından elit okçuların rahatlatma-gevşeme, canlandırma-enerji, mücadele planı ve yeniden odaklanma puanlarının anlamlı düzeyde arttığı bulunmuştur. Farkındalığın, gözlemlenme, tanımlama, farkındalıkla davranma ve içsel deneyimlere tepkisizlik alt boyutlarına ait puanlarının da anlamlı düzeyde arttığı bulunmuştur. Bu sonuçlar, 8 haftalık Farkındalık Temelli Beceri Geliştirme programının elit sporcuların mental becerileri ve farkındalık düzeylerinin gelişmesine katkıda bulunduğunu göstermektedir. Bu bulgular ışığında programın katılımcıların gevşeme ve enerji düzeylerinin artmasına, mücadele planı hazırlamaya ve yeniden odaklanmaya olumlu yönde etki eden bir program olduğu söylenebilir.

Anahtar kelimeler: farkındalık temelli beceri geliştirme programı, farkındalık, mental beceriler, spor psikolojisi

Introduction

In recent years, mindfulness has attracted a great deal of attention from researchers in psychology, education and sports. Although mindfulness has various definitions, Kabat-Zinn's (1994) definition stands the most commonly used in mindfulness literature. According to this definition, 'mindfulness' refers to "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p.4). In their earlier paper, Kabat-Zinn et al. (1992) note that mindfulness is considered an attentional skill and has special relevance to athletic performance. They maintained that mindfulness, as a form of self-regulated present moment attention, is gained by regular practices of various mindfulness exercises. Gardner and Moore (2004) argue that mindfulness practice is founded on the basis of a nonjudging awareness and acceptance of affective, sensory and cognitive experiences which take place in the moment. According to this view, internal experiences are considered naturally occurring events, coming and going regularly, as normal and expected features of human existence. Thus, mindfulness techniques include a nonjudgmental attitude and no prior evaluation of the current situation (Gardner & Moore, 2004). Previous studies have suggested that mindfulness-based interventions may not only alleviate different mental health problems, but also improve positive psychological functioning (Baer, 2003).

As physical conditions can be improved with exercise, it is also possible to improve mindfulness levels by practicing mental exercises (Siegel, Germer, & Olendzki, 2009). Improving mindfulness in sport performance relies on a desire for optimal accomplishment, the strong intent of the individual, and mental training (Moore, 2009). According to Gardner and Moore (2006) an athletes' performance can be affected by internal and mental factors. Weinberg and Gould (2011) underline that these factors can be controlled through traditional sport psychology interventions - including imagery, self-talk and goal setting - to help athletes perform at optimal levels. However, recent research has found that these techniques are not always effective and adequate (De Petrillo, Kaufman, Glass, & Arnkoff, 2009) and have questioned the ability of traditional methods to successfully improve an athlete's performance (Birrer & Morgan, 2010). As opposed to traditional sport psychology interventions, mindfulness interventions used to improve performance in sport include psychological training techniques, focusing on attention, and optimum performance (Moore, 2009). Mindfulness also teaches athletes to concentrate on the present rather than focusing on past mistakes or future outcomes of these mistakes (Stratton, Cusimano, Hartman, & DeBoom, 2005).

Moran (2009) notes that focusing and concentration are important skills for successful sport performance. Despite its physical nature, as one's physical actions are controlled by the

mind, sports require a significant amount of mental focusing (Lee, 2013). Among certain sport branches, including archery, focusing and concentration skills are especially critical. Archery requires both mental (e.g. focus, imagery, goal-setting) and physical (e.g. body strength, hand-eye coordination, posture, heart rate, relaxation) skills. Improving focusing skills can also positively impact archers' mental health and well-being. To maintain attention during a competition is an essential aspect in archery (Lee, 2013). Awareness also plays an important role in being successful in archery. More specifically, an archer's being aware of their mind and body is essential to improve the practical skills necessary for effective practice, training and competition. Both during training and before competitions, meditation provides a useful tool for archers to strengthen and improve mental awareness. In other words, mental awareness skills progress through mindfulness meditation.

Current research in sports psychology provides some evidence mindfulness is closely related to sport performance (Gardner & Moore, 2004; Kee & Wang, 2008). In addition to these correlational studies, there are experimental studies carried out with archers and golfers (Kaufman, Glass, & Arnkoff, 2009) and also long-distance runners (De Petrillo et al., 2009). Bernier, Thienot, Codron and Fournier (2009) in their qualitative study reported similar results on elite swimmers' flow experiences. Similarities were found between a state of mindfulness and elite swimmers' bodily awareness condition and attitude of acceptance level in race preparation. Although there has been considerable attention given to mindfulness practice in other branches of sport, mindfulness studies focusing on elite archers has remained limited in number. Therefore, this study focused on the effectiveness of mindfulness-based skill development program on elite recurve archers' mental skills.

Mindfulness is useful for an individual to focus on the present. Roemer and Orsillo (2002) highlight meditation techniques may provide a useful way to heighten self-awareness. Frewen, Evans, Maraj, Dozois and Partridge (2008) added that mindfulness practices may help to reduce the frequency of negative thoughts and to improve the ability to release negative thoughts. With the help of mindfulness practices, athletes can become aware of their regular response patterns to external cues, and hence feel better equipped to choose appropriate responses to athletic demands (Gardner & Moore, 2004). In the sport psychology field, mental training generally includes focusing on the positive side of athletes' mental performances, physical abilities and preparation skills. The idea behind the mental training program is that positive or negative images in one's mind can be decisive and have a direct effect on an athlete's abilities (Porter, 2003); hence athletes should mentally prepare themselves for stressful situations. Described by Eiring and Hathaway (2012) as a flexible state of mind in which one can actively engage in the present moment. Mindfulness helps

athletes to understand their mental state during sport performance and to develop effective interventions to enhance that performance (Rivera, Quintana & Rincón, 2011).

Considering the relevance of mindfulness to athletic performance, the main purpose of this study is to test whether a mindfulness-based skill development program improves the mental skills and mindfulness levels of elite recurve archers. It is hypothesized that there will be significant differences between pre and post test scores of elite recurve archers' mental skill subscales and mindfulness subscales.

Methods

Research Design

This study is focused on testing the effectiveness of the program on elite archers' mental skills and mindfulness levels. In the study, a quasi-experimental design is used and a one group pretest-posttest model utilized to compare elite recurve archers' pre-test and post-test scores (Table 1) (Fraenkel & Wallen, 2006).

Table 1

Experimental Design of the Study

Group	Pre-test	Experimental Design	Post-test
Experimental Group	P1	X	P2

Participants

The study sample included 11 elite recurve archers in the Turkish National Archery Team. The participants ages ranged between 16 and 25 years ($M = 20.27$, $SD = 2.90$) and their ages for starting sports varied from 3 to 15 ($M = 11.64$, $SD = 3.56$). Five participants are female (% 45.5) and six are male (%54.5).

Measures

Demographic Information Form

It is prepared to determine the demographic characteristics (age, gender) and experience within the sport (e.g. sports age, national caps) of the participants.

Ottawa Mental Skills Assessment Tool-3 (OMSAT-3)

Durand-Bush, Salmela and Green-Demers (2001) developed and Erhan, Güler, Ağduman and Gerek (2015) the adapted OMSAT-3 into Turkish culture by. The scale aims to

measure the mental skills of the athletes and is developed as a self-evaluation tool. The Turkish form of the scale consists of 48 items and 12 subscales under three conceptual components. These components are foundation skills which include goal setting, self-confidence, commitment, psychosomatic skills which include stress reactions, fear control, relaxation, activation, and cognitive skills which include imagery, mental practice, focusing, refocusing, and competition planning. A 7-point Likert scale is used, where options range from strongly agree (7) to strongly disagree (1) with an available neutral choice.

The adaptation study of the scale included 220 athletes (Erhan et al., 2015). During the adaptation process, the Ottawa Mental Skills Assessment Tool -3 Scale Form was translated from English to Turkish using translators and sports academics. For construct validity of the scale, confirmatory factor analysis was used and fit index values were reported as RMSEA=0.072, SRMR=0.066, NFI=0.92, NNFI=0.95 and CFI = 0.956. The overall internal consistency value was 0.94. Cronbach alpha coefficients for goal setting, self-confidence, commitment, stress reactions, fear control, relaxation dimension, activation dimension, focusing, refocusing, imagery, mental practice, competition planning are .67, .69, .69, .68, .55, .70, .67, .74, .81, .56, .72 and .75, respectively.

Five-Facet Mindfulness Questionnaire (FFMQ)

The FFMQ was developed by Baer et al. (2006) and adapted for Turkish culture by Kınay (2013) with a group of university students. The five facets of the questionnaire are observe, describe, act-aware, non-judge, and non-react. The questionnaire includes 39 items with a 5-point Likert type scale. Options range from “Never or very rarely true”, “rarely true”, “sometimes true”, “often true”, to “very often or always true”.

In the adaptation study, both Turkish and original forms of the scale were completed by the students in order to test the lingual validity of the questionnaire. First the English version of the questionnaire was given to 4th year students of Translation and English Literature and after 2 weeks, the Turkish version of the FFMQ was given to the same group and significant and positive correlations achieved. Factor analysis results yielded 5 dimensions as in the original form. The consistency coefficients varied from .67 to .85 in the Turkish form of the scale (Kınay, 2013).

Data analysis

In order to test whether there is a significant difference between elite archers' pre- and post-test scores, the Wilcoxon Signed-Rank Test was used in this study.

Procedure

This study includes the application of an 8-session Mindfulness-Based Training Program aimed at achieving a positive change in the mental skills and mindfulness levels of elite archers. The development of the program and the selection of relevant exercises were made on the basis of previous literature (Bernier et al., 2009; Çatak & Ögel, 2009a; Çatak & Ögel, 2009b; Linehan, 1993; Ögel, 2015; Stahl & Goldstein, 2010; Wehrenberg, 2018). The program was developed based on two theoretical bases. While some sessions included exercises based on mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002), some other sessions included exercises based on acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999). The ACT approach combines mindfulness with acceptance approaches to help a person develop a new relationship with difficult thoughts, feelings, images, memories, sensations, urges and emotions (Harris, 2006). ACT employs acceptance, the observing self, defusion, values contact with the present moment, and committed action as six core principles to help people develop psychological flexibility. All of these principles possess and require specific practice, techniques, metaphors and follow-up actions (Harris, 2006). The MBCT program aims to teach recognition of and disengagement from self-defeating patterns of negative thoughts and ruminations at times of potential relapses (Segal, Williams, & Teasdale, 2013).

On this theoretical base, varying sources were used to compile exercises based around focus, awareness of breathing and mindful practice skills. In the program, as suggested by Bernier et al. (2009), mindfulness of breath, mindfulness and acceptance practices, bodily sensations and movements, and awareness of emotions and thoughts in nonjudgmental ways were introduced throughout the sessions. The information provided to the participants, the exercises used in each session and homework for participants was prepared before each session. The program content included information about mindfulness and the importance of being in the present moment. Group exercises included in the program were on cognitive distortions, states of mind, homework, mindful breathing and body awareness. The aim of each session was prepared in accordance with the affective, cognitive and behavioral aims and components of the program. The eight session Mindfulness-Based Training Program is presented as follows:

In the first session, group rules are agreed on; the pre-test measure is applied; and content information is given. In the second session, information about mindfulness is given to group participants; after an explanation of the importance of being in the present moment, the importance of being here-and-now are explained and the correct method of calm breathing (diaphragmatic breathing) taught to the participants. Breath and body awareness exercises are

taught in the same session. Homework related to the full body scan exercise to be completed on a daily basis is also given. The third session starts with a mindful awareness exercise in order to relax participants as the session followed a heavy training program. The purpose of starting the session with mindful awareness exercises is to help participants focus on the present moment. In this session, the participants are instructed to continuously ask themselves the questions “Where am I?” and “What am I doing?” to remain aware of the present moment. Afterwards, participants are provided with information relating to the three states of mind (reasonable mind, wise mind and emotion mind) taken from dialectical behavior therapy (DBT) model (Linehan, 1993, p. 214). Participants talk about their states of mind in their daily lives and feedback on this discussion is given. This session’s homework related to mindful awareness practice, including observing breathing and bodily sensations and a worksheet (taken from Çatak & Ögel, 2009a) related to participants thinking styles. In the fourth session, mindful breathing (Stahl & Goldstein, 2010) is presented as a technique to help the participants observe their emotions, thoughts and bodily sensations. This technique also helps with being aware of the present moment. Information about the relationship between negative thoughts and negative emotions is provided and related exercises carried out; homework of a mindful breathing practice to be done on a daily basis is given. The fifth session starts with a progressive muscle relaxation exercise, followed by a second exercise which aims to help participants detach themselves from negative thoughts, the effects of which were explained in the previous session. Participants are guided through a discussion on the cause of negative emotions and information on the subjects “Being unable to think unbiased” and “Let go of thoughts” is given and explained. Lastly, participants practiced releasing the thoughts causing negative emotions and received homework to observe their experiences and thoughts. A “Judgement Track Form” (taken from Çatak & Ögel, 2009b) was distributed to the participants to record the moments they judge their experiences and thoughts. In the sixth session, the topic of observing thoughts is introduced to the participants using metaphors developed based on MBCT principles. Participants engage in a mindful awareness exercise and “let go of thoughts” exercise, including practice of mental imagination techniques (Çatak & Ögel, 2009b). After explaining “negative automatic thoughts”, the archers are requested to detect their own negative automatic thoughts and then expected to apply the thought replacement exercise (pause, reappraise, and reframe) whenever their minds are full with these thoughts (taken from Wehrenberg, 2018). A “Negative Affects Form” is distributed to be filled during the following week.

The seventh session of the study began with awareness of breathing practice. After the practice, information was given about cognitive distortions and participants asked if they have

observed these distortions themselves and were encouraged to talk about such distortions. To learn to encourage a feeling of happiness during competitions, group participants were also asked to fill “Happiness Cards” using motivational and happiness related sentences. The final mindfulness session started with focusing on the body and mindful breathing exercises. The happiness cards collected from the participants earlier are prepared as gift cards and returned. Participants were requested to carry these cards and to read the sentences before training and at competitions. In the same session, the whole program was summarized. After getting feedback from participants, post-test instrumentation is applied. The training program was carried out by the first author.

Application of the Program

The Mindfulness-Based Training Program upon which this study is focused was completed between January – March 2016. This eight-week program was attended by eleven participating elite archers. Participants attended once a week and each session lasted ninety minutes. Pre-test was taken to measure mindfulness levels and mental abilities before the training sessions started. Post-test was applied at the end of last session to measure the effectiveness of the program. Table 2 shows means and standard deviations for pre and post test scores for the OMSAT-3 subscale scores.

Results

Table 2

Descriptive Statistics for the OMSAT-3 Subscales

Subscales	Pre-test M (SD)	Post-test M (SD)
Goal setting	22.18 (3.31)	22.64 (4.12)
Self-confidence	24.73 (3.00)	24.64 (3.64)
Commitment	26.27 (1.55)	25.91 (2.46)
Stress reactions	18.91 (2.91)	19.45 (3.04)
Relaxation	20.64 (3.23)	22.36 (2.73)
Fear control	20.91 (4.41)	21.45 (4.36)
Activation	20.73 (4.92)	23.18 (4.09)
Focusing	19.55 (5.31)	20.72 (4.83)
Imagery	21.73 (3.19)	22.73 (3.49)
Competition planning	14.91 (6.33)	16.82 (4.62)
Mental practice	20.00 (5.49)	20.90 (4.48)
Refocusing	13.09 (3.08)	15.91 (2.87)

A Wilcoxon signed-rank test was conducted to test whether participants’ pretest scores significantly differ from participants’ post-test scores in OMSAT-3 subscales and Five Facet

Mindfulness Questionnaire subscales. Wilcoxon signed-rank test results for OMSAT-3 subscale scores were shown in Table 3.

Table 3

Wilcoxon Signed Ranks Test Results for Pre- and Post-Test Scores of The OMSAT-3 Subscales

OMSAT-3	Ranks	n	Mean Rank	Sum of Ranks	Z	p
Relaxation	Negative Ranks	0	0.00	0.00	-2.840	0.005*
	Positive Ranks	10	5.50	55.00		
	Ties	1				
	Total	11				
Activation	Negative Ranks	2	2.50	5.00	-2.315	0.021*
	Positive Ranks	8	6.25	50.00		
	Ties	1				
	Total	11				
Competition planning	Negative Ranks	2	5.25	10.50	-2.010	0.044*
	Positive Ranks	9	6.17	55.50		
	Ties	0				
	Total	11				
Refocusing	Negative Ranks	2	2.75	5.50	-2.260	0.024*
	Positive Ranks	8	6.19	49.50		
	Ties	1				
	Total	11				

* $p < 0.05$

As indicated in Table 3, there were significant differences in relaxation ($Z = -2,840$, $p = 0.005$), activation ($Z = -2,315$, $p = 0.021$), competition planning ($Z = -2,010$, $p = 0.044$), and refocusing ($Z = -2,260$, $p = 0.024$) subscales of OMSAT-3, while the differences in goal setting ($Z = -,635$, $p = 0.526$), self-confidence ($Z = -,361$, $p = 0.718$), commitment ($Z = -,426$, $p = 0.670$), stress reactions ($Z = -,493$, $p = 0.622$), fear control ($Z = -,639$, $p = 0.523$), focusing ($Z = -1,309$, $p = 0.191$), imagery ($Z = -1,801$, $p = 0.072$), and mental practice ($Z = -,924$, $p = 0.355$) were not significant. The results indicated significant increases in participants' relaxation, activation, competition planning and refocusing skills as a result of the program. Table 4 presents means and standard deviations for pre- and post-test scores of the FFMQ subscales.

Table 4

Descriptive Statistics for The FFMQ Subscales

Subscales	Pre-test M (SD)	Post-test M (SD)
Observe	28.64 (5.64)	32.55 (5.39)
Describe	29.18 (6.28)	31.73 (6.42)
Acting with awareness	30.90 (6.05)	33.45 (5.41)
Nonjudging of inner experience	21.09 (4.03)	20.27 (4.19)
Nonreactivity to inner experience	16.73 (3.55)	20.00 (2.23)

A Wilcoxon signed-rank test was conducted to determine whether there were differences between participants' pre- and post-test scores in FFMQ subscales. Wilcoxon signed-rank test results for FFMQ subscale scores were shown in Table 5.

Table 5

Wilcoxon Signed-Rank Test Results for Pre- and Post-test Scores of The FFMQ Subscales

FFMQ	Ranks	n	Mean Rank	Sum of Ranks	Z	p
Observe	Negative Ranks	0	0.00	0.00	-2.812	0.005*
	Positive Ranks	10	5.50	55.00		
	Ties	1				
	Total	11				
Describe	Negative Ranks	2	3.50	7.00	-2.321	0.020*
	Positive Ranks	9	6.56	59.00		
	Ties	0				
	Total	11				
Acting with awareness	Negative Ranks	1	4.00	4.00	-2.405	0.016*
	Positive Ranks	9	5.67	51.00		
	Ties	1				
	Total	11				
Nonreactivity to inner experience	Negative Ranks	2	2.25	4.00	-2.349	0.019*
	Positive Ranks	8	6.31	50.50		
	Ties	1				
	Total	11				

* $p < 0.05$

As indicated in Table 5, there were significant changes in participants' pre- and post-test scores in observe ($Z = -2,812$, $p = 0.005$), describe ($Z = -2,321$, $p = 0.020$), acting with awareness ($Z = -2,405$, $p = 0.016$), and nonreactivity to inner experience ($Z = -2,349$, $p = 0.019$) subscales. These results suggested significant increases in participants' observe, describe, acting with awareness and nonreactivity levels as a result of the program.

Discussion

The purpose of this study was to investigate the effectiveness of an 8-session mindfulness-based skill development program on elite archers' mental skills and mindfulness levels. Results of the study suggested that the training program contributed to the enhancement in relaxation, activation, competition planning, and refocusing skills of elite archers. These results contributed to existing literature regarding the effect of mindfulness-based training programs in the sports field and the findings of this study are consistent with previous findings. For example, Bernier et al. (2009) reported that mindfulness and acceptance based psychological skills training programs have positive effect on performance

enhancement in competition and activation scores among golfers. Similarly, in a 4-week study on recreational archers and golfers, it was found that increased levels of flow were associated with increased mindfulness (Kaufman et al., 2009). Further, Terzioğlu, Yıldız and Çakır (2020) applied the 8-session program developed based on mindfulness-based stress reduction and MBCT approaches, to nine female handball players. Their results indicated significant differences in terms of goal setting and mental preparation, concentration, coachability ability to cope with adversity and being free from worries. Our findings also support the findings of Aherne, Moran and Lonsdale (2011). They investigated the relationship between mindfulness-based training (a nonjudgmental attentional training technique) and flow experiences in elite athletes from various sport branches and concluded that awareness training was found to have a positive effect on setting clear goals and a sense of control. In their study, follow up tests indicated an increase in flow scores of the experimental group.

New ways to cultivate mindfulness in athletes are among emerging research areas. These approaches generally develop training programs based on ACT and MBCT. In one of these studies, ACT-based psychological coaching intervention resulted in enhanced ability to cope with stress and anxiety, and new ways of understanding different aspects of training and performance among female football players (Kettunen & Välimäki, 2014). In another study, mindfulness practice has found to be related with the ability to let go of and the decreased occurrence of negative thoughts (Frewen et al., 2008). Schwanhausser (2009) applied nine sessions of the Mindfulness-Acceptance-Commitment approach on Steve, a springboard diver. The results of the study found an increase in mindful awareness, mindful attention, experiential acceptance, flow, and diving performance. Considering these previous findings, the results of this current study provided more evidence for the feasibility of mindfulness-based approaches in skill training for elite archers.

The results of the current study also suggested that there was significant increase in observing, describing, acting with awareness, and non-reactivity to inner experience levels of elite archers. These results gave further evidence that mindfulness skills can be improved as the result of regular training (Siegel et al., 2009). Despite the differences in measuring mindfulness, there are compatible results in the literature to compare with current findings. De Petrillo et al. (2009) evaluated the use of Mindful Sport Performance (MSPE) for recreational long-distance runners, a population of athletes who often experienced negative thoughts and physical discomfort throughout the sport. Runners participating in the workshops experienced significant reductions in sports anxiety related worry and perfectionism, and significant increases in mindfulness.

This study was the first study to focus on the effectiveness of a mindfulness-based skill training program on elite archers in Turkey. Therefore, the findings of this study will contribute to the literature. However, there are certain limitations to be noted. Firstly, as there was no control group, the enhancement in the post-test scores should be interpreted cautiously. In addition, competition performance of the athletes was not measured, nor compared before and after treatment in the study. It can be recommended that further research could compare the pre and post treatment competition performance of athletes.

In this study, the mindfulness-based skill development program was implemented during the training camp periods of athletes. Comparison can be made with this study by applying mindfulness-based skill training program to different sports branches. For future studies, it is strongly recommended that the effectiveness of the mindfulness-based training program be compared by taking follow up measurements.

Based on current findings, mindfulness-based programs with different mindfulness exercises other than the one included in the study could be used to improve the performance and mental skills of athletes. In addition, mindfulness-based interventions could be used for preventive purposes and practices. Therefore, the use of mindfulness-based training programs is recommended to group and individual sports by sports psychologists.

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