

The effect of mindfulness sports performance enhancement (MSPE) to reduce competitive state anxiety on karate athletes

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Abstract

Competitive state anxiety influences cognitive, emotional, and athlete behaviour while they have to perform perfectly in a competition. This study was conducted to analyze the effect of Mindfulness Sports Performance Enhancement (MSPE) training on competitive state anxiety of karate athletes in Surabaya. The research method used is quantitative with an experimental design. The sample in this study was 28 Karate athletes from Dojo Shiroite and INKAI in Surabaya. Those samples were selected using quota sampling. The intervention provided was an MSPE intervention adapted from Mindfulness Sports Performance Enhancement (MSPE). The data collection method was carried out using a competitive state anxiety scale adapted from The Revised Competitive State Anxiety Inventory – 2 with 17 items. The data were analyzed by paired t-test with SPSS 26. The result showed a significant decrease in the average competitive state anxiety by 9.25 points. This condition is supported by the decrease in cognitive anxiety and somatic anxiety dimension by 7.76 and 3.86 points. The decrease was also followed by an increase in the self-confidence dimension by 8.21 points. The findings in this study show the importance of continuous mental mindfulness training to improve athlete performance by overcoming competitive state anxiety. This research can also be a reference for practitioners and researchers. MSPE training can be developed as an effort to improve or solve problems related to an athlete's condition.

Keywords: mindfulness, karate athlete, competitive state anxiety.

INTRODUCTION

The competitive environment provides several factors that encourage athletes to show certain performances. This exposes athletes to a variety of intense physical and psychological stressors associated with the demands of competing athletes. An athlete who feels unable to meet the demands of high performance on the field will perceive these demands as a threat. This has the potential to have a negative impact in the form of anxiety that is influenced by internal and external conditions in the field (Liu

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et al., 2021). The existing challenges make the results of sports competitions determined by the athlete's competence to display the best performance in stressful conditions (Ngo et al., 2017).

The negative impact of competitive state anxiety experienced by athletes will affect cognitively, emotionally, and behaviorally. This will reduce the athlete's self-confidence and concentration during the match. This impact is explained in the postulates of distraction theory (Ngo et al., 2017) where various existing stimuli (state anxiety) will block individual attention to task-related information resulting in a decrease in performance. This is also explained in the self-focus theory which explains that pressure will induce individual self-awareness so that the required skill execution occurs. This condition will reduce the automation of athletes' performance skills that have been previously trained (Ngo et al., 2017). The failure of athletes to adapt to demands has the potential to cause mental and health problems, even increasing the athlete's risky behaviour and the desire to resign (Rahayuni, 2019).

Competitive State Anxiety is an emotional condition of an athlete influenced by the interpretation and assessment of the competition environment. This construct consists of 3 aspects: cognitive anxiety, somatic anxiety, and self-confidence (Ie, Ngnoumen, et al., 2014). The first aspect, cognitive anxiety experienced by internal athletes, is caused by negative expectations related to success or negative self-evaluations. This aspect has a negative relationship with athlete performance. The second aspect, somatic anxiety, will affect the athlete's condition through autonomic stimulation and feelings of discomfort. The appearance of nervousness and pressure often characterizes this condition. This aspect has a linear curve relationship with competitive state anxiety in an inverse U shape with competitive conditions. The last aspect, self-confidence, includes the athlete's perception of self-confidence in the face of competition (Liu et al., 2021).

Several studies have found that competition causes high levels of anxiety for athletes. This is indicated by an increase in sCort (salivary

cortisol) and sAA (salivary enzyme alpha-amylase), namely in rock climbing athletes (Draper et al., 2012), taekwondo (Capranica et al., 2017), archery (Lim, 2016).

Researchers developed a mental training called Psychological Skill Training (PST) which includes various processes that focus on controlling emotions and thoughts considered detrimental (Pineau et al., 2014). Unfortunately, this process is often disrupted by the human tendency to think negatively. This condition is a precisely counter-intentional error (Gorgulu, 2019). This error shows that PST has the potential to increase the athlete's negative condition by encouraging athletes to explore the negative experiences experienced (Gorgulu, 2019). The process of exploring experiences adversely affects negative thoughts and feelings that are prominent in consciousness (Chen et al., 2022).

Research conducted by Walter et al., (2019) showed that self-talk could reduce the side effect of competitive state anxiety. The same result also happened in other research, which used imagery (Fekih, et al., 2021), arousal regulation through relaxation (Elliott, et al., 2014), and goal setting as interventions. Mindfulness is considered another mental training besides PST that include some practice which as meditation and yoga (Bergomi, et al., 2015).

Mindfulness is considered a viable alternative approach to preparing athletes for optimal performance. This preparation is done by training the athlete to focus on the goal in the present moment and without judging the experience (Kaufman et al., 2018). In addition, mindfulness practice can change negative emotions into positive emotions, peace of mind, and relaxation (Mutahir et al., 2017). This happens through paying attention to what it is, acceptance of experience, disconnection, and clarity about the internals of one's life (le, Ngnouen, et al., 2014).

Research conducted by Mehrosafar et al. (2019) found increased self-confidence after mindfulness training in wushu athletes. This helps the athlete experience sensations such as nervousness and thoughts such as subjective distress. This finding is in line with research by Thompson et al.

(2011) who found that mindfulness interventions can increase the confidence of golf and archery athletes. In addition, the training carried out reduces competitive state anxiety both cognitively and somatically. In addition, mindfulness can also improve an athlete's stress management ability through self-regulation during competition so that athletes can simultaneously regulate responses to physical and mental stimuli.

Regular mindfulness training and programs such as mindfulness-acceptance-commitment (MAC) can increase athletes' well-being, resilience, athletic coping skills, and mindfulness. These conditions increase athletes' ability to overcome competitive state anxiety (Bagheri & Dana, 2021; Campbell, 2021; Mohebi, dkk, 2022; Robinson & Cedenblad, 2019; Vidic & Cherup, 2022). In addition, this training can reduce competitive state anxiety (Dana, et al., 2022). The same condition also happens in combative athlete such as Kung Fu, Karate, and Taekwondo (Trujillo-Torrealva & Bossio, 2017).

MSPE has a more beneficial potential related to the mental readiness of athletes to support performance on the field. This is because athletes are trained to develop awareness and acceptance of the present moment without having to scan for negative experiences (Pineau et al., 2014). Furthermore, the increased performance of athletes after receiving mindfulness interventions shows a positive impact on making it easier for athletes to be in the flow zone. A good flow balance combines action with awareness with intrinsic satisfaction (Chen & Meggs, 2021). This indicates that the athlete's flow zone will affect the resulting performance. Therefore, mindfulness interventions are interesting to study because the intervention is given so that athletes can better deal with an experience.

MSPE positively impacts athletes involved in individual sports, specific skills, and objective assessments. This is because these athletes require significant mental focus and good motor skills. Athletes who practice MSPE can more easily be in the flow zone because athletes can more clearly evaluate the performance they are doing. This shows that MSPE

affects the flow conditions of athletes related to the zone and peak performance of athletes ([Haase et al., 2016](#)).

Mindfulness interventions reduce distractions by increasing calm in mind and body by increasing self-awareness regarding a person's physical and psychological condition. This can stop the domino effect of negative things by working non-judgmentally on awareness and actively embracing all experiences related to thoughts, feelings, and bodily sensations. For example, good mindfulness makes athletes not have to wait to feel confident, be in a feeling, or feel sufficient readiness to perform optimally ([Baltzell & Akhtar, 2014](#)).

Preliminary studies conducted reveal some of the benefits of mindfulness for athletes. One of them is to make it easier for athletes to process muscle memory, feeling, and cognition. In addition, these benefits will prevent athletes from being on autopilot by increasing attention, affection, and behaviour according to the conditions ([Kaufman et al., 2018](#)).

Referring to the description above, this research on how the impact can be given from the implementation of the MSPE is important. Especially considering the fact on the ground that there are still many athletes who have difficulty managing their anxiety when facing a match. Therefore, the scheme for reducing competitive state anxiety in this study is described in the following chart:

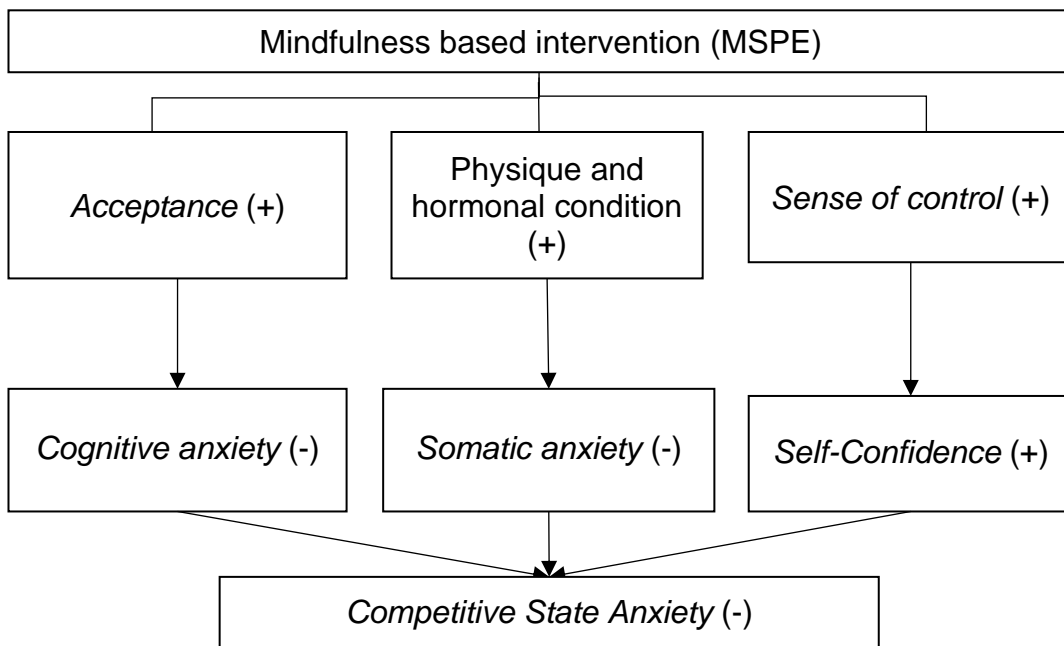


Figure 1. Competitive state anxiety reducing scheme

Researchers have proved the benefit of MSPE training to help the athletes get into the zone or flow. Therefore, an athlete who has the peak performance in the zone or flow can overcome the competitive anxiety. This condition is confirmed in running, archer, golf, athletic, and swimming athletes (Chen & Meggs, 2021; de Petrillo, et al., 2009; Minkler, et al., 2021; Thompson, et al., 2011). On the other side, there is now research that analyses the implementation of MSPE to overcome the competitive state anxiety of Karate athletes.

METHOD

This research is an experimental quantitative type with a one-group pretest-posttest design. The design is described in the following table:

Table 1. Experimental design

Pre-test	MSPE training	Post-test
O _a	X	O _b

Information:

X = Provision of MSPE training intervention

O_a = Pretest experimental group

O_b = Posttest experimental group

Pre-test data were obtained from athletes selected as research samples 1 hour before competing in a competition. Pretest data were collected before the athlete competed in Jombang Open Karate 2021 on 25-28 November 2021. One week after the Jombang Open 2021, those athletes are given the MSPE training by the trainer for six weeks. The MSPE training is held in each dojo once a week. The post-test data were collected after the athletes completed the training. The post-test data collection was held right before the athletes competed in Kasal Cup on 2-4 February 2022. In addition, this data is also collected at regional level competitions, namely the 2021 Jombang Open and the 2022 Kasal Cup.

The research sample was selected by ensuring the distribution of sex with a ratio of 50:50. This means that the number of male and female athletes involved is balanced. This aims to avoid type S error in the experiment. In addition, the selected athletes are also sought to be in the same age range. Furthermore, the selected research sample is a karate athlete with experience competing in competitions with a minimum level at the regional level. Furthermore, the sex distribution of the research sample was selected with a balanced amount. The selected athlete then received the MSPE intervention.

The MSPE intervention was carried out in each dojo according to the agreed schedule. The intervention was carried out before the regular practice hours were carried out. This aims to minimize the possibility of type G error due to the potential for interference from other individuals who were not included in the study.

The MSPE training intervention was given by a trainer from APMOI (Association of Indonesian Mental Sports Trainers), namely Rahardyana Puruhita, S.Psi. He is a sports mental coach who joined the organization in 2016. In addition, he has also been a member of the psychology team of KONI East Java since the same year. In this study, the researcher also acts as an assistant who helps with the administration and smoothness of the given intervention. The researcher helps the athlete do the practice correctly while the trainer gives the instructions.

Population and Sample

The population in this study are athletes who live in Surabaya and have become karate athletes. The sample in this study was selected using a quota sampling technique which is part of the non-probability sampling. This technique is widely used in psychological research when the population can be clearly defined and accessed by researchers [Howitt and Cramer, \(2014\)](#).

The number of samples was calculated by a priori power analysis using the G*Power application version 3.1.9.7 ([Faul et al., 2007](#)). Research related to mindfulness interventions in athletes conducted by Scott-Hamilton et al., 2016 showed that the predictor of mindfulness had an effect of $d = 0.61$ (statistical power .80 and alpha .05). The results of the study's effect size are used as the basis for determining the minimum number of samples. Based on these findings, the minimum number of samples in this study was 24 athletes (power statistic .80 and alpha .05).

Data Collection

This study uses a non-test technique using a scale. The scale in this study uses a Likert scale that adopts the Revised Competitive State Anxiety Inventory-2 (CSAI-2R) questionnaire proposed by [Cox et al. \(2003\)](#). The scale was chosen based on the similarity of the dimensions studied.

The process of adopting measuring instruments through the CVI process to determine the validity of the overall scale content ([Yusoff, 2019](#)). CVI was carried out with three experts getting some notes from the instruments that had been made. Then, notes from experts were used to adapt the instrument. The notes are contained in the appendix section.

The next process is to calculate the value that the expert has given. The results of the calculation of the results of the S-CVI calculation found the following results:

Table 2. S-CVI calculation

Item	Number of Agreement	I-CVI
1	3	1
2	3	1
3	3	1
4	3	1
5	3	1
6	3	1
8	3	1
9	3	1
10	3	1
11	3	1
12	3	1
13	3	1
14	3	1
15	3	1
16	3	1
17	3	1
	S-CVI	1
	Total Agreement	17
	S-CVI/UA	1

Calculation of validity with these data was carried out during the try-out on the population not recruited in the research group. The data obtained were as follows:

Table 3. Pearson validity test

	Validity
ITEM_01	.002
ITEM_02	.008
ITEM_03	.016
ITEM_04	.005
ITEM_05	.004
ITEM_06	.000
ITEM_07	.000
ITEM_08	.010
ITEM_09	.001
ITEM_10	.000
ITEM_11	.000
ITEM_12	.001
ITEM_13	.000
ITEM_14	.000
ITEM_15	.000
ITEM_16	.022
ITEM_17	.000

Based on these data, it can be concluded that all items in the instrument are considered valid. All items have a significance level below 0.05 (Arikunto, 2014).

The scale's reliability is also described in the findings of Cox et al. (2003). is .83 on cognitive anxiety, .88 on somatic anxiety, and 0.91 on self-confidence. This value shows very strong reliability in all three dimensions (Arikunto, 2014).

The research was held on INKAI and Shiroite Dojo in Surabaya. Fourteen athletes from each dojo were recruited for this research, meaning that 28 athletes contributed as participants in this research. Pretest data were collected before the athlete competes in Jombang Open Karate 2021 on 25-28 November 2021.

One week after the Jombang Open 2021, the trainer gave the athletes six weeks of MSPE training. The MSPE training is held in each dojo once a week, which means the athletes had trained six times before the posttest data was collected. The post-test data were collected after the athletes completed the training. The post-test data collection was held right before the athletes competed in Kasal Cup on 2-4 February 2022.

Data analyze

The data obtained were first analyzed through assumption testing to ensure that the data were parametric through the level of homogeneity, the level of intervals and ratios of the data, and the data were normally distributed. The data was then analyzed using the Paired sample t-test to compare the mean of one group before and after the intervention in the experiment (Harrison et al., 2021). The data tested in this study were the posttest results of the research and control samples. The analysis process is carried out using the SPSS (Statistical Product and Service Solution) version 26 application.

RESULT

The process of collecting and analyzing that has been carried out shows the following data:

Table 4. Age distribution of research participants

Age	Total	Percent (%)
13	12	43%
14	11	39%
15	4	14%
16	1	4%

Based on the data attached in table 4, it can be concluded that the research subjects were dominated by individuals aged 13 years, as many

as 12 people (43%), and only one person aged 16 years (4%). In addition, the subjects were in the same age range, namely teenagers.

Table 5. Competitive state anxiety level category

Category	Pre-Test	Percent (%)	Post-Test	Percent (%)
Low	8	28.6	10	35.7
Middle	12	42.9	12	42.9
High	8	28.6	6	21.4

Findings in the field indicate that the level of competitive state anxiety of research subjects is mostly at a moderate level. This frequency persisted in both pre and post-test. There was an increase in the frequency of the low category from 8 people to 10 people. On the other hand, there was a decrease in the frequency in the high category, from 8 people to 6 people.

Normality test

The results of the normality test are described in table 6

Table 6. Normality test result

Kolmogorov-Smirnov

Variable	Stats	Sig.
Competitive State Anxiety	.112	.200

The normality test results using the Kolmogorov-Smirnov test showed that the data were normally distributed. This is indicated by the results of a significance of $0.2 > 0.05$. Therefore, it can be concluded that the data obtained is parametric. Then the data can then be analyzed using the paired t-test.

Change of means among dimensions

The dynamics of the competitive state anxiety condition of research subjects reviewed based on each dimension are described in table 7.

Table 7. Change of means among CSAI-2R dimensions

Dimensions	Pre	Post	difference
Cognitive Anxiety	25.86	16.86	3.86
Somatic Anxiety	24.13	16.38	7.76
Self-confidence	26	34.21	8.21

There was an average decrease in cognitive and somatic dimensions. For example, a decrease of 3.86 points on the cognitive dimension started from a score of 25.86 to 16.86. Meanwhile, the decrease of 7.76 points that occurred in the somatic dimension started from a score

of 24.13 to 16.38. On the other hand, there was an average increase of 8.21 points in the self-confidence dimension, from 26 to 34.21.

Hypothesis test result

The results of hypothesis testing are reflected in table 8.

Table 8. T-test result

Dimensions	t	Sig. (2-tailed)
Cognitive Anxiety	28.38	.000
Somatic Anxiety	15.83	.000
Self-confidence	-16.89	.000

The results of the paired t-test showed a significant result of 0.00 on all dimensions. This indicates a significant difference between the pre-test and post-test. The mean value indicates an average decrease of 9.00 on the cognitive anxiety dimension. The same thing happened to the somatic anxiety dimension of 7.76. On the other hand, the average increase occurred in the self-confidence dimension, which was 8.22.

DISCUSSION

The results of the MSPE training that have been given are my estimates where the mindfulness exercise has a negative effect on the athlete's competitive state anxiety. This is reflected in the results of the t-test with a significance of 0.00 so that it can be concluded that H0 is rejected. This result is followed by the mean score, which indicates a decrease in cognitive and somatic anxiety accompanied by increased self-confidence in the study sample.

This finding is in line with the literature review by [Khoury et al. \(2015\)](#) who showed that mindfulness-based training (MBI) had a positive impact on reducing symptoms of stress and anxiety in a population of healthy individuals and individuals with clinical disorders. In addition, the physical and psychological benefits of practising mindfulness have been documented in both clinical ([Khoury et al., 2015](#)) and non-clinical ([Khoury et al., 2015](#)) and non-clinical ([Demarzo et al., 2015](#); [Khoury et al., 2015](#)) populations.

Changes followed significant differences in the pre-test and post-test results in the mean of each dimension of competitive state anxiety. These dimensions include cognitive anxiety, somatic anxiety, and self-confidence.

In the pre-test score, the cognitive anxiety dimension on the instrument of the participants showed a mean score of 25.85. Changes in the score that occurred in this dimension were 3.86 points, so the post-test score on this dimension changed to 16.86. This is possible because increased mindfulness moderates changes in individual responses to emotional experiences and cognitions (Scott-Hamilton et al., 2016). The decrease in score on this dimension is in contrast to the increase that occurs in the self-confidence dimension. This is in line with the findings of Cox et al. (2003) where the two dimensions have a negative relationship. This is explained in the pre-test score of the self-confidence dimension of 26 points, which has increased by 8.21 points to 34.21.

Birrer et al. (2012) assume that mindfulness interventions change behaviour by helping individuals deal with cognitive and emotional processes. Mindfulness interventions lead a person to be open to negative thoughts, resulting in positive coping with negative conditions in various conditions and everyday life. Individuals trapped in negative expectations tend to have difficulty concentrating attention on signals relevant to the stimulus in the field. Mindfulness exercises oriented toward training acceptance of stimuli will lead individuals to effective stimulus control strategies. This helps the athlete to remain open-minded and non-judgmental in every condition experienced (Goodman et al., 2014).

On the other hand, there is a dimension of somatic anxiety whose increase will be accompanied by an increase in performance to a certain point. In other words, there is a certain threshold where somatic anxiety will harm athletes by placing them at risk of decreased performance. MSPE, which includes training sessions that involve body movements, helps athletes recognize various body sensations in yoga movements, walking, and sports exercises. This reduced somatic anxiety by 7.76 points or from a pre-test score of 24.13 to 16.38. This phenomenon is in line with previous

research, which describes that mindfulness practice is also associated with athlete activity that affects a person's physiological response ([Sanada et al., 2016](#)).

The implementation of the 6-week MSPE training intervention is in line with [Kaufman et al. \(2019\)](#) which found that a sustained mindfulness intervention with a duration of more than four weeks would have a more significant impact on the personal development of athletes. Investigations carried out show that mindfulness training will provide optimal results if it lasts between 5 weeks to 8 weeks ([Khoury et al., 2013](#)).

The limitation of this study is that the sample used in this research was only from the same type of sport, namely karate, accompanied by an age group that tends to be uniform. In addition, this study did not measure changes in psychological variables of mindfulness and anxiety such as acceptance, concentration, focus, competitive trait anxiety, and so on that occurred after each MSPE intervention session was completed. Therefore, further research needs to develop a more diverse target population accompanied by more detailed measurements of changes in psychological variables in each training session. Measurements carried out in each session will show more detailed data regarding changes in the condition of psychological variables, as already mentioned.

This study was limited to conducting different tests on athletes' anxiety scores before and after the intervention, so it could not explore previous somatic anxiety findings, which were formulated in the inverted-U form ([Kaufman et al., 2018](#)). However, measurements in each given training session are useful for examining changes that occur using repeated-measures ANOVA. This is so that the findings in the field can be studied further regarding the effect of each different training theme for each session on changes in psychological variables in athletes.

Future research is expected to continue to apply similar mindfulness interventions on an ongoing basis. This is because continuous training with a duration of 4-8 weeks has been shown to impact better athlete development ([Kaufman et al., 2019](#); [Khoury et al., 2013](#)). In addition, [Zhang](#)

et al. (2016) found that a person's level of mindfulness will decrease little by little after the training program is completed. So it can be assumed that mindfulness practice depends on participants' persistence and attachment to the intervention received. This assumption is in line with the finding that an individual's state of mindfulness is related to the level of practice continuation and not to the accumulation of practice in one year (Bergomi et al., 2015).

CONCLUSION

Based on the research that has been done, it can be concluded that Mindfulness Sports Performance Enhancement (MSPE) training can reduce competitive state anxiety in athletes. Furthermore, the findings of this study also indicate that mindfulness practice can play an important role for athletes. This is illustrated by a decrease in cognitive and somatic anxiety dimensions accompanied by an increase in self-confidence.

For trainers, these findings can provide insight into the importance of mental training. These exercises need to be done side by side with physical exercise. This condition will prepare athletes to be optimal physically and mentally when facing matches. In addition, these findings are also a reference for developing coordination with various parties in dealing with problems experienced by athletes.

On the other hand, this research can also be a reference for practitioners and researchers. MSPE training can be developed as an effort to improve or solve problems related to an athlete's condition.

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