

Differences in Anxiety Levels between Shooters practicing Mindfulness vs Shooters not practicing Mindfulness: A Comparative Study

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Abstract: This comparative study aims to investigate the anxiety levels between shooters who practice mindfulness and those who do not. A sample of 20 shooters was chosen, where each group had 10 athletes in it. A mixed-method design was chosen as it helped in integrating quantitative assessments with qualitative assessments to obtain a rich understanding of anxiety levels. To measure levels of anxiety, Competitive State Anxiety Inventory – II, developed by Martens et al., in 1990 was used as the primary quantitative measure to check levels of cognitive anxiety, somatic anxiety and self-confidence levels. Qualitative assessments were carried out through interviews and thematic analysis was identified, which related to Physiological Responses, Body Language, Emotional Regulation and Resilience. Quantitative results were analysed through the Mann-Whitney U Test, which revealed statistical significant differences between Cognitive Anxiety ($p = .002$), Somatic Anxiety ($p = .002$) and Levels of Self-Confidence ($p = .001$). Athletes who practiced Mindfulness showed significantly reduced levels of cognitive anxiety and somatic state anxiety, though they did show significantly higher levels of self-confidence. Qualitative analysis showed that Mindfulness practicing shooters had reduced levels of anxiety in competition, a relaxed and assertive body posture, a sense of control over their match and were more resilient than shooters who did not practice mindfulness. The study concluded that mindfulness techniques played a role in reducing anxiety levels of shooters. Having a small sample size and a lack of control over external/extraneous variables, some limitations were noted and mentioned in the study. Alongside, a lack of inclusion of physiological measures was also one of the limitations that was noted. More of the limitations are discussed in the following article.

Keywords- Anxiety, Mindfulness, Shooting Sport, CSAI-2.

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I. Introduction

Anxiety is a widely known phenomenon, often experienced by athletes during their tournaments and competitions. To define anxiety, the American Psychological Association (2018) has simply put it “as an emotion characterized by apprehension and somatic symptoms of tension in which an individual anticipates impending danger, catastrophe, or misfortune. The body often mobilizes itself to meet the perceived threat: Muscles become tense, breathing is faster, and the heart beats more rapidly. Anxiety may be distinguished from fear both conceptually and physiologically, although the two terms are often used interchangeably. Anxiety is considered a future-oriented, long-acting response broadly focused on a diffuse threat, whereas fear is an appropriate, present-oriented, and short-lived response to a clearly identifiable and specific threat” (APA, 2018). Competitive rifle shooting is a sport that requires high precision and stability. Anxiety, however, in excess, reduces the sport performance of the body when it is manifested physically (Parnaba, V. et al., 2015). Anxiety plays a huge role in a sport with precision like shooting. A study by M Mon-López et al. (2022) concluded that any anxiety that is induced before competition increases the time taken to shoot, thus impairing sport performance.

Anxiety can manifest in an athlete in 2 ways, as mentioned in the questionnaire- the first one, Cognitive State Anxiety (CSA) and Somatic State Anxiety (SSA). The psychologist who made CSAI 2, Rainer Martens defined cognitive anxiety as “the mental component of anxiety and is caused by negative expectations about success or by negative self-evaluation” (Martens et al., 1990). Newer studies have had more refined definitions, such as this definition from Mercader-Rubio's study in 2023: “cognitive anxiety is a state in which the subject has distressing and negative thoughts that significantly affect performance and attention” (Mercader-Rubio et al., 2023). Whereas, Somatic Anxiety defined by Rainer Martens in his theory, is “a state in which the subject's thoughts and sensations are manifested at the body level, for example, in difficult breathing, palpitations, sweating, etc.” A modern definition by Mercader-Rubio of somatic state anxiety was “a state in which the subject's thoughts and sensations are manifested at the body level, for example, in difficult breathing, palpitations, sweating, etc.”

“Mindfulness is a factor that enhances athletes' ability to cope with high sport pressure and the healthy management of competition (e.g., fear of failure), or with their daily life” (Sánchez et al., 2023). Mindfulness

requires focus and reduces anxiety, which then further leads to improved athletic performance and the ability to get into the state of flow. “Assist with recovery: Mindfulness supports emotional and psychological aspects of injury recovery, helping athletes keep a positive and proactive mindset” (Kaitlin, 2022).

Rationale of the study-

Competitive Rifle Shooting is a very precision-based sport focusing on emotional stability, fine motor coordination and has been studied with the effects of performance anxiety (Mon-López, Tejero-González, & Calero, 2022). Studies conducted in recent times have shown that mindfulness can improve and maintain physiological regulation and at the same time, enhance execution under pressure (Tang, Hölzel, & Posner, 2015). However, despite growing evidence, research that examines mindfulness/anxiety and shooting sport has been limited in context to Indian Shooting Athletes. To close the gap, the present study is using a mixed-method design that combines CSAI-2 scores with semi-structured interviews and observational analysis. This research aims to better understand how mindfulness relates to emotional regulation, anxiety experience and resilience in competitive shooters.

II. Review of Literature

Scott (2024) examined how time pressure affects anxiety and shooting accuracy during basketball performance. This study aims to measure the impact of cognitive and somatic anxiety on performance, hypothesizing that time pressure would increase anxiety and decrease shooting accuracy, with self-confidence acting as a protective factor. Ten players from a high school boys' basketball team participated in three trials: no pressure, a ten-second countdown, and a three-second countdown using the CSAI 2. The results showed that time pressure did not significantly induce anxiety in the players, and there were no differences in shooting performance across the trials. However, self-confidence was positively correlated with shooting accuracy, suggesting that players with higher self-confidence performed better despite the potential for anxiety and pressure. These findings show that self-confidence may mitigate the effects of anxiety and pressure on performance.

Wan Pa et al. (2024) studied a quantitative cross-sectional method to investigate the effect of pre-competition anxiety on the accuracy of forehand (FH) and backhand (BH) tennis shots among Malaysian varsity players. Using the Competitive State Anxiety Inventory-2 (CSAI-2) and performance measures for shot accuracy, data were collected from 60 participants selected through convenience sampling. Descriptive results indicated high levels of both cognitive and somatic anxiety and low self-confidence 24 hours before competition. Through inferential analysis using simple

linear regression, it was revealed that pre-competition anxiety significantly impacted shot accuracy, accounting for 10.1% of the performance variance. The findings suggest that elevated anxiety levels before competition detrimentally affect precision in tennis shots, thus highlighting the need for psychological strategies like meditation, self-talk, imagery, and sports massage to manage anxiety and enhance performance.

Yu et al. (2024) investigated the effects of a 7-week mindfulness training program on competitive state anxiety in Chinese sprinters, given growing concerns over psychological challenges in elite sprinting. A total of 24 sprinters ($Mage = 22.46 \pm 1.351$) participated in a 2×3 mixed design study, with mindfulness vs. control as the between-subject variable and test time (pre-, mid-, and post-test) as the within-subject variable. The mindfulness group engaged in weekly 60-minute sessions over 7 weeks, while the control group received only routine psychological guidance. Outcome measures included the Five-Facet Mindfulness Questionnaire (FFMQ) and the Competitive State Anxiety Scale. Results indicated no significant pre-test differences between groups; however, significant improvements were observed in the mindfulness group in both competition anxiety ($p = 0.03$ for time, $p = 0.004$ for group, $p = 0.009$ for interaction) and mindfulness levels ($p = 0.027$ and 0.028 for group and interaction effects, respectively). Mindfulness training significantly reduced both somatic and cognitive state anxiety and enhanced state self-efficacy. The findings suggest mindfulness as an effective psychological intervention for managing competition-related anxiety in elite sprinters.

Xiao, J., Liu, X., Sun, J., and Zhang, T. (2023) conducted research to study the effects of interference training and mindfulness training on the shooting performance and mental state of pistol shooting enthusiasts. The study aimed to evaluate which intervention could better support athletes' performance enhancement under competitive conditions. Fifty-seven shooting athletes were divided equally into three groups: an Interference Training Group, a Mindfulness Training Group, and a Control Group. Participants' shooting performance, mindfulness levels, and competitive anxiety were assessed using the Five-Facet Mindfulness Questionnaire and the Competitive State Anxiety Inventory-2 across six time points. The results indicated that both interference training and mindfulness training significantly improved participants' motor performance and mental state, while the control group also demonstrated some improvements. Performance gains from interference training were rapid but plateaued quickly, whereas improvements following mindfulness training were more gradual and sustained.

Mat Salleh, F. N., et al. (2023) compared the psychophysiological characteristics and shooting

performance between intermediate and elite compound archers. The study included 20 archers aged 13–21 who were divided into intermediate and elite groups. Participants' competitive anxiety, arousal, heart rate, and blood oxygen levels were measured using the revised Competitive State Anxiety Inventory-2 (CSAI-2R), Polar heart rate monitors, and a pulse oximeter. The results revealed that elite archers showed a pattern of lower cognitive anxiety, somatic anxiety, heart rate, and blood oxygen levels during shooting compared to the intermediate group. While no significant differences in cognitive anxiety, somatic anxiety, self-confidence, or heart rate were observed between groups, elite archers exhibited significantly higher shooting performance and self-confidence. Additionally, self-confidence had a stronger correlation with shooting performance in the elite group. The study concluded that elite archers, with better shooting scores, showed lower psychophysiological stress markers and higher self-confidence.

Panurushtanon, P. (2023) explored the effects of self-talk skills training on anxiety and shooting performance in Korfball players. The study involved 40 players, randomly selected based on their Korfball shooting test scores, who were divided into an experimental group ($n = 20$) and a control group ($n = 20$). The experimental group received eight weeks of self-talk skills training alongside regular Korfball training, while the control group received only Korfball training. Anxiety and self-confidence were measured using the Revised Competitive State Anxiety Inventory-2. The results indicated that the experimental group experienced a significant increase in self-confidence and a reduction in both physical and mental anxiety compared to the control group. The experimental group showed improved Korfball shooting performance, suggesting that self-talk skills training had a positive effect on reducing anxiety and enhancing shooting accuracy. This study highlights the potential benefits of psychological skills training in improving both the mental state and physical performance of athletes.

Mon-López, D. et al. (2022) conducted research to study the effects of competitive anxiety on female sport pistol shooters during qualification and final rounds. As Olympic shooting is a precision sport influenced by both physical and psychological factors, the study explored how anxiety levels impact performance outcomes. The study involved 23 female shooters, including 5 elite athletes, who competed at a national Spanish Olympic shooting championship. Participants completed a socio-demographic questionnaire and the Competitive State Anxiety Inventory-2 (CSAI-2) shortly before each competition round. Shooting performance was objectively measured using electronic targets. The results indicated that pre-competition anxiety impaired

shooting performance and increased trigger time. Among finalist shooters, physical condition was found to be inversely related to somatic anxiety and positively related to self-confidence. These findings suggest that anxiety modifies critical technical skills, such as trigger control, and highlight the importance of physical conditioning in enhancing psychological resilience and overall performance.

Lu, J. et al. (2022) conducted research to study the impact of pre-competition sleep quality on the mood and performance of elite air-rifle shooters. Acknowledging the critical role of psychological and physiological factors in precision sports, their study aimed to understand how sleep patterns influence emotional states and athletic outcomes during competitions. The study involved 23 elite shooters, with an average age of 23.11 years, who were monitored using actigraphy measures such as Total Sleep Time (TST), Sleep Efficiency (SE), Sleep Latency (SL), and Wake After Sleep Onset (WASO). Sleep quality was further assessed using the Pittsburgh Sleep Quality Index (PSQI) and the Profile of Mood States (POMS), while mood states were evaluated through the Competitive State Anxiety Inventory-2 (CSAI-2). Results showed that poor sleep quality before competition was associated with increased tension, fatigue, depression, and emotional disturbance, and lower energy levels among athletes. Moreover, PSQI scores positively correlated with cognitive and somatic anxiety, and negatively correlated with energy and self-confidence levels. However, despite these psychological effects, no significant direct relationship was found between sleep indices and shooting performance during the competition.

Mat Salleh, F. N., et al. (2020) aimed to determine optimal zones of heart rate, anxiety intensity, and arousal for archery performance among Malaysian elite developmental archers. Nineteen archers aged almost 15 years were monitored over three months, with heart rate, anxiety, arousal, and performance tracked across routine training and competitions. The study used the revised Competitive State Anxiety Inventory-2 (CSAI-2R) and Polar heart rate monitors to assess the psychological and physiological parameters. Results showed that better shooting performance was associated with lower heart rate, lower arousal, higher self-confidence, and higher cognitive and somatic anxiety. Cluster analysis revealed two profiles: one with low heart rate and high performance, and another with high heart rate and low performance. Significant differences were found in cognitive and somatic anxiety between the groups.

Kaur et al. (2019) aimed to analyze the effect of anxiety on the performance of archers, with a specific focus on exploring the relationship between trait and state anxiety. The study included 80 archers (34 female, 42.5%; 46 males, 57.5%) who consented to participate. The

Competitive State Anxiety Inventory-2 (CSAI-2) and the State-Trait Anxiety Scale were employed to measure state and trait anxiety, respectively, while archers' performance was assessed using FITA round scores. The results revealed a significant negative correlation between trait anxiety and the somatic component of state anxiety with archery performance ($p < 0.01$). A positive correlation was found among anxiety parameters themselves. Additionally, age was positively associated with improved performance, and the confidence component of state anxiety demonstrated a significant positive correlation with archery scores.

BV, G., Boucher, J., & As, C. (2017) conducted a study to measure the effect of competitive anxiety components and mindfulness on the performance of a 3000m race among endurance athletes. A group of 20 runners (10 women, 10 men) from the University of Quebec at Montreal participated in the recruitment race for the cross-country team. Before the warm-up, participants completed the Competitive State Anxiety Inventory (CSAI-2R) and the Five Facets Mindfulness Questionnaire (FFMQ). The runners were equipped with a bio monitor to measure heart rate, respiratory rate, and speed during the race. The results showed a significant positive correlation between self-esteem scores (CSAI-2R) and mindfulness scores (FFMQ), as well as between mindfulness factors and competitive anxiety. Furthermore, the number of years of running experience positively correlated with self-confidence and negatively with emotional non-responsiveness. The number of hours spent running each week was negatively correlated with competitive anxiety. These findings suggest a connection between competition anxiety and mindfulness, indicating that mindfulness could serve as a valuable intervention to modify psychological factors before, during, and after competitive events.

Rupasinghe, W. et al. (2015) investigated the relationship between Competitive State Anxiety (CSA) and shooting accuracy among Gampaha district school-level netball shooters. The study involved 30 netball players (ages 14–18), who were randomly selected from the Zonal Netball Tournaments. Competitive State Anxiety was measured using the Competitive State Anxiety Inventory-II, with participants completing the questionnaire 30 minutes before the competition. The findings revealed that self-confidence had a moderate positive correlation with shooting accuracy ($r = 0.393$), while somatic anxiety had a weak positive correlation ($r = 0.193$), and cognitive anxiety had a weak negative correlation ($r = -0.183$) with shooting accuracy. These results suggest that while self-confidence positively influences shooting performance, the role of anxiety in performance is more complex and may differ for somatic and cognitive components.

III. Method

Research Design: The research design employed in this study was a Mixed Method Convergent Parallel Research design. It was chosen because data was collected right before the athletes' competition and post-competition interviews might change the responses of the athletes. A mixed-method design was used to give a more holistic perspective, as it would combine both the characteristics of quantitative and qualitative methods. A mixed-method design would help in understanding the subjective feelings of athletes rather than focusing solely on the objective quantitative analysis. It also helps in providing a deeper and clearer understanding of how mindfulness impacts the anxiety levels of shooters.

Participants: The sample taken for this study was 20. Each group had 10 participants in it. The shooters were aged between 16 and 24 and were playing in the Selection Trials 1&2 that took place in Delhi. These shooters had reached a minimum level of qualification score in nationals to participate in this competition. The sampling technique used in this study was Purposive; the shooters were selected by the researcher themselves based on availability.

Instruments: Quantitative- The Competitive State Anxiety Inventory-2 (CSAI-2 – Martens et al., 1990) was used in this study. It is a 27-item questionnaire developed by Martens et al. (1990), which assesses cognitive anxiety, somatic anxiety, and self-confidence in a competitive sports setting. The scale uses a 4-point Likert scale (1="Not at all", 4="Very much so") for each item.

The CSAI-2 and CSAI-2R have demonstrated good internal consistency, with items within each subscale measuring the same construct.

- Test-retest reliability has been generally acceptable, indicating stability of scores over time.
- Pre-competition and post-practice trials of CSAI-2 show high reliability across repeated measures.
- Cronbach's alpha values range from 0.61 to 0.93 across different studies and subscales.
- CSAI-2 is widely considered valid for measuring cognitive anxiety, somatic anxiety, and self-confidence.
- Some studies have questioned the factorial validity of the original CSAI-2, especially the cognitive anxiety subscale.
- Confirmatory factor analysis (CFA) of the original CSAI-2 often yields poor fit indices, suggesting the proposed factor structure may be flawed.
- Studies report high convergent validity (e.g., $r \approx 0.72$) with related measures of anxiety and performance.
- CSAI-2R, the revised version, addresses factorial issues and generally shows improved psychometric properties.

- CSAI-2R has been validated in multiple contexts (Brazilian, Indonesian, web-based), supporting cross-cultural reliability and validity.
- The reduced item version (15–16 items) maintains reliability while improving factorial fit and ease of administration.

Scoring: Directly taken from the Questionnaire “To score the CSAI-2, take the scores for each item at face value except item 14, where you 'reverse' the score. For example, if you circled 3, count that as 2 points. When totaling your rankings, you will arrive at the following three scores: _____ Cognitive State Anxiety: (Sum of items 1, 4, 7, 10, 13, 16, 19, 22, & 25) _____ Somatic State Anxiety: (Sum of items 2, 5, 8, 11, 14, 17, 20, 23, & 26) _____ Self-Confidence: (Sum of items 3, 6, 9, 12, 15, 18, 21, 24, & 27) Your scores for each will range from 9 to 36: 9 indicating low state anxiety and 36 indicated high state anxiety.”

Qualitative Analysis: A semi-structured interview was conducted based on themes that would be best suited for anxiety and mindfulness. An open-ended and a semi-structured interview gave the researcher balance between consistencies among the participants and gave the researcher flexibility to explore additional insights that were different from a quantitative measure (Kallio et al., 2016). Themes such as Resilience were taken into consideration, as mindfulness has shown considerable improvements in resilience levels (Jadhav, 2025). A study by Qi (2025) confirms that mindfulness practices has been linked to improved resilience.

Data Triangulation: Data Triangulation was incorporated by utilizing many data sources. The main method for triangulation was Data Source Triangulation. Quantitative scores from CSAI 2 were analyzed alongside the responses from the interviews and researcher field observations were collected during data collection. This helped in reducing mono method bias and improved interpretative credibility. This approach also ensured that athletes' subjective experiences were contextualized within their behavioral indicators and psychometric outcomes.

Reflexivity Statement: Reflexivity was maintained throughout the research process. The researcher's familiarity with competitive shooting was acknowledged as potential influence on interpretation. To reduce bias, the bracketing method was employed to reduce any influences on the qualitative responses. Notes were made alongside the interviews to cross-check the respondents' responses with themselves to ensure that the researcher's interpretation aligned with the respondents' responses.

Data Coding and Thematic Analysis: Data interpreted using the inductive thematic approach. The responses were read multiple times to familiarize with the data and open coding was initiated in this process. Codes were

then compared, refined and grouped to establish broader conceptual categories. Coding reliability was ensured through iterative review and cross-checking with the notes made from the interviews. This process transformed the raw data into empirically grounded thematic codes.

IV. Results

Result Table 1- Ranks and Medians

Domain	Condition	N	M. Rank	S.O. Rank	Median
Cognitive Anxiety	Practicing	10	6.2	62	14.5
	Not Practicing	10	14.8	148	25.5
Somatic Anxiety	Practicing	10	6	60	14
	Not Practicing	10	15	150	20
Self Confidence	Practicing	10	14.6	146	26
	Not Practicing	10	6.4	64	19

Three variables, Cognitive Anxiety, Somatic Anxiety, and Self-confidence, were analysed. The sample was divided into 2 groups. Shooters who practiced mindfulness and Shooters who did not practice mindfulness.

In the domain of Cognitive Anxiety, the mean rank for shooters practicing mindfulness was calculated to be 6.2 and shooters who did not practice mindfulness had a mean rank of 14.8. The sum of ranks was calculated to be 62 for the group of mindfulness-practicing athletes and 148 for shooters who didn't practice mindfulness. In the domain of Somatic Anxiety, the mean rank for shooters practicing mindfulness was calculated to be 6 and shooters who did not practice mindfulness had a mean rank of 15. The sum of ranks was calculated to be 60 for the group of mindfulness-practicing athletes and 150 for shooters who didn't practice mindfulness.

In the domain of Cognitive Anxiety, the mean rank for shooters practicing mindfulness was calculated to be 14.6, and shooters who did not practice mindfulness had a mean rank of 6.4. The sum of ranks was calculated to be 146 for the group of mindfulness-practicing athletes and 64 for shooters who didn't practice mindfulness.

Result Table 2- Mann-Whitney Test Statistics

Conditions	Cognitive Anxiety	Somatic Anxiety	Self Confidence
Mann-Whitney U	7	5	9
Wilcoxon W	62	60	64
Z score	-3.263	-3.435	-3.111
Asymp. Sig. (2-Tailed)	.001	.001	.002

Note: For Cognitive Anxiety, the scores for Mann-Whitney U were calculated to be 7 with a Z score of – 3.263. The p-values, denoted by Asymptotic Significance (2-Tailed), were calculated as 0.001. This indicates that the mindfulness practicing shooters had lower levels of Cognitive Anxiety than the shooters not practicing mindfulness. This implies that mindfulness leads to lower levels of negative thought patterns and worry.

For Somatic Anxiety, the Mann-Whitney U score was calculated to be 5 with a Z score of –3.435. The p-values, denoted by Asymptotic Significance (2 Tailed), were calculated as 0.001. This also indicates that the mindfulness-practicing shooters had lower levels of Somatic Anxiety than the shooters who do not practice mindfulness. This implies that shooters who practice mindfulness experience lower levels of physical anxiety, such as muscle tension, increased heart rate, bodily discomfort, etc.

For self-confidence, the scores for Mann-Whitney U were calculated to be 9 with a Z score of -3.111. The p-values, denoted by Asymptotic Significance (2 Tailed), were calculated as 0.002. This indicates that the mindfulness-practicing shooters had higher levels of self-confidence than the shooters who were not practicing mindfulness. This suggests that mindfulness practice may lead to greater perception of confidence.

Qualitative Analysis- Key themes were employed through reading previous research related to shooting, mindfulness and anxiety. Themes that were identified are mentioned in the following table-

Result Table 3

Theme	Mindfulness	Non-Mindfulness
Emotional Regulation	Calmness/Emotional Stability	Heightened Anxiety/Emotional Dysregulation
Nonverbal Behavior	Confident Body Posture	Physical Insecurity
Physiological Responses Under Stress	Controlled Physiological Arousal	Dysregulated Physiological Arousal
Resilience Under Stress	Adaptive Resilience	Reduced Resilience

Theme 1- Emotional Regulation

Athletes who practiced mindfulness displayed a greater sense of emotional stability and calmness during high pressure situations. In contrast to mindfulness-practicing athletes, shooters who did not practice mindfulness reported difficulty in controlling negative thoughts and experienced heightened anxiety in competitive situations.

Theme 2- Nonverbal Behavior

Athletes who practiced mindfulness displayed an assertive and confident body posture with relaxed

shoulders, consistent eye contact, etc. Shooters who did not practice mindfulness displayed fidgeting behaviors, reduced eye contact, restlessness and behaviors of avoidance.

Theme 3- Physiological Responses Under Stress

Athletes who practiced mindfulness reported awareness and control over their heart rate and grip strength with their Air Weapon. They also reported that they rarely experienced muscle tension. Shooters who did not practice mindfulness had minimal to low control over their heart rates under stressful competitive situations. They also experienced pain/numbness in their hand after they completed a match.

Theme 4- Resilience Under Pressure

Shooters practicing mindfulness showed greater abilities to recover from mistakes and refocus, whereas shooters who did not practice mindfulness reported a lack of ability to bounce back from mistakes and to return to their optimal levels of performance.

V. Discussion

This research aimed to study the difference in anxiety levels between shooters who practice mindfulness and those who do not. A mixed-method approach was used in the study, where CSAI II was used for quantitative analysis and Interviews were used for qualitative analysis.

The results revealed that the difference in the means of anxiety levels between shooters practicing mindfulness and shooters not practicing mindfulness was significant. In the domain of Cognitive State Anxiety, the median score of the non-mindfulness group was 25.5, and scores of the Mindfulness group were 14.5, which implies that there is a significant difference between the 2 groups. The Mann-Whitney U value is 7 and the value of Asymp. Sig. (2-tailed) shows us that 0.001 is a value that indicates a significant statistical difference ($p > 0.05$). This implies that this research aligns with the previous studies done by other researchers such as Xiao, J. et Al. (2023), which reported that intervals and mindfulness training decreased the anxiety levels of shooters during practice and competitions.

In the domain of Somatic State Anxiety, the median score came out to be 20 for the Non-Mindfulness Group and 14 for the Mindfulness group. This indicates that there are statistically significant differences. The Mann-Whitney U test value was calculated to be 5. The sig (2-tailed) value came out to be 0.001, which implies that there are statistical differences in the 2 groups ($p > 0.05$). The same study, mentioned in the domain of Cognitive State Anxiety (Xiao et al., 2023) emphasized how mindfulness can affect somatic anxiety and how it demonstrated significant differences. The results of this study align with the findings of the mentioned study.

In the domain of Self Confidence, the median score came out to be 19 for the non-mindfulness group and 26 for the Mindfulness group, which denotes significant differences between the 2 groups. The U value was calculated to be 9. The Sig. (2-tailed) value of 0.002, which indicates a significant statistical difference ($p > 0.05$), Mat Salleh et al. (2023) study showed that elite archers who practiced deep breathing exhibited significantly higher shooting performance and self-confidence, which aligns with the findings of this study. Interviews were also held to know more about the difference in the athletes' anxiety levels during competitions, and certain themes were chosen to determine if there were any differences. A total of 10 interviews were conducted with each group. i.e., mindfulness practicing shooters and non-mindfulness shooters had 5 responses each. Certain themes, such as their Emotional Regulation, Non-Verbal Behavior, Physiological Responses, and Resilience under Stress.

The first theme highlights the differences between adaptive emotional regulation and emotional dysregulation. Athletes in the mindfulness group consistently reported that they were feeling calmer than usual and had control over their thoughts during a competition. Their responses reflected an increased capacity to refocus on the task at hand, which also aligns with previous research stating that mindfulness enhances emotional stability under pressure (Baltzell & Akhtar, 2014). The shooters who did not practice mindfulness reported feelings of heightened anxiety, overthinking, and difficulty in managing negative thoughts. Eysenck and Wilson (2012) conducted a study which had similar results, stating that anxiety reduces encouraging self-talk and disrupts attentional focus. These results are supported by quantitative findings, which means that mindfulness is helpful in increasing an individual's emotional regulation.

The second theme captures the differences in the shooters' nonverbal behavior. No interview was conducted to measure the nonverbal behavior of the athletes; rather, plain observation was used, and notes were made on their nonverbal behavior. The athletes who performed mindfulness looked relaxed and had a confident body posture. They maintained eye contact with the researcher and displayed minimal fidgeting behavior. In Contrast, the shooters who did not practice mindfulness exhibited very tense nonverbal behavior and kept fidgeting with their hands a lot. It was difficult for them to maintain eye contact with the researcher while they were being interviewed. Shooters also had tensed shoulders and were pacing around the room a lot. These patterns are reflected in Martens et al.'s (1990) book, where it is mentioned that anxiety can manifest itself in the body as muscle tension. This theme is also backed by the quantitative scores, which showed that somatic

anxiety was high in shooters who did not practice mindfulness. This behavioral distinction also suggests that mindfulness may not only influence subjective emotional experiences but also translate into objective improvements in shooting, like body composure and confidence.

The third theme reveals how athletes manage physiological arousal during competition. The shooters who practiced mindfulness stated that they felt in control of their physiological arousal and were able to manipulate their heart rate levels if it was too high. They also reported that they did not feel any muscle tension/pain or numbness after the match. They mentioned that they employed many breathing techniques that helped them calm their heart rate in an intense situation. This aligns with previous evidence, which suggests that mindfulness improves the ability to recover from a stress-induced arousal (Tang et al., 2015). Conversely, shooters who did not practice mindfulness exhibited feelings of grip tightness and palm numbness after competitions. They also reported that they were not in control of their heart rate levels. Shooters mentioned that it became difficult for them to stabilize their weapon to shoot at their optimal performance levels. These experiences are consistent with the somatic dimension of anxiety and are mentioned in previous studies, such as Ren et al. (2022), which suggested that anxiety increased physiological arousal in athletes. These qualitative findings correlate with the quantitative findings, where the mindfulness group displayed lower levels of somatic anxiety. These findings suggest that mindfulness plays a role in improving physiological control and keeping performance at optimal levels under pressure.

The fourth theme explained the difference in the levels of resilience between shooters who practiced mindfulness and those who did not. Shooters from the mindfulness group reported that it was easy for them to bounce back to their optimal performance if their performance was not up to the level. They reported that it was easier for them to detach from their negative thoughts and refocus on the competition at hand. This aligns with previous research, which states that mindfulness helps in improving cognitive flexibility and reduces emotional reactivity (Joseffson et al., 2017). In contrast, shooters who did not practice mindfulness exhibited difficulty in returning to optimal performance after errors. They exhibited an inability to rebound after setbacks, which could hamper performance levels, especially in a precision sport like shooting. This theme also triangulates with the scores of the self-confidence domain of CSAI 2 in the quantitative measure. Shooters who practiced mindfulness had increased scores of self-confidence. This explains that mindfulness plays a huge role in lowering the levels of anxiety of shooters.

VI. Conclusion

The current study aimed to compare anxiety levels between shooters practicing mindfulness and those who don't practice mindfulness. The findings suggest that there is a significant difference present between the 2 groups that have been assessed, meaning that the group practicing mindfulness has less amount of cognitive state anxiety ($p = .001$), somatic state anxiety ($p = .001$), compared to the group not practicing mindfulness, with a significance level of .002 ($p > 0.05$). Additionally, qualitative analysis was conducted through the form of interviews, which were highlighted on 4 themes- Emotional Regulation, Nonverbal Behavior, Physiological Responses, and Resilience Under Stress. The findings suggest the importance of mindfulness practices, which decreased anxiety levels, improved body language, improved control over physiological arousal and also improved resilience levels under stress.

VII. Limitations

1. The sample size for this research was small, which could restrict the generalizability of the results to broader shooting athletes.
2. The research relied on self-report measures, which included responses in the CSAI 2 questionnaire, which may be influenced by social desirability bias/subjective interpretation.
3. The research design was cross-sectional rather than longitudinal, which means that causality cannot be established. The differences in anxiety levels were only focused on mindfulness and not on other factors like years of training, personality traits, prior mental skills training, etc.
4. The observation analysis was done when interviews were being conducted, rather than observing shooters in their competitive zone, which did not measure their responses during genuine high stress situations.
5. Thematic analysis was conducted systematically, but it still might reflect the researcher's bias. To address this, triangulation and reflexivity statements were employed but for improvements, inter-rater coding, and multiple analyst triangulations should be employed.

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