The Effect of Pre-Competition Anxiety on Tennis Accuracy Shot Performance Among Malaysian Varsity Tennis Players

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ABSTRACT

Athletes with high levels of anxiety may take wrong actions and cause athletes to not be able to perform well. Specifically, when pre-competition anxiety problems occur, this situation can affect the accuracy of the shots in tennis. Therefore, this study identifies the effect of pre-competition anxiety on tennis forehand (FH) and backhand (BH) accuracy shots among Malaysian varsity tennis players. This study uses quantitative cross-sectional survey research. This research used the Competitive State Anxiety Inventory (CSAI-2) questionnaire and the tennis forehand (FH) and backhand (BH) accuracy shot instrument to survey 60 respondents utilizing a convenient sampling technique. The descriptive data showed high cognitive and physical anxiety and low self-confidence 24 hours before the competition. Researchers used the Statistical Package for the Social Sciences (SPSS) software, version 25, to perform inferential statistical analysis related to the Simple Linear Regression Test and concluded that pre-competition anxiety had a significant impact on tennis forehand (FH) and backhand (BH) accuracy shots, accounting for 10.1% of the variance. These findings imply that an excessive level of pre-competition anxiety has a significant negative impact on tennis forehand (FH) and backhand (BH) accuracy shots. The conclusion is that pre-competition anxiety poses a significant threat to the accuracy of tennis forehand (FH) and backhand (BH) accuracy shot performance. Solutions are desperately needed, such as meditation, self-talk,

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imagery, and sports massage intervention, which may control pre-competition anxiety and subsequently accurately perform tennis forehand (FH) and backhand (BH) shots.

Keywords: Accuracy, anxiety, pre-competition, tennis, varsity

INTRODUCTION

The impact of pre-competition anxiety on players' performance necessitates a comprehensive examination of psychological factors to facilitate effective adaptation and good responses (Kerketta, 2015). Pre-competition anxiety is a common experience among tennis players, and it can have both positive and negative effects on motivation (Juspah et al., 2023; Marih et al., 2023). By adopting effective strategies to manage anxiety and channel it into a positive competitive drive, players can enhance their motivation and perform at their best on the tennis court. Pre-competition anxiety is a serious stumbling block for players (Jastari et al., 2023). Even if a person is a professional athlete, he or she is not exempted from pre-competition anxiety difficulties (Saadan et al., 2015). Cognitive anxiety, physical anxiety, and self-problems are the three primary components of pre-competition anxiety (Saadan et al., 2016). With the advent of science, particularly psychological areas, anxiety issues have become an important aspect of mental health experts based on empirical data and scientific traditions (Misran et al., 2021).

In sports performance, it has been said that Malaysian athletes emerged as the overall champions at the 2017 Southeast Asian Games, securing 145 gold, 92 silver, and 86 bronze medals (Bernama, 2017). This claim is based on evaluating Malaysia's athletic accomplishments throughout the preceding five-year period. Nevertheless, amid the fervor, the national tennis athletes secured just a bronze medal out of the five categories contested at the 2017 Games. It raises a significant concern among researchers regarding the disparity in accomplishments between tennis players and gold medalists from the 2001 SEA Games. Based on a report by Buletin Utama (2018), it is noted that the most recent instance of a national tennis player winning a gold medal at the Southeast Asian Games occurred in 2001. Selvam Veerasingam, a former national tennis player, accomplished this noteworthy achievement. Paradoxically, despite a significant allocation of government financing towards the development of national sports, no tennis player has achieved the feat of securing a gold medal at the Southeast Asian (SEA) Games, even after the passage of 16 years. Additionally, according to statistical reports from the Association of Tennis Professionals (ATP) and Women's Tennis Associations (WTA) for 2019, no tennis players from this country have ranked among the world's top 100 tennis players. It has a significant impact on tennis practitioners and associations in Malaysia. As a result, stakeholders in the Malaysian tennis industry must find a solution to ensure that Malaysian tennis can one day compete on a global level.

Tennis players who struggle with anxiousness have a tough time making good strokes (Mullen & Hardy, 2000). The combination of ball speed and accuracy is critical in determining the quality of tennis shot techniques (Landlinger et al., 2012; Vergauwen et al., 2004). Two tennis abilities must be mastered: forehand (FH) and backhand (BH) shots to be a competent tennis player (Mavvidis et al., 2010). Muhamad et al. (2011) stated that even tennis players with competitive status struggle to grasp forehand (FH) and backhand (BH) shot techniques. As a result, researchers chose to focus on technical ability in tennis, specifically the ability to execute accurate forehand (FH) and backhand (BH) shots among Malaysian university tennis players.

The second distinction is that the effects of pre-competition anxiety on forehand (FH) and backhand (BH) shot accuracy continue to receive little attention, as previous research has focused on the relationship between pre-competition anxiety and emotions, self-confidence, cortisol hormone changes, and heart rate in athletes from a variety of sports (Ayuso-Moreno et al., 2020; Carolina-Paludo et al., 2020; Mojtahedi et al., 2023; Kang & Jang, 2018; Yang et al., 2020). Thus, researchers are greatly motivated to investigate the influence of pre-competition anxiety on the capacity of university-level tennis players in Malaysia to perform forehand (FH) and backhand (BH) shot accuracy. Therefore, this research aims to identify levels of pre-competition anxiety among university tennis players and to determine the effect of pre-competition

anxiety on the ability to perform forehand (FH) and backhand (BH) shot accuracy among university tennis players. Hence, the null hypothesis was created to provide an initial anticipation because there was limited evidence of pre-competition anxiety in tennis, specifically among Malaysian Varsity tennis players. The null hypothesis was that pre-competition anxiety does not have a significant impact on the ability to perform forehand (FH) as well as backhand (BH) shot accuracy among university tennis players.

Tennis has been identified as a fast, powerful, and extremely dynamic sport (Fernández-Fernández et al., 2014; Roetert & Kovacs, 2019). However, surveys indicate that the impact of pre-competition anxiety on forehand (FH) and backhand (BH) stroke accuracy continues to attract less attention than service shot accuracy (Landlinger et al., 2012). Accurate forehand (FH) and backhand (BH) shots are the most critical aspects that can provide an edge over performance and enable tennis players to reach a higher level of competition (Kibler, 2009). Additionally, tennis shots are classified as extremely complicated motor abilities that need the generating of force and the capacity to transfer that force throughout the body, referred to as kinetic chains (Kibler, 2014). Thus, academics have focused on gaining an additional understanding of pre-competition anxiety about the accuracy of forehand (FH) and backhand (BH) shots.

Additionally, previous researchers have indicated that pre-competition anxiety

as a 'threat' to players is more likely to arise in individual sports than in team sports (Judge et al., 2016; Sutarsyah, 2017). Although anxiousness is typically connected with an unpleasant taste and is seen negatively, some players have demonstrated a positive response and have increased their performance quality (Doron & Martinent, 2016). Players have the opportunity to compare themselves to competitors prior to the competition, as all players warm up in the same pre-competition area. If players believe they can win, such beliefs can help them perform better and control their fear (Uphill et al., 2019). On the other side, if players examine a scenario and determine that they may be unable to manage a particular stressor, this is classed as an indication of anxiety affecting athletic performance. Players react ineffectively in these situations, which has a detrimental effect on their psychological abilities, muscles, and even capabilities.

Three elements of pre-competition anxiety are explained by the Multidimensional Anxiety Theory: cognitive anxiety, physical anxiety, and performance self-confidence. Cognitive anxiety, in particular, is a mental component generated by the dread of poor self-esteem and self-esteem threats (Jarvis, 2002; Martinent et al., 2010). On the other hand, somatic anxiety is associated with the physiological features of mood anxiety that are intimately connected with physiological awakening. Increased heart rate, respiration rate, sweaty hands, abdominal discomfort, and muscle tension are all physiological responses (Cox, 1998). By contrast, self-confidence refers to a person's trust in his or her ability to overcome the difficulties inherent in the task at hand (Martens et al., 1990). Martens et al. (1990) identified three distinct types of graphs that must be understood (Woodman & Hardy, 2003). Specifically, it is hypothesized that cognitive worry has a negative linear connection with performance. In comparison, somatic anxiety is expected to have a quadratic association (U-inverted) with performance, whereas self-confidence has a positive straight-line relationship.

According to A. Kumar (2017), pre-competition anxiety refers to uncomfortable or destructive awakenings experienced the day before the competition begins. Pre-competition anxiety must be thoroughly investigated to determine the best solution or method. Additionally, this effort is necessary since players' anxiety levels can affect their performance in the tournaments they compete in (Mojtahedi et al., 2023). Athan and Sampson (2013) stated that players are frequently overcome with pre-competition anxiety prior to competing in a tournament. It results from physical difficulties, fear of defeat, feelings of inadequacy, loss of control, and guilt. However, some findings indicate that players' cognitive anxiety, somatic anxiety, and self-confidence are not significantly different (Şekeroğlu, 2019).

Numerous scholars have already investigated the relationship between time changes and anxiety using a time-to-competition perspective. According to Spielberger (2021), pre-competition anxiety is a state of mind that players

endure for a week, several hours, and a few minutes before the competition begins. Pre-competition anxiety, for instance, can be measured across three months (John et al., 2011), 30 days (Souza et al., 2019), seven days (Radzi et al., 2018), two days (Turksoy et al., 2012), one day (Saadan et al., 2015), and one hour (Muñoz et al., 2017). Other scholars performing research on a variety of sports have also reported adopting a similar approach (Carolina-Paludo et al., 2020; Mahadevan & Halankar, 2021; Mohebi et al., 2019; Şekeroğlu, 2019). According to Saadan et al. (2015), players often experience pre-competition anxiety within the 24 hours preceding the start of the tournament.
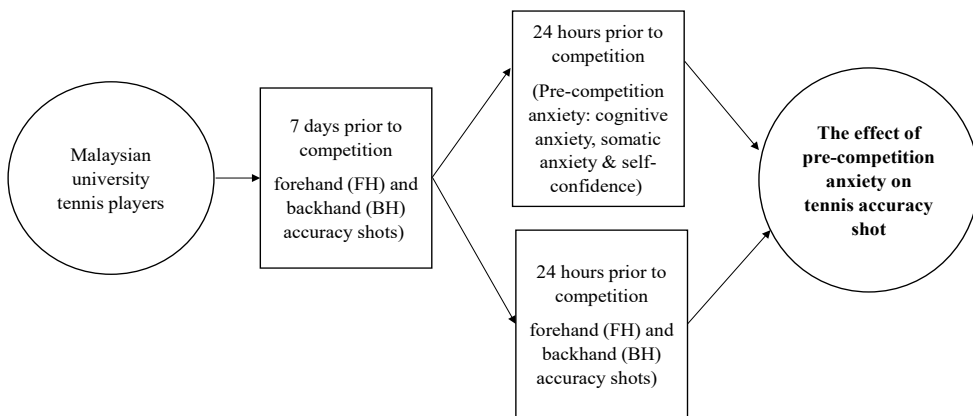
Conceptual Framework

Figure 1. Conceptual framework
Source: Authors' work

The conceptual framework is a generative framework that encapsulates the research process in its essence (Adom et al., 2018). The conceptual framework depicted in Figure 1 was created for each study's processes and the underlying variables used to review the new search results. The study concept is derived from the researchers' reading of the literature.

METHODOLOGY

The researchers used a cross-sectional survey design combined with quantitative methods and a convenient sampling technique. This study surveyed 60 respondents, who were Malaysian university tennis players. All these respondents were selected from 4 public universities around the Klang Valley. Data collection on pre-competition anxiety was carried out 24 hours before the Universiti Malaysia Sports Council (MASUM) Tennis Tournament. Meanwhile, data collection on the accuracy of forehand (FH) and backhand (BH) shots was done in two sessions, seven days before and one day before the competition. Data collection on the accuracy of forehand (FH) and

backhand (BH) shots performed twice is to obtain baseline data in the first session. The researcher wants to see a change from the baseline data in the second session. To ensure that the ethics of the study are complied with, the researcher has made a letter of application together with a letter of acknowledgment of data collection to the coaches and the tournament organizers. Later, the researcher also provided consent and ethics acknowledgment forms to the respondents to be directly involved in this study. Among the data collection processes implemented are identifying study respondents, obtaining the organizer's permission and the respondent's certificate and quoting data.

The Statistical Package for the Social Sciences (SPSS) version 25 was used for data entry and analysis. A simple descriptive analysis was conducted using numbers and percentages. To discover the evidence of pre-competition anxiety on tennis accuracy shot performance, simple linear regression was implemented as a test of significance, with a threshold of less than 0.05 considered significant.

Instruments

A self-administered questionnaire known as The Competitive State Anxiety Inventory-2 (CSAI-2), developed by Martens et al. (1990), was adopted in this research and distributed to the respondents. The instrument has three components, namely cognitive anxiety, somatic anxiety, and self-confidence. Each component contained 9 question items, and the total items were

27 questions. The order of the items in this questionnaire was arranged randomly. The items for the cognitive anxiety component were 1, 4, 7, 10, 13, 16, 19, 22, and 25. The items for the somatic anxiety component were 2, 5, 8, 11, 14, 17, 20, 23, and 26. The items for the self-confidence component are 3, 6, 9, 12, 15, 18, 21, 24 and 27. All items have a Likert scale of 1 to 4, from strongly disagree to strongly agree. All items (27) underwent pilot testing, and Cronbach's Alpha results showed that the reliability value of each item was 0.65 and above. According to Chua (2014), the value of Cronbach's Alpha coefficient should be between 0.65 and 0.95, which is high and satisfactory.

Instruments for testing the accuracy of forehand (FH) and backhand (BH) shots were adapted from Wiebe (1980) as cited in Mavvidis et al. (2010) with a validity value of $r = 0.71$ and the reliability value was > 0.88. The equipment required to conduct forehand (FH) and backhand (BH) shot accuracy tests are tennis courts, tennis nets, tennis balls, tennis rackets, measuring tapes, masking tape, and cone markers. The diameter of each zone is 1.4 meters long X 1.8 meters wide. The tennis courts (no man's land area) were divided into several zones for forehand (FH) and backhand (BH) shot evaluation.

During the assessment, the tennis player stands on the baseline and hits the ball sent by the coach from the baseline on the opposite side of the court. Each player aims a shot in a specific direction from the opposite side of the court to get the highest

score. For each test, each player is only allowed to perform ten (10) forehand shots (FH) and ten (10) backhand shots (BH). Each successful shot was rated from 0 to 9 points, based on where the tennis ball landed after being hit. If the ball is stuck in the net or does not land in the specified area, the points scored are 0.

If the player fails to hit at the start of the attempt, the shot is considered a failure or rated 0. However, the player can make a repeat shot if the tennis ball gets stuck in the net (the white part) and passes the opposite court. Test scores were assessed based on the number of points accumulated after ten times of forehand shot (FH) and ten times of backhand shot (BH).
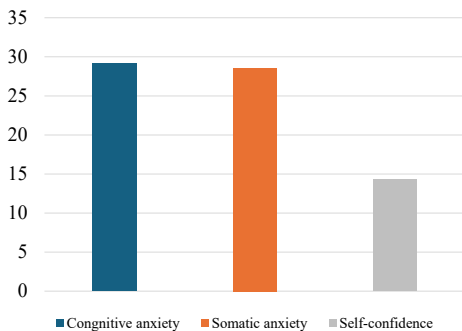
RESULTS AND DISCUSSION

Sixty university tennis players completed the study questionnaire; 40 (66.7 %) were male tennis players, and 20 (33.3%) were female tennis players. The range of years of experience in training and competing in tennis was less than five years: 15%, 5 to 10 years: 36.7%, 10 to 15 years: 38.3%, and more than 15 years: 10%. Descriptive analysis was performed to answer the first research questions.

Figure 2 shows the level of pre-competition anxiety (mean): cognitive anxiety (29.15) and somatic anxiety (28.57) are high, while self-confidence (14.30) is low 24 hours before the competition begins.
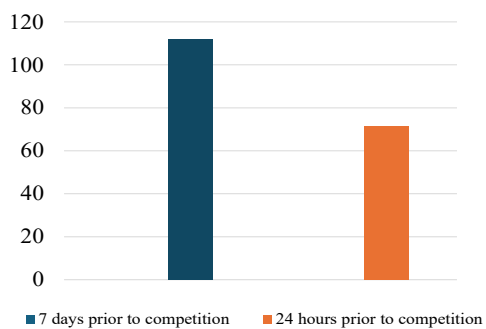

Figure 2. Pre-competition anxiety of Malaysian university tennis players

Source: Authors' work

Figure 3. Tennis forehand (FH) and backhand (BH) accuracy shot

Source: Authors' work

Based on Figure 3, the graph shows the level of the tennis forehand (FH) and backhand (BH) shot accuracy among Malaysian university tennis players (mean) decreased from 111.98 to 71.50 in seven days.

As shown in Table 1, the Simple Linear Regression yielded a significant value of $p = 0.013$ ($P < 0.05$). In conclusion, these findings indicate that the null hypothesis (Ho1) was rejected; pre-competition anxiety had significantly contributed to tennis forehand (FH) and backhand (BH) accuracy shot performance. Therefore, the researchers referred to the Coefficients and R^2 value test to determine how pre-competition

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Table 1

Simple linear regression test of the impact of pre-competition anxiety on tennis forehand (FH) and backhand (BH) accuracy shot

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.515	1	1.515	6.514	0.013
	Residual	13.485	58	0.233		
	Total	**15.000**	**59**			

Source: Authors' work

anxiety use affects the tennis forehand (FH) and backhand (BH) accuracy shot among Malaysian university tennis players.

As presented in Table 2, the Coefficients test showed that the correlation between the dependent and predictor variables was $R = 0.318$. Linear Regression Analysis was found to be significant [$F_{(1,59)} = 6.514$, $p = 0.013$ ($P < 0.05$)], and R^2 equivalent to 0.101 showed that 10.1% of the change in the dependent variable of tennis forehand (FH) and backhand (BH) accuracy shot was due pre-competition anxiety. Thus, the researchers concluded that pre-competition anxiety significantly impacted tennis forehand (FH) and backhand (BH) accuracy by 10.1%. It can decrease

tennis shot accuracy performance, self-efficacy and motivation among Malaysian university tennis players. These findings suggest that pre-competition anxiety has a significant negative effect on tennis forehand (FH) and backhand (BH) accuracy shots, and solutions, such as self-talk, imagery, progressive muscle relaxation and sports massage, are urgently needed to overcome it. Interventions that can assist Malaysian university tennis player to regulate and lessen their pre-competition anxiety are also critically needed.

The present study's findings significantly contribute to the Multidimensional Theory of Anxiety by demonstrating a clear, quantifiable effect of pre-competition

Table 2

Coefficients test

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R	R^2	Percentage (%)
		B	Std. Error	Beta					
1	*(predictor)*	74.756	1.277		58.530	0.001			
	Pre-competition anxiety	0.045	0.180	0.318	2.552	0.013	0.318	0.101	10.1

Note. Predictor: Pre-competition anxiety; Dependent variable: tennis forehand (FH) and backhand (BH) accuracy shot

Source: Authors' work

anxiety on the performance of tennis shots, specifically forehand (FH) and backhand (BH) accuracy. Our results, indicating that pre-competition anxiety accounted for 10.1% of the variance in shot accuracy, underscore the theory's assertion that cognitive and somatic anxiety can detrimentally affect athletic performance (G. Jones, 2000; Martinez & Scott, 2021).

In practice, managing pre-competition anxiety becomes paramount for coaches and sports psychologists working with varsity tennis players. Implementing targeted interventions, such as sports massage (Pa et al., 2021), cognitive-behavioral strategies (Liu et al., 2022) and mindfulness-based stress reduction (MBSR) techniques (B. J. Jones et al., 2020), could mitigate anxiety's negative impact. Adopting personalized anxiety management programs, as suggested by Patel and Smith (2024), can further refine athletes' preparatory routines to enhance performance.

This investigation markedly enhances our comprehension of the Multidimensional Theory of Anxiety by elucidating the quantifiable influence of pre-competition anxiety on the accuracy of tennis shots. It corroborates that cognitive and somatic anxieties detrimentally impact performance, accentuating the necessity for customized anxiety management interventions for athletes. Future studies should tackle existing limitations, such as the dependence on self-reported anxiety metrics and a restricted participant demographic, by integrating more objective measures and expanding the participant base to bolster

generalizability and thoroughly examine causality.

CONCLUSION

The present study investigated the relationship between pre-competition anxiety and performance accuracy in forehand and backhand tennis shots among university tennis players in Malaysia. Our findings reveal that both cognitive and somatic anxiety are significantly elevated 24 hours before competition, correlating strongly with a reduction in shot accuracy. This research not only supports but also quantifies the impact of pre-competition anxiety as outlined in the Multidimensional Theory of Anxiety, showing a tangible decrease in performance of 10.1% in shot accuracy.

Significantly, the study underscores the inverse relationship between self-confidence and anxiety levels, highlighting an area ripe for intervention. The decrease in tennis shot accuracy over a period leading up to competition suggests that anxiety management should be a focal point in athletic preparation, particularly in the context of university-level sports where athletes may be more susceptible to psychological pressures.

The practical implications of this study are profound. For coaches and sports psychologists, there is a clear mandate to develop and implement strategies that can help reduce anxiety levels in athletes. Such strategies could include psychological training focusing on anxiety management techniques, confidence-building exercises,

and possibly incorporating relaxation practices into the pre-competition routines. These interventions can not only enhance performance but also contribute to the overall wellbeing of the athletes.

Furthermore, the study's implications extend to the scheduling and structure of sporting events. Sports organizers and coaches are encouraged to consider the timing of anxiety peaks and structure event schedules that allow athletes adequate time to engage in psychological preparation and relaxation. This approach could help optimize performance and manage athletes' psychological health, which is crucial for their long-term development and success in sports.

In conclusion, the study provides compelling evidence of the critical impact of pre-competition anxiety on performance in sports. It also offers a blueprint for practical interventions that can help mitigate these effects. Future research should explore longitudinal interventions to confirm the effectiveness of these strategies and potentially uncover additional factors that could influence the anxiety-performance relationship in athletes. By continuing to explore these dynamics, athletic performance at all levels can be supported, fostering an environment where athletes can excel psychologically and physically.

Implication of the Study

This study contributes to the existing literature on the Multidimensional Theory of Anxiety by empirically validating the theory's application within a specific athletic context at the university level of tennis. Our findings underscore the theory's assertion that cognitive and somatic anxiety can significantly affect performance (Martens et al., 1990). The high levels of cognitive and somatic anxiety observed in players 24 hours before a competition correlate with a notable decline in shot accuracy, reinforcing the theory's distinction between these anxiety types and their unique impacts on performance. This study extends the theory by quantifying the impact (10.1% decrease in shot accuracy) and highlights the critical need to manage these anxiety types differently to optimize athletic performance.

From a practical standpoint, our results have significant implications for coaches and sports psychologists working with university tennis players. The pronounced decrease in forehand and backhand shot accuracy as a function of pre-competition anxiety suggests that interventions aimed at reducing anxiety levels could be crucial in enhancing performance. Coaches might consider implementing tailored anxiety-reduction workshops or individualized psychological support focusing on cognitive and somatic anxiety management techniques (Weinberg & Gould, 2015).

Furthermore, our study highlights the importance of fostering self-confidence among athletes, which was inversely related to anxiety levels. It could be beneficial to develop routine psychological training sessions that include confidence-building activities. Such sessions could focus on visualization techniques, positive self-talk, and setting achievable performance goals,

which may help mitigate the negative impacts of anxiety (Hanton et al., 2008).

Additionally, given the critical timing of anxiety's impact (24 hours before competition), these findings suggest that timing interventions to specifically address pre-competition anxiety could be key. It might include relaxation techniques such as deep breathing, progressive muscle relaxation, or mindfulness exercises tailored to the athletes' pre-competition routines (Gardner & Moore, 2017).

Finally, this study's implications extend to tournament preparations. Understanding that anxiety peaks close to competition time, organizers and coaches could redesign the scheduling and programming of events to include periods of mental relaxation and preparedness, potentially improving overall performance outcomes.

Limitations and Recommendations for Future Research

While the study provides valuable insights, several limitations must be acknowledged. First, the reliance on self-reported measures of anxiety may introduce bias or inaccuracies in reporting levels of pre-competition anxiety (Hamilton & White, 2022). Secondly, the sample size, limited to Malaysian varsity tennis players, may not fully represent the broader athlete population, potentially affecting the generalizability of the findings (S. Kumar & Lee, 2023). Finally, the study's cross-sectional design precludes the determination of causality between pre-competition anxiety and shot accuracy (Nguyen & Tran, 2023).

Future research should consider longitudinal designs to explore the causal relationships between pre-competition anxiety and tennis performance more comprehensively to build upon the current study's findings (Zhang & Wang, 2024). Expanding the sample to include players from various cultural backgrounds and skill levels could enhance the generalizability of the results (Roberts & Jackson, 2022). Moreover, incorporating objective measures of anxiety, such as physiological indicators, alongside self-reported data could offer a more nuanced understanding of anxiety's impact (Singh & Gupta, 2023). Investigating the efficacy of specific anxiety management interventions in improving tennis shot accuracy would also provide practical guidance for coaches and athletes (Morales & Fernandez, 2023).

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