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RECEIVED 29 February 2024

ACCEPTED 15 May 2024

PUBLISHED 10 June 2024

CITATION

Conde-Ripoll R, Escudero-Tena A and
Bustamante-Sánchez Á (2024) Pre and post-
competitive anxiety and self-confidence and
their relationship with technical-tactical
performance in high-level men's padel players.
Front. Sports Act. Living 6:1393980.
doi: 10.3389/fspor.2024.1393980

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Pre and post-competitive anxiety and self-confidence and their relationship with technical-tactical performance in high-level men's padel players

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Introduction: This study aimed to analyze the variations in pre- and post-competitive anxiety and self-confidence considering match outcomes, the performance according to the result and the correlation among performance and psychological variables.

Methods: The sample consisted on 12 matches in which 11 high-level padel players from Finland (top 24) voluntarily participated. CSAI-2R and STAI-S were used to assess psychological variables and technical-tactical performance was evaluated by a certified padel coach.

Results: Losing players presented higher cognitive ($p = .004$), somatic ($p = .020$) and state ($p = .001$) anxiety and lower selfconfidence ($p = .014$), and winning players showed higher state anxiety ($p = .022$), after than before the matches. Post-match, winning players exhibited higher self-confidence ($p = .015$) than losing players. Winning players made more winners ($p = .010$) than losing players. There are direct correlations between unforced errors and post-state anxiety ($p = .015$), unforced errors and state anxiety ($p = .009$) and winners and cognitive anxiety ($p = .033$), in winning players; between generators of forced error and post-cognitive anxiety ($p = .034$), forced errors and cognitive anxiety in losing players ($p = .001$). There are indirect correlations between forced errors and pre-cognitive anxiety ($p = .009$), winners and somatic anxiety ($p = .046$), unforced errors and state anxiety ($p = .042$) in losing players.

Discussion: The outcomes imply the need for intervention programs to equip players, especially those facing defeat, with tools for anxiety management and self-confidence enhancement. Likewise, coaches are advised to incorporate exercises that promote the occurrence of winners.

KEYWORDS

psychology, match analysis, racket sports, CSAI-2R, STAI-S

Introduction

The sport of padel is witnessing exponential growth worldwide, with participation from more than 80 nations affiliated with the International Padel Federation (1). This expansion has prompted a marked rise in scholarly investigations, particularly focused on assessing technical and tactical performance (2–4).

Mental toughness, as evidenced by its capacity to enable athletes to uphold or enhance performance during challenging circumstances (5), holds a particular significance in the context of sports psychology. Within this domain, anxiety is seen as a concept

characterized by an emotional reaction to a perceived threat, blending physiological arousal and cognitive apprehensions (6). In a competitive scenario, a distinction can be made between a stable personality disposition termed trait anxiety (7), and the transient symptoms encountered during a specific competition, referred to as state anxiety (8). Cognitive anxiety encompasses adverse anticipations of success or self-evaluation, negative thinking, reduced self-worth, pessimistic inner dialogues, fear of failure, diminished self-belief, performance worries, visions of failure, challenges in concentration, and disrupted attention (9–11). Somatic anxiety is linked to autonomic arousal, presented as increased heart rate or muscle tension, contributing to negative sensations like nervousness, breathing difficulties, heightened blood pressure, dry throat, muscle strain, rapid heartbeat, clammy palms, and a sensation of butterflies in the stomach (9, 11, 12). Self-confidence, defined as a player's conviction in his/her ability to perform effectively in competition (13), is a facet studied within this construct to gauge the athlete's comprehensive sense of accomplishment (14).

In this sense, competitive anxiety and self-confidence, specially prior to competition, has been extensively studied in recent decades (15–17). Research has shown that athletes with elevated anxiety levels often demonstrate poorer performance in competitions in comparison to those with lower anxiety levels (18–20). Additionally, there exists a direct correlation between the player's self-confidence and his/her performance in sports (20, 21). Once the competition is over, athletes from different sports such as football, basketball and volleyball show lower levels of competitive anxiety than moments prior to the event (22–24). The same happened to taekwondo athletes, who also showed higher levels of self-confidence at this stage (25). However, to the best of our knowledge, there is only one study, in tennis, which distinguishes winning vs. losing players regarding post-competitive anxiety and self-confidence, with the former showing notably reduced cognitive anxiety and elevated self-confidence compared to the latter (16).

A key performance indicator shaping match results in professional padel is the effectiveness of the ultimate shot (26–28). From these investigations, it has been established that a point in the game can culminate through a winner, a forced error or an unforced error. A winner occurs when a player secures the point directly (i.e., after the ball bounces correctly on the opposing side after crossing the net, the ball bounces for a second time; or the ball strikes the opponent's body before being out). Conversely, a forced error happens when a player loses the points due to difficulty in executing a shot or being poorly positioned following the opponent's shot. Finally, an unforced error arises when a player loses the point despite facing a relatively straightforward situation with favorable space-time conditions (27). Winning pairs commit more winners and less unforced errors than losing pairs (2, 29, 30). Nevertheless, while previous articles dissect each method of concluding the point separately, our research not only does so but also advocates for the adoption of technical-tactical performance ratios. These ratios are advantageous as they remain unaffected by the number of points, games, or sets. Moreover, regarding the court area,

winners are mainly executed from the net area (30) while errors, regardless of the type, are evenly distributed between the net and the back of the court. In absolute terms, overheads and volleys are the primary sources of winners (31), whereas forced errors often result from volleys, and unforced errors mainly arise from volleys and groundstrokes with no wall (26).

Upon reviewing the scientific literature, the combination of mental preparation and performance in padel has received limited attention, with only a few studies exploring precompetitive anxiety and self-confidence (32–34) and none of them studying post-competitive anxiety and self-confidence. Understanding the interplay between a player's anxiety, self-confidence, and performance holds substantial value for players, coaches, and sports psychologists. This insight can enable players to adapt their playing style, while coaches and psychologists can customize feedback and training sessions accordingly. The aims of the present investigation were to analyze: (1) the differences between pre and post-competitive anxiety and self-confidence during matches in high level men's padel players from Finland as a function of the result, (2) the differences between winning and losing players regarding anxiety and self-confidence as a function of the moment (pre or post-match), (3) the technical-tactical performance according to the result and (4) the correlation among technical-tactical performance, anxiety and self-confidence. Therefore, the following hypotheses were put forward: (1) match winning players will show higher levels of self-confidence and lower levels of anxiety in the post-match compared to pre-match; the opposite will happen in the match losing players, (2) before and after the match, respectively, match winning players will display higher levels of self-confidence and lower levels of anxiety than match losing players, (3) match winning players will make more winners and generators of forced errors, and less forced and unforced errors than match losing players, (4) there will be a direct correlation between winners and self-confidence in match winning players, whereas in match losing players, there will be a direct correlation between errors and anxiety, and an indirect correlation between errors and self-confidence.

Material and methods

Study design

The design of this research is framed under an empirical methodology and more specifically it is a study with a descriptive strategy. On one hand, questionnaires are applied (psychological variables) (35) and, on the other hand, matches are observed, the latter being nomothetic, punctual and multidimensional (technical-tactical performance variables) (36).

Sample and participants

We analyzed 12 matches in which 1,514 points were disputed. Following a convenience sampling, these matches were played by a

total of 11 men’s high-level padel players (27.91 (5.03) years old and 4.64 (1.86) years of competitive experience) from Finland who voluntarily participated in the present study. This represents almost 50% of the total target population. An observational study of elite athletes from volleyball included 14 athletes who were in preparation for competing in important events, representing a similar sample size in a similar context (high-level athletes prior to competition) (37). The STROBE flow chart (Figure 1) was used to ensure that the clear assessment of participants (38). All participants were ranked top 24 in Finland. None of the athletes had any physical injuries nor were they taking any medication at the time of the measurements. In addition, none of the participants had any reason that prevented them from participating in the study.

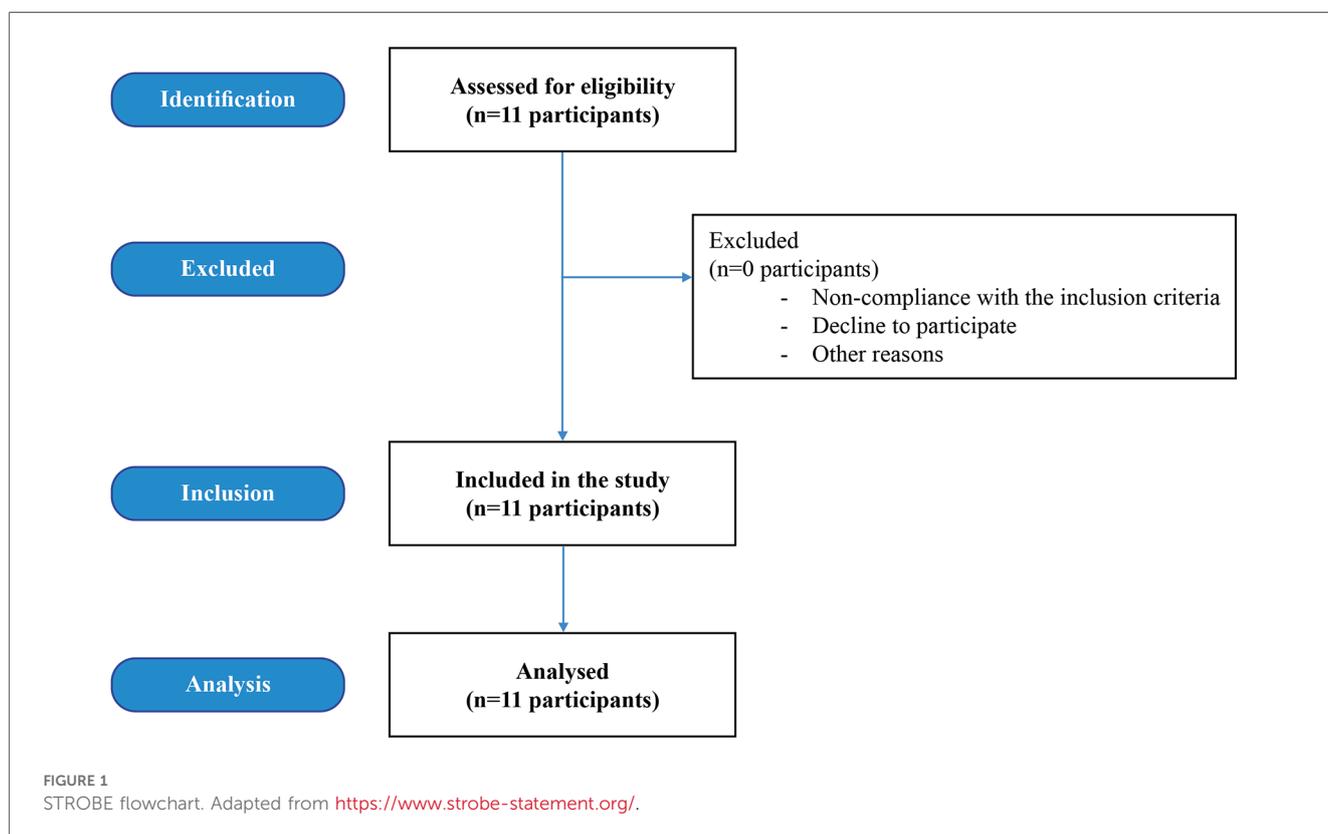
The study was in accordance with the Helsinki Declaration (39). Participants were treated ethically under the American Psychological Association code of ethics regarding consent, anonymity and responses. Previously, the current investigation had been approved by the Ethics Committee of the European University of Madrid with the code CIPI/22.303. So as to respect the principles of voluntariness and confidentiality, each player was required to sign an informed consent form that clearly explained the objectives of the research and their voluntary participation in it.

Study variables

To carry out this study, the following variables were taken into account:

- Psychological variables: somatic anxiety, cognitive anxiety, self-confidence (9, 11, 13) and state anxiety (40). CSAI-2R questionnaire was used to measure somatic and cognitive anxiety and self-confidence of players (41) and STAI-S questionnaire was used to measure their state anxiety (42). These questionnaires have been used in previous research in padel (34). All questionnaires were completed in a quiet room with controlled temperature of 20°C. Participants completed the questionnaires in English, as it is the only language that both researchers and athletes are fluent in. Participants were not allowed to speak during the assessments. In the analysis of the CSAI-2R instrument, Cronbach’s alpha coefficients were obtained, showing reliability scores of .75 (for pre), .72 (for post) for cognitive anxiety, .84 (for pre), .90 (for post) for somatic anxiety, and .72 (for pre), .88 (for post) for self-confidence, all meeting acceptable standards (43–45).
- Technical-tactical performance variables [defined based on their categorical core and degree of openness (46)]:
- Effectiveness of the last shot: a difference was made between winner, forced error and unforced error (27).
- Forced error generator: shot which induces a forced error in the opposing pair (47).

In addition, technical-tactical performance ratios were calculated using the above mentioned technical-tactical performance variables. It is worth noting that the effectiveness of the shots is considered a performance indicator in racket sports (48).



Procedure

The questionnaires were administered to the players between 30 and 45 min prior to the start of each practice match, following the same criteria to that used by Conde-Ripoll et al. (34). 15–30 min after the practice match is over, the questionnaires were administered for post-competitive anxiety and self-confidence.

During each practice match, which followed the International Padel Federation rules, a certified padel coach with more than 10 years of experience, recorded the technical-tactical performance study variables through an ad-hoc instrument in Excel, following similar criteria than previous research (49, 50). At the end of the collection process, an intra-observer reliability analysis was performed to ensure the veracity of the data collected. The observer reanalyzed a random sample of 3 matches (matches were previously recorded) to ensure enough relevant data to represent 10%–20% of the study sample (51). The mean intra-observer reliability was .90, considered almost perfect (52). In addition, another observer, a doctor in sports sciences, with more than 20 JCR scientific articles published related to the topic of study, also analyzed a random sample of 3 matches to calculate the average inter-observer reliability, which was .84 (52).

Statistical analysis

Shapiro-Wilk (considering $n = 11$ athletes) and a Kolmogorov-Smirnov (considering $n = 1,514$ points) tests were used to test the normality of the distribution of the data and it indicated that it is non-parametric. Then, a descriptive analysis was performed to obtain information on the number of times each study variable occurred (median and interquartile range).

Next, inferential analyzes were then conducted, including Wilcoxon signed-rank and Mann-Whitney’s U -tests. Additionally, effect sizes [r] were calculated for the non-parametric tests, which were classified as follows: .5 is a large effect, .3 is a medium effect and .1 is a small effect (53, 54).

Finally, a bivariate correlation analysis among psychological and technical-tactical performance variables in different contexts using Spearman’s correlation.

All data were analyzed using the statistical package SPSS for Macintosh v.25.0 (SPSS Inc, Chicago, IL, United States) and a p value of less than .05 was considered to be statistically significant.

Results

As can be seen in Table 1, regarding differences between before and after the matches, losing players showed a significant surge in cognitive, somatic and state anxiety alongside a significant decline in self-confidence; whereas winning players only displayed a significant increase in state anxiety. Besides, match-winning players significantly exhibited more self-confidence post-match compared to losers.

Evidenced in Table 2, winning players significantly produced more winners than losing players per match. The same occurred in every single technical-tactical performance ratio [for example:

TABLE 2 Differences in technical-tactical performance of the padel players according to the match outcome.

Variable	Winning players		Losing players		p	ES
	Median	IQR	Median	IQR		
W	13.50	7.00	9.00	6.00	.010*	.373
GFE	8.00	4.00	7.50	5.00	.298	.150
FE	7.00	5.00	9.00	4.00	.110	.231
UE	9.50	5.00	12.00	6.00	.356	.133
W/UE	1.31	0.82	0.91	0.55	.001*	.460
(W + GFE)/UE	2.10	1.22	1.63	0.95	.002*	.442
W/(FE + UE)	0.85	0.51	0.49	0.25	.001*	.502
(W + GFE)/(FE + UE)	1.33	0.75	0.83	0.36	<.001*	.515

W, winner; GFE, generator of forced error; FE, forced error; UE, unforced error; SD, standard deviation; p , p -value; ES, effect size. * $p < .05$.

TABLE 1 Anxiety and self-confidence according to the moment (pre and post) and match outcome.

Match outcome	Variable	Pre median (IQR)	Post median (IQR)	Pre vs. post-measure		Winning vs. losing players pre		Winning vs. losing players post		Winning vs. losing players pre-post	
				p	ES	p	ES	p	ES	p	ES
Losing player		1.30 (.40)	1.70 (.60)	.004*	.592						
Winning player	SA	1.29 (.43)	1.43 (.29)	.731	.070	.328	.141	.323	.143	.124	.222
Losing player		1.43 (.54)	1.50 (1.32)	.020*	.475						
Winning player	SC	3.20 (.60)	3.20 (.60)	.746	.066	.123	.222	.015*	.353	.093	.242
Losing player		3.00 (.40)	3.00 (.80)	.014*	.503						
Winning player	STA	5.50 (3.00)	6.00 (5.00)	.022*	.466	.338	.138	.112	.229	.192	.188
Losing player		6.00 (5.00)	8.50 (7.00)	.001*	.685						

CA, cognitive anxiety; SA, somatic anxiety; SC, self-confidence; STA, state anxiety; p , p -value; ES, effect size. * $p < .05$.

winner/unforced error or (winner plus generator of forced error)/unforced error].

As depicted in Table 3, there are indirect correlations between somatic and cognitive anxiety, between state anxiety and self-confidence, in winning players; and between forced errors and cognitive anxiety in losing players.

In addition, there are direct correlations between state anxiety and somatic anxiety in winning players; between state anxiety and cognitive anxiety, and between state anxiety and somatic anxiety, in losing players.

As shown in Table 4, there are indirect correlations between state anxiety and self-confidence in winning players; and between self-confidence and cognitive anxiety, between self-confidence and somatic anxiety, between state anxiety and self-confidence, in losing players.

In addition, there are direct correlations between state anxiety and cognitive anxiety, between unforced errors and state anxiety, in

winning players; and between somatic anxiety and cognitive anxiety, between state anxiety and somatic anxiety, between generators of forced error and cognitive anxiety, in losing players.

Highlighted in Table 5, there are indirect correlations between self-confidence and somatic anxiety in winning players; and between winners and somatic anxiety, between unforced errors and state anxiety in losing players.

In addition, there are direct correlations between somatic anxiety and cognitive anxiety, state anxiety and somatic anxiety, winners and cognitive anxiety, unforced errors and state anxiety in winning players; and between somatic anxiety and cognitive anxiety, between state anxiety and cognitive anxiety, between forced errors and cognitive anxiety in losing players.

Illustrated in Table 6, there are direct correlations between unforced errors and generators of forced error, and between unforced errors and forced errors, in winning players; and between unforced errors and winners in losing players.

TABLE 3 Correlations between the pre-competitive values of the psychological and technical-tactical performance variables, in winning and losing players.

Winning players								
	CA	SA	SC	STA	W	GFE	FE	UE
CA	1	-.558**	-.094	.056	-.211	.029	.104	.295
SA		1	-.281	.456*	.090	.194	-.035	-.217
SC			1	-.662**	.146	.063	-.332	.019
STA				1	-.259	-.018	.299	-.097
Losing players								
	CA	SA	SC	STA	W	GFE	FE	UE
CA	1	.377	-.305	.458*	.066	.225	-.524**	.247
SA		1	.022	.500*	.111	-.057	.181	.160
SC			1	-.186	.356	-.207	.080	.136
STA				1	-.033	.236	.070	-.049

CA, cognitive anxiety; SA, somatic anxiety; SC, self-confidence; STA, state anxiety; W, winner; GFE, generator of forced error; FE, forced error; UE, unforced error.
 *p < .05.
 **p < .01.

TABLE 4 Correlations between the post-competitive values of the psychological variables, and technical-tactical performance variables, in winning and losing players.

Winning players								
	CA	SA	SC	STA	W	GFE	FE	UE
CA	1	-.221	-.054	.621**	.098	.077	.020	.299
SA		1	-.361	.082	.153	.147	-.085	-.122
SC			1	-.533**	.126	-.025	-.172	-.201
STA				1	.197	.094	.316	.490*
Losing players								
	CA	SA	SC	STA	W	GFE	FE	UE
CA	1	.602**	-.586**	.285	-.146	.433*	.180	-.131
SA		1	-.412*	.619**	-.233	.089	.189	-.167
SC			1	-.444*	.240	-.247	-.203	.049
STA				1	-.313	.182	.227	-.299

CA, cognitive anxiety; SA, somatic anxiety; SC, self-confidence; STA, state anxiety; W, winner; GFE, generator of forced error; FE, forced error; UE, unforced error.
 *p < .05.
 **p < .01.

TABLE 5 Correlations between values of the psychological (post minus pre) and technical-tactical performance variables in match winning and losing players.

Winning players								
	CA	SA	SC	STA	W	GFE	FE	UE
CA	1	.502*	-.177	.296	.435*	.097	-.077	.155
SA		1	-.592**	.499*	.078	-.129	-.049	.248
SC			1	-.350	.042	-.093	.188	-.154
STA				1	.336	.099	.157	.520**
Losing players								
	CA	SA	SC	STA	W	GFE	FE	UE
CA	1	.483*	-.377	.492*	-.195	.274	.643**	-.402
SA		1	-.314	.264	-.410*	.106	.162	-.384
SC			1	-.254	-.007	-.155	-.256	-.076
STA				1	-.382	.047	.240	-.418*

CA, cognitive anxiety; SA, somatic anxiety; SC, self-confidence; STA, state anxiety; W, winner; GFE, generator of forced error; FE, forced error; UE, unforced error.
 * $p < .05$.
 ** $p < .01$.

TABLE 6 Correlations between technical-tactical performance variables, in match winning and losing players.

Winning players				
	Winner shot	Generator of forced error	Forced error	Unforced error
Winner shot	1	.090	.042	.318
Generator of forced error		1	.245	.432*
Forced error			1	.511*
Unforced error				1
Losing players				
	Winner shot	Generator of forced error	Forced error	Unforced error
Winner shot	1	.329	.246	.512*
Generator of forced error		1	.251	.119
Forced error			1	-.020
Unforced error				1

* $p < .05$

Discussion

Our initial hypothesis suggested that winning pairs would exhibit higher self-confidence and lower anxiety in the post-match, compared to pre-match; while losing players would show the opposite pattern. Our findings partially supported this hypothesis. Winning players displayed higher state anxiety post-match, possibly due to unmet performance expectations or individual variability within winning pairs. Conversely, losing players demonstrated expected increases in anxiety and decreases in self-confidence post-match, potentially due to underperformance and emotional distress. This contrasts with prior research on singles tennis players on official competition (16). Overall, these findings highlight the contrasting impact of victory and defeat, indicating that while winning might not necessarily yield favorable effects, the repercussions of losing

could be considerably detrimental to players. Consequently, coaches and players are prompted to participate in psychological training to skillfully manage the outcomes of triumph and loss (55), facilitating their continual evolution and growth as athletes. Additionally, recognizing padel as a partner sport emphasizes the interdependence between players, where individual performance directly affects the overall outcome, underscoring the importance of effective communication, trust, and mutual support within pairs.

The second hypothesis that match-winning players would exhibit higher self-confidence and lower anxiety before and after the practice match, compared to match-losing players, was partially supported. Prior to the match, no significant differences were found, consistent with previous research (34). Post-match, only self-confidence showed significant differences, with match-winning players exhibiting higher levels. This could be due to the fact that the increase of self-confidence is linked, among other factors, to positive performance results (56). In this line, Fuentes-García et al. (16) observed higher post-match self-confidence among winning elite junior tennis players compared to losers.

Additionally, it was third hypothesized that match-winning players would make more winners and forced error generators, and fewer forced and unforced errors compared to match-losing players. This hypothesis was partially supported. Significant differences were found in the number of winners, aligning with prior research (29, 30), highlighting the importance of winners as a key performance indicator in padel. Athletes should collaborate closely with their coaches to enhance strategies for increasing winners during training sessions. This could involve reviewing competitive or practice matches to discern winner shots and their underlying reasons (57). Additionally, coaches could implement exercises that emphasize and incentivize winners (58, 59). Although not statistically significant, winning players produced more generators of forced error, while losing players committed more forced and unforced errors. Regarding the latter, losing players significantly commit more unforced errors than winning players (2, 60) in the professional level. Additionally, winning players demonstrated technical-tactical performance ratios, emphasizing the usefulness of such ratios for

evaluating padel players, as they are independent of the number of points, games, or sets. To illustrate, making 10 winners in a 6/0 6/0 match where each game is won at 40/0 (48 points in total) is not equivalent to achieving the same feat in a 7/6(5)—6/7(5)—7/6(5) match where each game is won at a golden point and each tiebreak was won 7/5 (120 points in total).

As a final hypothesis, it was established that there would be a direct correlation between winners and self-confidence in winning players, whereas in losing players, there would be a direct correlation between errors and anxiety, and an indirect correlation between errors and self-confidence. Acceptance of this hypothesis was partial. Winning players showed direct correlations between the number of winners and cognitive anxiety. This suggests that executing winners may evoke a heightened level of mental engagement, reflecting the complexity of the task. Likewise, significant direct correlations were found between generators of forced error and post-cognitive anxiety in losing players. This could be due to the defensive skills of the opponents, the winning players, who actively tried to reach even the most challenging shots. Significant direct correlations were found between unforced errors and state and post-state anxiety in winning players. Committing unforced errors may contribute to heightened state anxiety among winning players, since they may not like the idea of giving “free” points to the opponents through avoidable errors. And heightened anxiety levels indicate a decrease in sports performance (61, 62) and anticipation efficiency (63). Hence, these players could benefit from working closely with a sport psychologist, to develop resilience strategies to effectively cope with the frustration of pressure stemming from errors (64), emphasizing techniques such as reframing perspectives on mistakes. Significant direct correlations were found between forced errors and cognitive anxiety in the losing players. The rationale behind this observation might be losing players’ emotional reactions to their failure in executing demanding shots, potentially influencing their perception of the effective technical-tactical maneuvers executed by winning players. Hence, coaches and sport psychologists could implement targeted training sessions focusing on stress management techniques and simulated match scenarios that replicate high-pressure situations (65). Indirect correlations were found between forced errors and pre-cognitive anxiety, and between unforced errors and state anxiety, among the losing players. When losing players make mistakes that they feel they can control and improve upon during practice matches, they may feel more responsible for those mistakes. Tailored approaches may assist in reframing perceptions of errors (66, 67) and pre-competition nervousness, ultimately aiding players in better managing their anxieties during matches. Furthermore, indirect correlations were found between winners and somatic anxiety among losing players. In fact, anxiety has been shown to impair sports performance (68–70).

Practical applications

It is important to consider these results when structuring personalized training programs for each athlete and formulating

task-specific training exercises. For example, doing exercises which make the athlete feel a higher level of self-confidence (71) and a lower level of anxiety after losing a practice match, especially if there is a tournament in the upcoming days may be of great importance for the future performance in that competition. Furthermore, coaches are instigated to integrate pressure training into their sessions with athletes to enhance athletes’ performance in competition (65). This approach involves exposing athletes to pressure scenarios during practice, fostering their ability to perform proficiently under pressure (59), which can be defined as the athlete’s heightened sense of the importance of performing well (72). It is essential to highlight that in padel, players are consistently required to make rapid decisions within brief timeframes (73) and the capability to manage pressure situations directly affects one’s performance (74–76). Thus, coaches can implement consequences (such as judgement, forfeits, rewards), establish demands, and planned disruption during pressure training (77, 78). In this line, research indicates that consequences induce higher levels of pressure compared to demands (77), and an example of a consequence could be the head coach monitoring players’ padel technical-tactical performance.

Strengths

This study presents several strengths. Firstly, it pioneers research in padel by delving into pre- and post-competitive anxiety alongside self-confidence. Secondly, it stands as the initial study in padel to establish a correlation between technical-tactical performance and anxiety/self-confidence. Thirdly, its findings hold substantial practical implications for coaches and sports psychologists, particularly considering the differences in psychological variables in practice match losing players.

Limitations and future studies

Despite employing a similar methodology to recent research in the domain, it is essential to underscore certain inherent limitations within this study. In future studies, researchers are encouraged to examine whether anxiety and self-confidence responses manifest similarly in both sexes. Although the questionnaires employed are valid and reliable, one specific limitation is that self-confidence and anxiety are assessed through self-perception, and some measurements of internal load (hormones such as cortisol, autonomic modulation or cortical arousal) could enhance the comprehension of the relationship between technical-tactical performance and anxiety/self-confidence. Future research should consider athletes from different levels (beginners, amateur, professional players...).

Conclusion

Losing players demonstrated elevated cognitive, somatic, and state anxiety, along with reduced self-confidence, while winning

players experienced an increase in state anxiety post-match compared to their pre-match levels. Post-match, self-confidence was higher among winning players. In terms of technical-tactical performance variables, winning players made more winners than losing players. They also outperformed the losing players in every technical-tactical performance ratio. Besides, direct correlations were observed between unforced errors and state anxiety (both post-, and pre-post), and between winners and cognitive anxiety (pre-post) in winning players; between generator of forced errors and post-cognitive anxiety, and between forced errors and cognitive anxiety (pre-post) in losing players. Indirect correlations were observed between forced errors and pre-cognitive anxiety, between winners and somatic anxiety (pre-post), between unforced errors and state anxiety (pre-post) in losing players. Players are encouraged to develop their mental skills to manage errors and defeat. Likewise, coaches are encouraged to include pressure training and promote the appearance of winners in simulated matches.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ethics Committee of the Universidad Europea de Madrid with the code CIPI/22.303. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

References

1. International Padel Federation. List of countries associated with the International Padel Federation (FIP). (2024). Available online at: <https://www.padelfip.com/es/> (Accessed May 20, 2024).
2. Conde-Ripoll R, Muñoz D, Sánchez-Alcaraz BJ, Escudero-Tena A. Analysis and prediction of unforced errors in men's and women's professional padel. *Biol. Sport.* (2024) 41:3–9. doi: 10.5114/biolsport.2024.134763
3. García-Giménez A, Pradas de la Fuente F, Castellar Otín C, Carrasco Páez L. Performance outcome measures in padel: a scoping review. *J. Environ. Res. Public Health.* (2022) 19:4395. doi: 10.3390/ijerph19074395
4. Martín-Miguel I, Escudero-Tena A, Muñoz D, Sánchez-Alcaraz BJ. Performance analysis in padel: a systematic review. *J Hum Kinet.* (2023) 89:213–30. doi: 10.5114/jhk/168640
5. Beattie S, Hardy L, Cook A, Gucciardi DF. Mental toughness training. In: Hodges NJ, Williams AM, editors. *Skill Acquisition in Sport: Research, Theory and Practice (3rd)*. New York: Routledge (2020). p. 255–70.
6. Smith RE, Smoll FL. Psychological interventions in youth sports. In: Van Raalte JL, Brewer BW, editors. *Exploring Sport and Exercise Psychology*. Washington DC: American Psychological Association (2014). p. 353–78. doi: 10.1037/14251-016
7. Martens R. *Sport Competition Anxiety Test*. USA: Human Kinetics Publishers. Champaign, IL (1977).
8. Simon JA, Martens R. Children's anxiety in sport and nonsport evaluative activities. *J Sport Psychol.* (1979) 1:160–9. doi: 10.1123/jsp.1.2.160
9. Martens R, Burton D, Vealey RS, Bump LA, Smith DE. Development and validation of the competitive state anxiety inventory-2. In: Martens R, Vealey RS, Burton D, editors. *Competitive Anxiety in Sport*. Champaign: Human Kinetics (1990). p. 117–90.
10. Ampofo-Boateng K. *Understanding Sport Psychology*. Selangor, Malaysia: UPENA (2009).
11. Jarvis M. *Sport Psychology*. New York, USA: Routledge (2002).
12. Jones JG. Stress and anxiety. In: Bull SJ, editor. *Sport Psychology: A Self-Help Guide*. Ramsbury, Marlborough: Crowood Press (2000). p. 31–51.
13. Robazza C, Bortoli L. Perceived impact of anger and anxiety on sporting performance in rugby players. *Psychol. Sport Exerc.* (2007) 8:875–96. doi: 10.1016/j.psychsport.2006.07.005
14. Craft LL, Magyar TM, Becker BJ, Feltz DL. The relationship between the competitive state anxiety inventory-2 and sport performance: a meta-analysis. *J Sport Exerc Psychol.* (2003) 25:44–65. doi: 10.1123/jsep.25.1.44
15. Bustamante-Sánchez A, Ramírez-Adrados A, Iturriaga T, Fernández-Eliás VE. Effects on strength, jump, reaction time and perception of effort and stress in men's top-20 world padel competitions. *Padel Scientific Journal.* (2024) 2:7–19. doi: 10.17398/2952-2218.2.7

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Funding

The author(s) declare financial support was received for the research, authorship, and/or publication of this article.

This study has been financed by the Universidad Europea de Madrid, through an internal competitive project with code CIPI/22.303, with a total amount of 3500€.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The handling editor JR declared a past co-authorship with the author AE.

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16. Fuentes-García JP, Villafaina S, Martínez-Gallego R, Crespo M. Pre- and post-competitive anxiety and match outcome in elite international junior tennis players. *Int J Sports Sci Coach.* (2022) 18:2108–16. doi: 10.1177/17479541221122396
17. Pineda-Espejel HA, Alarcón E, Morquecho-Sánchez R, Morales-Sánchez V, Gadea-Cavazos E. Adaptive social factors and precompetitive anxiety in elite sport. *Front Psychol.* (2021) 12:651169. doi: 10.3389/fpsyg.2021.651169
18. León-Prados JA, García IF, Lluich ÁC. Ansiedad estado y autoconfianza precompetitiva en gimnastas. *RICYDE Rev Int Cienc Deporte.* (2011) 7:76–91. doi: 10.5232/ricyde2011.02301
19. Ngo V, Richards H, Kondric M. A multidisciplinary investigation of the effects of competitive state anxiety on serve kinematics in table tennis. *J Hum Kinet.* (2017) 55:83–95. doi: 10.1515/hukin-2017-000
20. La Fratta I, Franceschelli S, Speranza L, Patruno A, Michetti C, D'Ercole P, et al. Salivary oxytocin, cognitive anxiety and self-confidence in pre-competition athletes. *Sci Rep.* (2021) 11:16877. doi: 10.1038/s41598-021-96392-7
21. Jekauc D, Fiedler J, Wunsch K, Mülberger L, Burkart D, Kilgus A, et al. The effect of self-confidence on performance in sports: a meta-analysis and narrative review. *Int Rev Sport Exerc Psychol.* (2023):1–27. doi: 10.1080/1750984x.2023.2222376
22. Jana BK. A study of pre-competitive and post-competitive anxiety level of intercollegiate football players. *Int J Physiol Nutr Phys Educ.* (2019) 4:2343–4.
23. Singh A. A study of pre and post-competitive anxiety level of inter-university basketball players. *Indian J Sci Technol.* (2011) 4:650–1. doi: 10.17485/ijst/2011/v4i6.8
24. Singh A, Gaurav V. A study of pre-competitive and post-competitive anxiety level of intercollegiate volleyball players. *Int J Sports Sci Eng.* (2011) 5:237–41.
25. Ghorbanzadeh B, Bayar P. A comparison of the pre-competition and post-competition anxiety levels of taekwondo athletes. *Life Sci J.* (2013) 10:5–10.
26. Mellado-Arbelo Ó, Baiget-Vidal E, Vivés-Usoñ M. Análisis de las acciones de juego en pádel masculino profesional. *Cult Cienc y Deporte.* (2019) 14:191–201. doi: 10.12800/ccd.v14i42.1332
27. Sánchez-Alcaraz B, Jiménez V, Muñoz D, Ramón-Llín J. Diferencias en los parámetros de carga externa entre el pádel masculino y femenino profesional. *J Sport Health Res.* (2021) 13:445–54.
28. Escudero-Tena A, Courel-Ibáñez J, García-Rubio J, Ibáñez SJ. Sex differences in professional padel players: analysis across four seasons. *Int J Perform Ana Sport.* (2021) 21:651–62. doi: 10.1080/24748668.2021.1930363
29. Martín-Miguel I, Sánchez-Alcaraz BJ, Parraca J, Muñoz D. Analysis of padel stroke effectiveness as a function of gender, point duration and point type. *Rev de Psicología del Deporte (J Sport Psychol).* (2023) 32:313–22.
30. Sánchez-Alcaraz BJ, Muñoz D, Sánchez-Pay A, Martín-Miguel I, Piedra D, Barriocanal I. Análisis de los golpes ganadores y errores en pádel profesional. *Rev Iberoam Cienc Act Fis Deporte.* (2022) 11:85–97. doi: 10.24310/riccafd.2022.v11i3.15474
31. Escudero-Tena A, Almonacid B, Martínez J, Martínez-Gallego R, Sánchez-Alcaraz BJ, Muñoz D. Analysis of finishing actions in men's and women's professional padel. *Int J Sports Sci Coach.* (2022) 174795412211399:174795412211399. doi: 10.1177/17479541221139970
32. Castillo-Rodríguez A, Hernández-Mendo A, Alvero-Cruz JR, Onetti-Onetti W, Fernández-García JC. Level of precompetitive anxiety and self-confidence in high level padel players. *Front Psychol.* (2022) 13:828. doi: 10.3389/fpsyg.2022.890828
33. Rodríguez-Cayetano A, Hernández-Merchán F, De Mena-Ramos JM, Sánchez-Muñoz A, Pérez-Muñoz S. Tennis vs padel: precompetitive anxiety as a function of gender and competitive level. *Front Psychol.* (2022) 13:1018139. doi: 10.3389/fpsyg.2022.1018139
34. Conde-Ripoll R, Escudero-Tena A, Suárez-Clemente VJ, Bustamante-Sánchez Á. Precompetitive anxiety and self-confidence during the 2023 Finnish padel championship in high level men's players. *Front Psychol.* (2023) 14:1301623. doi: 10.3389/fpsyg.2023.1301623
35. Montero I, León OG. A guide for naming research studies in psychology. *Int J Clinical Health Psychol.* (2007) 7:847–62.
36. Ato M, López-García JJ, Benavente A. Un sistema de clasificación de los diseños de investigación en psicología. *Anales de Psicología/Annals of Psychology.* (2013) 29:1038–59. doi: 10.6018/analesps.29.3.178511
37. Rebelo A, Pereira JR, Valente-dos-Santos J. Effects of a preseason triphasic resistance training program on athletic performance in elite volleyball players—an observational study. *Ger J Exerc Sport Res.* (2023) 53:163–70. doi: 10.1007/s12662-023-00877-8
38. Cushieri S. The STROBE guidelines. *Saudi J Anesth.* (2019) 13:S31–4. doi: 10.4103/sja.SJA_543_18
39. World Medical Association. World medical association declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA.* (2013) 310(20):2191–4. doi: 10.1001/jama.2013.281053
40. Endler NS, Kocovski NL. State and trait anxiety revisited. *J Anxiety Disord.* (2001) 15:231–45. doi: 10.1016/s0887-6185(01)00060-3
41. Cox RH. Psychological skills training. In: Cox RH, editor. *Sport Psychology. Concepts and Applications.* New York: McGraw-Hill (2012). p. 297–8.
42. Spielberger CD, Gorsuch RL, Lushene RE. *Manual for the State-Trait Anxiety Inventory.* Palo Alto, CA: Consulting Psychologists Press (1970).
43. DeVellis RF. *Scale Development: Theory and Applications. (2nd).* Thousand Oaks, CA: Sage (2003).
44. Nunnally JC, Bernstein IH. *Psychometric Theory. (3rd).* New York, NY: McGraw-Hill (1994).
45. Vaske JJ. *Survey Research and Analysis: Applications in Parks, Recreation and Human Dimensions.* State College, PA: Venture (2008).
46. Anguera MT, Hernández-Mendo A. Avances en estudios observacionales de ciencias del deporte desde los mixed methods [advances in observational studies of sports science from the mixed methods]. *Cuad Psicol Dep.* (2016) 16:17–30.
47. Conde Ripoll R, Genevois C. Forehand footwork variability in the attacking situation at elite level. *Coach. Sport Sci. Rev.* (2022) 30:22–4. doi: 10.52383/itfcoaching.v30i88.356
48. Sánchez-Pay A, Ramón-Llín J, Martínez-Gallego R. *Análisis de Rendimiento en los Deportes de Raqueta.* Sevilla: Wanceulen (2021).
49. Escudero-Tena A, Fernández-Cortés J, García-Rubio J, Ibáñez SJ. Use and efficacy of the lob to achieve the offensive position in women's professional padel. Analysis of the 2018 WPT finals. *Int J Environ Res Public Health.* (2020) 17:4061. doi: 10.3390/ijerph17114061
50. Escudero-Tena A, Gómez-Ruano MÁ, Ibáñez SJ, Sánchez-Alcaraz BJ, Muñoz D. Importance of maintaining net position in men's and women's professional padel. *Percept Mot Skills.* (2023) 130:2210–25. doi: 10.1177/00315125231194026
51. Igartua JJP. *Métodos Cuantitativos de Investigación en Comunicación.* Barcelona, Spain: Bosh (2006).
52. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics.* (1977) 33:159–74. doi: 10.2307/2529310
53. Coolican H. *Research Methods and Statistics in Psychology (7th).* UK London: Psychology Press (2017). doi: 10.4324/9781315201009
54. Fritz CO, Morris PE, Richler JJ. Effect size estimates: current use, calculations, and interpretation. *J Exp Psychol Gen.* (2012) 141:2–18. doi: 10.1037/a0024338
55. Bloom GA, Durand-Bush N, Salmela JH. Pre- and postcompetition routines of expert coaches of team sports. *Sport Psychol.* (1997) 11:127–41. doi: 10.1123/tsp.11.2.127
56. Vealey R. Conceptualization of sport-confidence and competitive orientation: preliminary investigation and instrument development. *J Sport Psychol.* (1986) 8:221–46. doi: 10.1123/jsp.8.3.221
57. García-González L, Moreno A, Gil A, Moreno MP, Villar FD. Effects of decision training on decision making and performance in young tennis players: an applied research. *J Appl Sport Psychol.* (2014) 26:426–40. doi: 10.1080/10413200.2014.917441
58. Low W, Freeman PB, Butt J, Stoker M, Maynard I. The role and creation of pressure in training: perspectives of athletes and sport psychologists. *J Appl Sport Psychol.* (2023) 35:710–30. doi: 10.1080/10413200.2022.2061637
59. Stoker M, Lindsay P, Butt J, Bawden M, Maynard IW. Elite coaches' experiences of creating pressure training environments. *Int J Sport Psychol.* (2016) 47:262–81. doi: 10.7352/IJSP2016.47.262
60. Escudero-Tena A, Sánchez-Alcaraz BJ, García-Rubio J, Ibáñez SJ. Analysis of game performance indicators during 2015–2019 world padel tour seasons and their influence on match outcome. *Int J Environ Res Public Health.* (2021) 18:4904. doi: 10.3390/ijerph18094904
61. García-Mas A, Palou P, Smith RE, Ponseti X, Almeida P, Lameiras J, et al. Ansiedad competitiva y clima motivacional en jóvenes futbolistas de competición, en relación con las habilidades y el rendimiento percibido por sus entrenadores. *Revista de Psicología del Deporte.* (2011) 20:197–207.
62. Ries F, Castañeda Vázquez C, Campos Mesa M, Del C, Castillo Andrés OD. Relaciones entre ansiedad-rasgo y ansiedad-estado en competiciones deportivas. *Cuad De Psicología del Deporte.* (2012) 12:9–16. doi: 10.4321/s1578-84232012000200002
63. Ren P, Song T, Chi L, Wang X, Miao X. The adverse effect of anxiety on dynamic anticipation performance. *Front. Psychol.* (2022) 13:823989. doi: 10.3389/fpsyg.2022.823989
64. Solomon G, Becker A. *Focused for Fastpitch: 80 Drills to Play and Stay Sharp.* Champaign, IL: Human Kinetics (2004).
65. Low WR, Stoker M, Butt J, Maynard I. Pressure training: from research to applied practice. *J Sport Psychol Action.* (2023) 15(1):3–18. doi: 10.1080/21520704.2022.2164098
66. Rach S, Ufer S, Heinze A. Learning from errors: effects of teachers' training on students' attitudes towards and their individual use of errors. *PNA.* (2013) 8(1):21–30. doi: 10.30827/pna.v8i1.6122

67. Vickers JN, Livingston LF, Umeris-Bohnert S, Holden D. Decision training: the effects of complex instruction, variable practice and reduced delayed feedback on the acquisition and transfer of a motor skill. *J Sport Sci.* (1999) 17:357–67. doi: 10.1080/026404199365876
68. De Sousa Fortes L, De Lima RCR, Almeida SS, Fonseca RMC, Paes PP, and Ferreira MEC. Effect of competitive anxiety on passing decision-making in under-17 soccer players. *Paidéia (Ribeirão Preto).* (2018) 28:0. doi: 10.1590/1982-4327e2820
69. Díaz-García J, Habay J, Rubio-Morales A, Wachter J, García-Calvo T, Roelands B, et al. Mental fatigue impairs padel-specific psychomotor performance in youth-elite male players. *Eur J Sport Sci.* (2024) 24:508–17. doi: 10.1002/ejsc.12039
70. Hepler TJ. Decision-making in sport under mental and physical stress. *Int J Kinesiol Sports Sci.* (2015) 3:79–83. doi: <https://doi.org/10.7575/aiac.ijkss.v3n.4p.79>
71. Ihsan S, Ekici S, Soyer F, Eskiler E. Does self-confidence link to motivation? A study in field hockey athletes. *J Hum Sport Exerc.* (2015) 10:24–35. doi: 10.14198/jhse.2015.101.03
72. Baumeister RF. Choking under pressure: self-consciousness and paradoxical effects of incentives on skillful performance. *J Pers Soc Psychol.* (1984) 46:610–20. doi: 10.1037//0022-3514.46.3.610
73. Castillo-Rodríguez A, Alvero-Cruz JR, Hernández-Mendo A, Fernández-García JC. Physical and physiological responses in paddle tennis competition. *Int J Perform Anal Sport.* (2014) 14:524–34. doi: 10.1080/24748668.2014.11868740
74. González-Díaz J, Gossner O, Rogers BW. Performing best when it matters most: evidence from professional tennis. *J Econ Behav Organ.* (2012) 84:767–81. doi: 10.1016/j.jebo.2012.09.021
75. Knight C, Lewis F, Mellalieu S. Helping junior tennis players cope with their emotions. *Coach Sport Sci Rev.* (2016) 24:21–3. doi: 10.52383/itfcoaching.v24i68.175
76. Martínez-Gallego R, Villafaina S, Crespo M, Fuentes García JP. Gender and age influence in pre-competitive and post-competitive anxiety in young tennis players. *Sustainability.* (2022) 14:4966. doi: 10.3390/su14094966
77. Stoker M, Maynard I, Butt J, Hays K, Lindsay P, Norenberg DA. The effect of manipulating training demands and consequences on experiences of pressure in elite netball. *J Appl Sport Psychol.* (2017) 29:434–48. doi: 10.1080/10413200.2017.1298166
78. Kegelaers J, Wylleman P, Oudejans RRD. A coach perspective on the use of planned disruptions in high-performance sports. *Spor Exerc Perform Psychol.* (2020) 9:29–44. doi: 10.1037/spy0000167
79. Hassmén P, Raglin JS, Lundqvist C. Intra-Individual variability in state anxiety and self-confidence in elite golfers. *J Sport Behav.* (2004) 27: 277–90.