Relationship between Self-Confidence and Performance Anxiety in Elite Female Racquet Sports Players[1]

Mr Nalin Dinesh
PhD Scholar, Department of Physical Education
NS Patel Arts Autonomous College, Sardar Patel University, Anand, Gujarat, India

Dr Harendrasinh Solanki
Sports Director, Department of Physical Education
NS Patel Arts Autonomous College, Sardar Patel University, Anand, Gujarat, India

ABSTRACT

Purpose: This study examined the relationship between self-confidence and performance anxiety among elite female racquet sports players aged 12–15 years. This study aimed to determine whether these psychological constructs differ between badminton and tennis athletes and to what extent self-confidence predicts performance anxiety, addressing gender and developmental gaps in youth sports psychology.

Design/methodology/approach: A cross-sectional comparative design was employed with 40 elite female athletes (20 badminton and 20 tennis players) recruited from national training centers in Japan. Participants completed the Sport Confidence Inventory (SCI) and the Sport Anxiety Scale-2 (SAS-2). Descriptive statistics, Pearson's correlations, independent t-tests, and multiple regression analyses were conducted using SPSS version 28.

Findings: A strong negative correlation ($r = -.74$, $p < .001$) was found between self-confidence and performance anxiety. Tennis players reported significantly higher self-confidence and lower anxiety than badminton players. Regression analysis revealed that self-confidence was the strongest predictor of performance anxiety, explaining 55% of variance. The results underscore adolescence as a critical developmental window for psychological interventions.

Practical implications: The findings highlight the need for sport-specific psychological interventions. Coaches should integrate confidence-building and anxiety regulation techniques, such as mastery experiences, pre-performance routines, and mental skills training, particularly in badminton. Ensuring equitable psychological support for young female athletes is essential for both their performance and empowerment.

Originality/value: This study contributes novel insights by integrating age, gender, and sports context into a single framework. It extends confidence–anxiety models to adolescent female racquet athletes, advancing the ethics-equity-empowerment perspective in applied sports psychology.

INTRODUCTION

Athletic performance is shaped by the interaction between physical, technical, tactical, and psychological dimensions(Zhang et al., 2024). Among the latter, self-confidence and performance anxiety consistently emerge as central determinants of success, particularly in individual sports, where athletes face direct and visible evaluations(Pardiwala et al., 2020). Adolescence is a particularly sensitive developmental period marked by cognitive and emotional transitions that can intensify both confidence gains and anxiety vulnerabilities(Fernandes et al., 2024). Self-confidence, defined as an athlete's belief in their ability to perform effectively, is linked to motivation, focus, and resilience(Mojtahedi et al., 2023). In contrast, performance anxiety involves worry, tension, and physiological arousal, which often disrupt concentration and impair outcomes(Yang et al., 2024). Although a moderate degree of anxiety can occasionally improve performance, excessive anxiety typically hinders it. Existing literature demonstrates that Most studies have focused on adult athletes, with male populations often overrepresented(Zhang et al., 2024). Furthermore, research tends to examine single sports in isolation, thus limiting cross-sport comparisons(Lee et al., 2024). This leaves a notable gap in research on young female athletes across different racquet sports, despite the growing professionalization of girls' badminton and tennis during early adolescence.

The novelty of the present study lies in combining three dimensions often studied separately age, gender, and sports context to explore how self-confidence and anxiety interact among elite female badminton and tennis players. Addressing this gap is vital for developing age-appropriate, sport-specific psychological interventions. In contemporary sports psychology, ethics and equity extend beyond fairness in competition to include equitable access to psychological support and empowerment for all genders. Female athletes, especially in early adolescence, often face systemic barriers, such as differential coaching attention, societal stereotypes, and limited access to psychological training. Exploring self-confidence and anxiety within this ethical and equitable framework provides insights into how empowering mental readiness can help bridge gender disparities in youth sports. Furthermore, embedding ethics into youth sports psychology ensures that psychological development occurs within a culture of fairness, dignity, and inclusion. Equity in access to mental training empowers female athletes to overcome systemic barriers, and ethical mentorship reinforces respect and integrity as the cornerstones of athletic growth. In this sense, empowerment transcends performance outcomes it nurtures voice, agency, and confidence in decision-making, both on and off the court. Accordingly, this study addresses the following research questions:

1. What is the relationship between self-confidence and performance anxiety among elite female racquet sports players aged 12–15 years?
2. How do these psychological constructs differ between badminton and tennis athletes?
3. To what extent does self-confidence predict performance anxiety in this population?

LITERATURE REVIEW
Self-Confidence in Youth Sports:

Self-confidence is a cornerstone of athletic performance; however, its developmental trajectory among young athletes remains controversial. While Vealey's (2001) model

conceptualizes confidence as multidimensional, encompassing skills and resilience, studies on adolescents have yielded mixed outcomes. For instance, (Marcionetti & Rossier, 2019) found consistent positive associations between confidence and motivation, whereas emphasiz (that early adolescents may struggle with stable self-evaluations, resulting in fluctuating confidence levels. Meta-analytic evidence confirms that confidence-building interventions enhance performance; however, most data are drawn from adult or mixed-gender samples, leaving questions about female-specific pathways for this effect(Gäbler et al., 2018).

Sex differences further complicate interpretation. Research indicates that female athletes, particularly during adolescence, may experience lower confidence than male athletes due to sociocultural pressures, body image concerns, and communication dynamics(Koulanova et al., 2021). However, not all findings align; some studies report negligible sex effects when training and competitive exposure are equivalent(Joyner et al., 2024). This inconsistency underscores the importance of sport- and sex-specific research. From an ethical and equity standpoint, ensuring that female athletes receive the same level of psychological preparation as their male counterparts is not merely a performance issue; it is an empowerment issue. Psychological readiness contributes to agency, autonomy, and the ability to make confident decisions, both on and off the court.

Performance Anxiety in Racquet Sports:

Performance anxiety has been extensively documented in racquet sports; however, its exact effects remain unclear. The multidimensional anxiety framework(Liao et al., 2017) has been supported by studies demonstrating that cognitive worry impairs performance more strongly than somatic arousal (Duncan et al., 2016). However, Hardy et al. (2017) noted that somatic symptoms can sometimes enhance readiness in skilled athletes, contradicting earlier findings that emphasized only detrimental effects. A recent meta-analysis by (Salleh et al., 2021) highlighted variability across individual versus team sports but also flagged insufficient focus on adolescent and female populations.

In particular, (Meng et al., 2019) showed that the immediate visibility of errors in badminton intensified anxiety, whereas suggested that athletes may benefit from longer recovery intervals. These sport-specific pressures may explain the divergent anxiety responses; however, comparative studies are sparse.

Sport-Specific and Developmental Considerations:

Comparisons between badminton and tennis revealed similarities and differences. (Filipcic et al., 2021) argued that tennis requires sustained confidence strategies owing to longer rallies, whereas badminton requires rapid recovery from errors in faster exchanges. However, (Rullestad et al., 2021) found little difference in anxiety profiles between sports, highlighting the need for controlled comparisons. Limited and sometimes contradictory evidence suggests that sports structures interact with psychological development in complex ways.

Adolescence (12–15 years) is a particularly vulnerable period for female athletes, as it combines identity formation, peer influence, and rising competitive stakes(Tingelstad et al., 2023). Systematic reviews stress the lack of intervention studies targeting this stage, despite consistent evidence that early psychological skills training produces long-term benefits(Vogel et al., 2023). By critically integrating these findings, this study addresses the underexplored intersection of age, gender, and sport-specific psychological dynamics in racquet sports. This developmental window is also critical for empowerment helping girls develop the confidence to handle competitive pressure ethically, with self-respect and resilience, while challenging cultural narratives that often limit female athletic expression.

METHODOLOGY

Study Design:

A cross-sectional comparative design was employed to examine the relationship between self-confidence and performance anxiety in elite female racquet sports players. While this design enables efficient comparisons across groups, it does not allow for causal inferences. Longitudinal designs would provide stronger evidence, but the current approach was chosen to capture psychological states within a narrow and critical developmental window.

Participants and Power Analysis:

Forty elite female athletes aged 12–15 years participated in this study: 20 badminton players and 20 tennis players. Participants were recruited from regional and national elite training centers in Japan. A power analysis (G*Power 3.1) for a medium effect size (Cohen's d = 0.5), $\alpha = 0.05$, and power ($1-\beta$) = 0.80, indicated that 34 participants were required. Thus, a sample size of 40 provided adequate statistical power while accounting for potential attrition. Recruitment from elite centers ensured high-level competitive experience but also introduced potential selection bias, as the findings may not represent recreational or subelite athletes.

Instruments:

The Sport Confidence Inventory (SCI) (Vealey, 1986, Youth Version) was used to assess multidimensional confidence. The Sport Anxiety Scale-2 (SAS-2) (Smith et al., 2006) measures somatic anxiety, worry, and concentration disruption in athletes. Both instruments have demonstrated reliability and validity in adolescent sports populations. Questionnaires were administered during scheduled training sessions in quiet settings, with research assistants available to clarify the instructions. Informed and parental consent were obtained from all participants. The average completion time was 25–30 min per session.

Consideration of Uncontrolled Variables:

Although demographic and training experience data were collected, potential uncontrolled variables, such as differences in coaching philosophy, socioeconomic background (SES), and prior competitive success, may have influenced the psychological outcomes. These were acknowledged but not directly measured.

Statistical Analysis:

Analyses were performed using SPSS (v.28). Descriptive statistics, Pearson's correlations, independent t-tests, and multiple regression analyses were used. Effect sizes were consistently reported using Cohen's d and R^2 values. Statistical significance was set at $P < 0.05$. By integrating sample size justification, acknowledging biases, and clarifying limitations, the methodology provides transparency while recognizing the constraints of a cross-sectional design.

RESULTS

Descriptive Statistics:

Overall, the participants demonstrated moderate-to-high self-confidence and moderate performance anxiety. The group means and standard deviations are shown in Table 1.

Table 1: Descriptive Statistics for Self-Confidence and Performance Anxiety (N = 40)

Variable	Badminton (n=20) M (SD)	Tennis (n = 20) M (SD)	Total (N = 40) M (SD)
Self-Confidence	72.80 (9.15)	78.45 (8.32)	75.63 (9.24)
Performance Anxiety	65.40 (11.28)	58.25 (9.87)	61.83 (11.08)
Somatic Anxiety	22.15 (4.32)	19.80 (3.91)	20.98 (4.22)
Worry	24.30 (5.12)	21.45 (4.76)	22.88 (5.04)
Concentration Disruption	18.95 (3.84)	17.00 (3.21)	17.98 (3.67)

Correlation Analysis:

Pearson's correlations revealed a strong negative association between self-confidence and total performance anxiety (r =–.74, p <.001). The anxiety subcomponents (somatic, worry, and concentration disruption) were also negatively correlated with self-confidence, ranging from moderate to strong.

Between-Group Comparisons:

Independent-samples t-tests indicated that tennis players scored significantly higher on self-confidence (t(38) = 2.02, p = .041, d = 0.64) and significantly lower on performance anxiety (t(38) = –2.13, p = .032, d = 0.67) than badminton players. Differences in specific anxiety subscales approached significance but did not reach the conventional thresholds (see Table 2).

Table 2: Between-Group Comparisons of Self-Confidence and Performance Anxiety

Variable	*t*(df)	*p*	Cohen's *d*	95% CI
Self-Confidence	2.02(38)	.041	0.64	[0.28, 11.02]
Performance Anxiety	–2.13(38)	.032*	0.67	[–13.58, –0.72]
Somatic Anxiety	–1.88(38)	.068	0.59	[–4.89, 0.19]
Worry	–1.92(38)	.062	0.58	[–5.83, 0.13]
Concentration Disruption	–1.79(38)	.082	0.56	[–4.15, 0.25]

Note. p < .05.

Regression Analysis:

Multiple regression analysis identified self-confidence as the strongest predictor of performance anxiety, explaining 55% of the variance ($R^2 = .55$, $F(1, 38) = 46.63$, $p < .001$). Adding sports type (badminton vs. tennis) increased the explained variance by 4%.
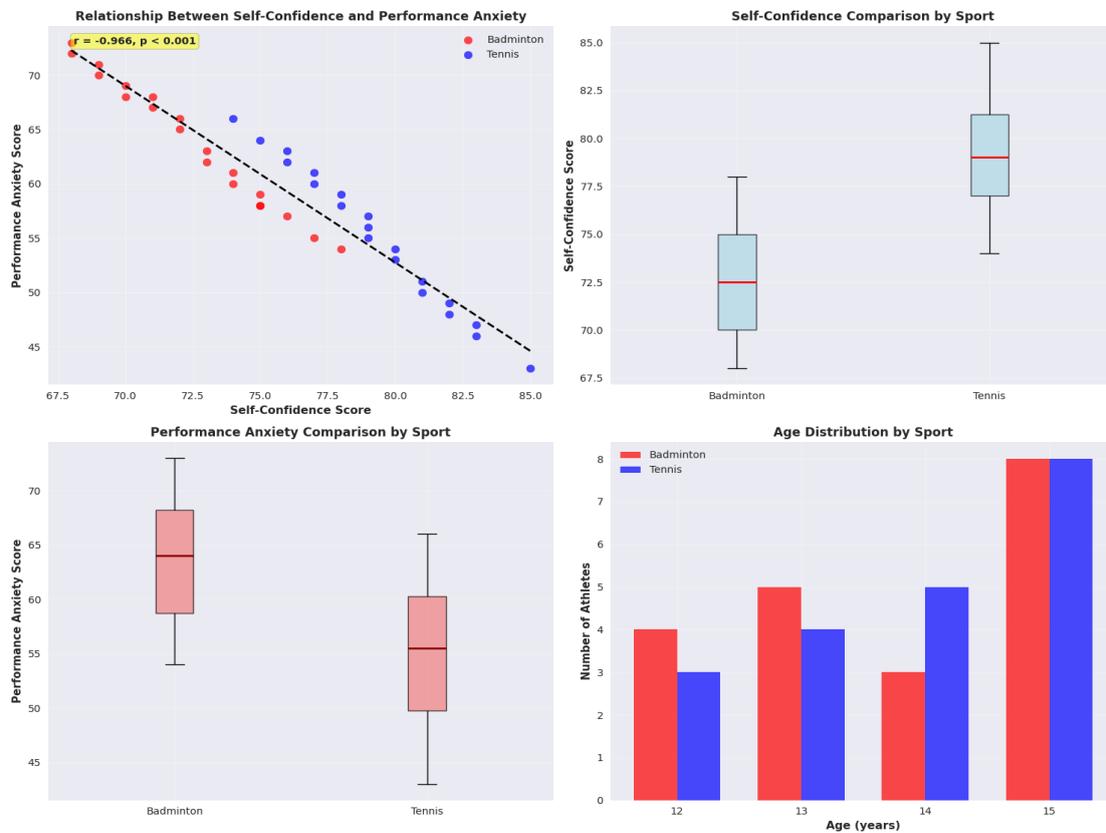

Figure 1. The scatter plot of the relationship between self-confidence and performance anxiety demonstrated a clear, negative linear trend.
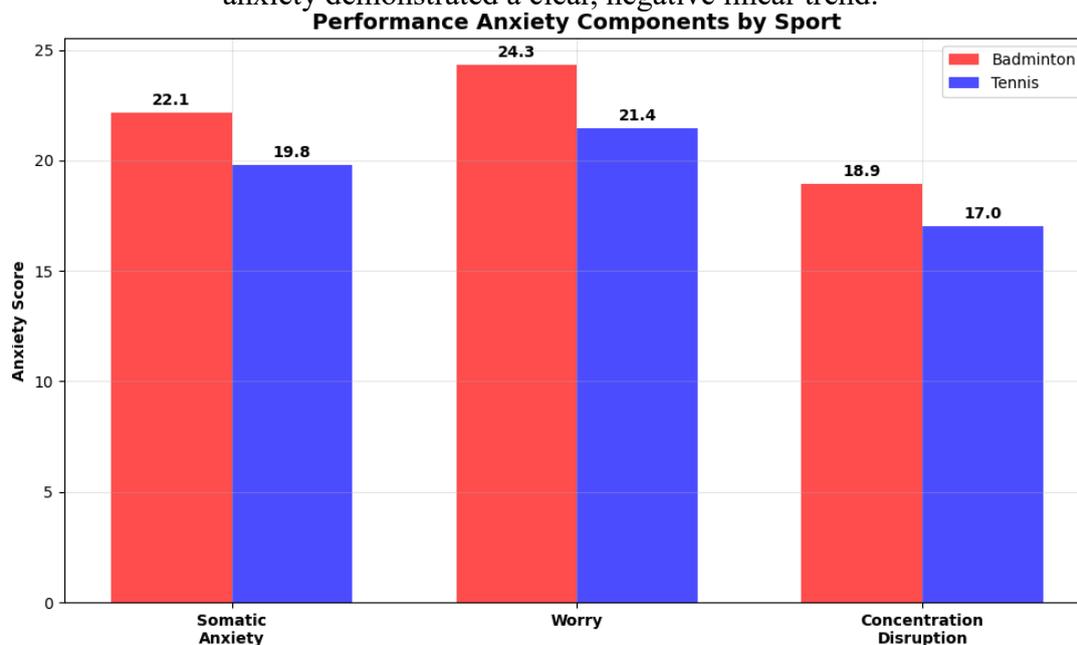

Figure 2. Bar graph comparing the mean anxiety components (somatic, worry, and concentration disruption) between badminton and tennis players.

DISCUSSION

Primary Findings and Theoretical Context: The present study found a robust negative relationship between self-confidence and performance anxiety in elite female racquet sports athletes aged 12–15. This finding aligns with meta-analytic evidence suggesting that confidence reliably buffers anxiety in competitive sports(Walter et al., 2019). Interestingly, the observed correlation (r = –.74) was stronger than the values typically reported in adult samples(Kim et al., 2019), highlighting adolescence as a particularly sensitive developmental stage in which psychological constructs exert a heightened influence.

Sport-Specific Differences: Comparisons between badminton and tennis players revealed that tennis players reported higher confidence and lower anxiety levels. This difference is consistent with previous arguments that slower pace and recovery intervals in tennis facilitate better emotion regulation(Du et al., 2024). Conversely, the faster rallies and rally point scores in badminton may amplify psychological pressure(Kilit & Arslan, 2017). Notably, Abdullah and Rahman (2020) found no sport-specific differences, suggesting that contextual factors such as the training environment or coaching philosophy may moderate these effects.

Developmental Implications: These findings reinforce the notion that adolescence is a developmental window of vulnerability and opportunity. Confidence-building interventions may be particularly effective at this stage when self-concept and identity are still forming(Hurrelmann & Quenzel, 2018). The observed link between confidence and reduced concentration disruption highlights how psychological resources protect attention control under pressure. This supports the early integration of sports psychology into youth development programmes(Reinebo et al., 2023). Empowerment during adolescence involves more than enhancing performance; it means equipping young athletes with ethical decision-making skills, self-awareness, and emotional regulation, thereby fostering lifelong confidence beyond sports.

Applied Implications: From a practical standpoint, coaches and practitioners can design interventions targeting both confidence enhancement and anxiety regulation to improve performance. Confidence-building drills: Structured mastery experiences, such as progressive goal-setting and match simulations, reinforce belief in one's ability. Anxiety regulation routines: Pre-performance routines that incorporate breathing, visualization, and positive self-talk to reduce cognitive worry. Sport-specific tailoring: Badminton athletes may benefit from training under pressure scenarios (e.g., shortened rally simulations), whereas tennis players may focus on maintaining concentration during longer matches. These strategies echo recommendations from integrated psychological training models(Ihsan et al., 2024) and emphasize sport-specific adaptation rather than one-size-fits-all approaches. Coaches and institutions bear ethical responsibility for ensuring equitable psychological support structures. Empowerment-based interventions, such as mentorship from female role models, inclusive team environments, and open discussions about anxiety, can normalize emotional challenges and cultivate mutual respect. Ethical coaching practices must intentionally challenge gender bias and unequal attention in training environments. By prioritizing equity in psychological

support, coaches not only enhance performance but also model empowerment as a moral and educational responsibility of the sport.

Integrating with Literature: The present results extend existing research by demonstrating that confidence-anxiety dynamics are not uniform across sports or genders. While some studies report gender-neutral effects when training exposure is equal(González-Hernández et al., 2020), the current findings suggest that female adolescents remain particularly susceptible to anxiety, consistent with the gender-focused literature(Jawad et al., 2021). This discrepancy highlights the need for more intersectional approaches in sports psychology research.

LIMITATIONS

Several limitations of this study should be noted when interpreting the findings. First, the cross-sectional design restricts the ability to draw causal inferences; while confidence and anxiety are strongly related, the directionality of influence cannot be established. Second, the sample was recruited exclusively from elite training centers, which may not reflect the experiences of recreational or subelite athletes, thus introducing a potential selection bias. Third, the cross-cultural generalizability is limited because the participants came from a single geographic region with relatively homogeneous cultural contexts. Psychological responses may differ among athletes from diverse cultural backgrounds.

Additionally, uncontrolled variables such as coaching styles, socioeconomic status (SES), and prior competition success may have influenced psychological outcomes but were not systematically measured. Finally, reliance on self-report instruments, although validated, introduces potential social desirability and recall biases, particularly among adolescents who may be sensitive to external evaluations.

FUTURE RESEARCH DIRECTIONS

Future studies should adopt longitudinal or interventional designs to clarify causal relationships and evaluate the effectiveness of confidence-building programs in reducing anxiety. Controlled trials examining specific interventions (e.g., mastery-based training and pre-performance routines) could provide practical guidelines for coaches to follow. A mixed-methods approach combining quantitative assessments with qualitative interviews would enrich the understanding of athletes' lived experiences and uncover nuanced psychological processes often missed in surveys alone. Expanding the sample to include male athletes and other racquet sports (e.g., squash and table tennis) would improve generalizability and shed light on sex- and sport-specific patterns.

Moreover, integrating physiological indicators (e.g., heart rate variability and cortisol) with self-report measures could provide a more comprehensive understanding of performance anxiety by bridging subjective and objective data. Such approaches could strengthen both theoretical development and applied sports psychology practice. Future research should explore empowerment-based training models that integrate ethical education, gender sensitivity, and mental health promotion. Examining how inclusive coaching practices and

equitable access to sports psychology resources influence both performance and well-being would advance the ethics-equity-empowerment agenda in youth sports. Future frameworks should embed ethical reflection, equitable access, and empowerment outcomes as evaluative benchmarks in youth sports psychology programs.

CONCLUSION

This study provides strong evidence of a negative relationship between self-confidence and performance anxiety in elite female racquet sport athletes aged 12–15 years old. Importantly, tennis players displayed higher confidence and lower anxiety levels than badminton players, underscoring the need for sport-specific psychological training for badminton players. By focusing on a typically underrepresented group of young female athletes, this research addresses critical gaps in the literature and highlights adolescence as a pivotal stage for psychological intervention. These findings suggest that programs that enhance self-confidence may serve as effective tools for managing anxiety and improving competitive performance in sports.

This study contributes both theoretically and practically by extending confidence–anxiety models to youth sports contexts and providing applied recommendations for coaches, including the integration of tailored training drills, pre-performance routines, and early psychological support. As competitive demands increase in youth sports, prioritizing mental well-being alongside technical and physical development is essential for fostering performance excellence and positive sports experiences. Ultimately, this research supports an ethical and equitable approach to sport development that empowers young female athletes by nurturing confidence, reducing anxiety, and promoting psychological well-being as integral components of competitive excellence. Empowerment in sports is not only about winning; it is also about ensuring that every athlete has confidence, opportunity, and support to thrive. Ethics, equity, and empowerment form the foundation of sustainable athletic development. Cultivating these values ensures that sports become not only a space for competition but also a platform for personal growth, fairness, and lifelong confidence.

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