

Changes in Positive and Negative Mood among Badminton Players before and After a Friendly Match

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Abstract

Emotional state before and after competition can influence athletic performance, particularly in a fast-paced racket sport such as badminton, where quick decision-making and emotional control are essential. This study examined pre-match and post-match mood states among badminton players using the Positive and Negative Affect Schedule (PANAS), a validated 20-item self-report measure of Positive Affect (PA) and Negative Affect (NA). Negative Mood is related to anxiety and general distress, but PANAS does not measure sport-specific anxiety directly. Fifteen male national-level badminton players, aged 18-23 years, were selected through convenience sampling from the Residential Badminton Training Centre, Khelgaon, Ranchi, Jharkhand. Participants completed the PANAS approximately 15 minutes before a friendly match and again immediately after it. Data were analysed using descriptive statistics and paired-samples *t*-tests (with Wilcoxon signed-rank tests as a robustness check), with significance set at $p \leq 0.05$. Positive Mood decreased significantly from pre-match ($M = 43.4$, $SD = 5.21$) to post-match ($M = 39.4$, $SD = 2.32$), $t(14) = 3.17$, $p = 0.007$, $d_z = 0.82$. Negative Mood decreased from a pre-match mean of 18.2 ($SD = 4.23$) to a post-match mean of 16.2 ($SD = 6.00$), but this change was not statistically significant ($t(14) = 1.30$, $p = 0.213$, $d_z = 0.34$). One player showed a marked post-match increase in Negative Mood (15 to 32); with this player excluded, the Negative Mood decrease was significant ($p < 0.001$), so the Negative Mood result is sensitive to this single case. Match outcome and performance were not recorded, so no conclusions about performance can be drawn. The findings suggest that a friendly match is followed by lower positive mood, while the change in negative mood is small and inconsistent across players. Future studies should add sport-specific anxiety measures, match outcomes and larger samples.

Keywords: Badminton; PANAS; Positive Mood; Negative Mood; Pre-match; Post-match

1. Introduction

Badminton is a racquet sport in which players strike a shuttlecock across a net, trying to make it land inside the opponent's boundary. The game can be played with one player on each side (singles) or two players on each side (doubles). The goal is to score points by hitting the shuttlecock over the net and onto the opposing side so that it cannot be returned. Because of its accessibility and simple rules, badminton is a popular pastime for many people. Beyond casual play, it is also a recognised competitive sport, featuring

everything from informal neighbourhood matches to major international championships that draw elite athletes from around the globe.

Anxiety can have both helpful and harmful effects on badminton players, both mentally and physically. Difficulty focusing, poor decisions and mistakes on the court can result from feeling anxious. Physiologically, anxiety triggers the release of stress hormones, which can cause tense muscles, a faster heartbeat and shaky hands. These physical symptoms can negatively affect a player's coordination, reaction time and overall performance, making it difficult for shots to be executed accurately and for movement to remain effective.

A moderate degree of anxiety can act as a helpful stimulus, sharpening focus and boosting motivation to prepare for a match; increased alertness and better anticipation of an opponent's moves can also result. However, excessive anxiety can be a genuine problem, producing stress, worry and physical symptoms such as a racing heart or tense muscles, which can hinder performance on the court and reduce enjoyment of the game (Jones, 1995). The pressure to perform well, especially in competitive settings, can also trigger anxiety in some individuals.

Research on psychological factors in badminton has largely concentrated on anxiety and on psychological training. In a systematic review, Bafirman et al. (2024) found that techniques such as goal setting, relaxation, mental imagery and mental-strength training improved badminton performance. They suggested that adding psychological training to regular practice can raise motivation, reduce competition anxiety, sharpen focus and build mental toughness, so they regarded sport psychology as an essential part of badminton training, ideally tailored to each athlete's needs. Studies of anxiety in badminton players show differences by gender and by level of play. Patel and Panchal (2024) assessed 48 collegiate players aged 18–21 years (24 female, 24 male) with the Sports Anxiety Scale-2. Female players reported higher overall anxiety than male players, mainly in somatic anxiety and worry, while concentration disruption did not differ significantly between the sexes. In Iran, Reddy et al. (2012) compared 30 elite and non-elite players aged 19–27 years, using the Competitive State Anxiety Inventory-2 before competition. Overall competitive state anxiety, somatic anxiety and self-confidence did not differ significantly between the groups, but cognitive anxiety was significantly related to training experience. Taken together, these studies show that anxiety is a meaningful concern in badminton and that psychological training can help manage it. None of them, however, looked at players' positive and negative mood around a match, which is the gap the present study addresses.

Findings from earlier studies suggest that pre-competition anxiety is often elevated and may hamper performance in some athletes (Adi et al., 2023), while post-competition anxiety or negative emotion was reported to be lower in some samples; match outcome appears to matter, as winners showed larger reductions in state anxiety (Villafaina et al., 2022). The PANAS has generally been reported to have appropriate reliability and validity (Mohammadi, 2011; Watson et al., 1988; Yanjana et al., 2025).

The use of PANAS in badminton research has rarely been examined, providing a strong rationale for further work in this area. Similarly, PANAS has not been widely used in other racket sports, leaving further scope for future research.

1.1 Objectives of the Study

- To analyse the level of Positive Mood among badminton players before and after a friendly match.
- To analyse the level of Negative Mood among badminton players before and after a friendly match.

1.2 Delimitations

The present study was delimited to the following aspects.

- The study was delimited to male subjects only.
- The subjects were selected from the Residential Badminton Training Centre, Khelgaon, Ranchi, Jharkhand.
- The age of the subjects ranged between 18 and 23 years.
- The study was delimited to measuring mood (as an indicator of pre- and post-match emotional state) through the Positive and Negative Affect Schedule (PANAS) questionnaire.

1.3 Limitations

- Experience and training background were not considered.
- No specific motivational techniques or devices were used to motivate or discourage the subjects before and after the match.
- The social and financial status of the subjects was unknown.
- The match was a friendly match, and its outcome (win or loss) and the players' performance were not recorded.
- The sample was small ($N = 15$), all male, drawn by convenience sampling from one training centre, and had no control group, which limits generalisation.
- PANAS is a general, self-report measure of mood; it is not a sport-specific or physiological measure of anxiety.

2. Methodology

2.1 Study Location

The study was conducted at the Thakur Vishwanath Shahdeo Indoor Stadium, Ranchi, which operates as a residential badminton training centre. This location was selected because the players followed a daily routine that included food and lodging arranged according to their match-performance requirements (Figure 1).



Figure 1: Thakur Vishwanath Shahdeo Indoor Stadium, Ranchi

2.2 Subjects

Participants for this study were selected from the Residential Badminton Training Centre, Khelgaon, Ranchi, Jharkhand. The subjects' daily routine was also taken into consideration, and is summarised in Table 1.

Table 1: Daily Routine

Morning Reporting Time	Training Session	Breakfast	School/College	Lunch	Resting Period	Evening Training Session
5:30 am	6-8 am	8:30-9:30 am	10:00 am-1:30 pm	2:00-3:00 pm	3:00-4:30 pm	5:00-6:30 pm

A total of 15 participants were selected using convenience sampling from among the badminton players present at the academy.

2.3 Variables

Variables relating to human psychology were used to measure mood (emotional state), as human psychology deals with the mental states that regulate behaviour. The PANAS questionnaire was used as the psychological measure for data collection (Figure 2).

2.4 Tests and Tools

PANAS-GEN

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you **GENERALLY** feel this way, that is how you feel **ON AVERAGE**.

Use the following scale to record your answers.

	Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
Interested	☐	☐	☐	☐	☐
Distressed	☐	☐	☐	☐	☐
Excited	☐	☐	☐	☐	☐
Upset	☐	☐	☐	☐	☐
Strong	☐	☐	☐	☐	☐
Guilty	☐	☐	☐	☐	☐
Scared	☐	☐	☐	☐	☐
Hostile	☐	☐	☐	☐	☐
Enthusiastic	☐	☐	☐	☐	☐
Proud	☐	☐	☐	☐	☐
Irritable	☐	☐	☐	☐	☐
Alert	☐	☐	☐	☐	☐
Ashamed	☐	☐	☐	☐	☐
Inspired	☐	☐	☐	☐	☐
Nervous	☐	☐	☐	☐	☐
Determined	☐	☐	☐	☐	☐
Attentive	☐	☐	☐	☐	☐
Jittery	☐	☐	☐	☐	☐
Active	☐	☐	☐	☐	☐
Afraid	☐	☐	☐	☐	☐

Figure 2: PANAS-GEN Questionnaire

The Positive and Negative Affect Schedule (PANAS) is a widely used self-report questionnaire in psychology that assesses two independent dimensions of mood: Positive Mood (PA) and Negative Mood (NA). The Negative Mood scale is related to anxiety and general distress, but the PANAS measures general mood rather than sport-specific anxiety. PANAS is commonly used by researchers and clinicians to evaluate changes in mood states over time or in response to interventions. Its brevity and ease of administration are considered to make it a practical tool for both research and clinical settings. PANAS was developed by Watson et al. (1988) and consists of 20 items. The Positive Mood items are numbers 1, 3, 5, 9, 10, 12, 14, 16, 17 and 19; the Negative Mood items are numbers 2, 4, 6, 7, 8, 11, 13, 15, 18 and 20.

2.5 Criterion Measures

All items were scored on a 5-point Likert scale, as shown in Table 2.

Table 2: Five-Point Likert Scale

Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely
1	2	3	4	5

2.6 Design of the Study

An analytical study design was used, in which pre-match and post-match mood (Positive and Negative Mood) were measured (Figure 3), following this sequence: pre-test (PANAS questionnaire), a 15-minute pre-match interval, competition, and post-test (PANAS questionnaire).

2.7 Administration of the Test



Figure 3: Data Collection, GPS-tagged (Ranchi, Jharkhand, 20 March 2025)

A consent form was given to participants before data collection. The PANAS questionnaire was administered to the players before the match, with each item explained in detail, and the same questionnaire was administered again immediately after the match to collect post-match data, in accordance with the ethical considerations applicable to research involving human participants.

2.8 Procedure of Data Collection

Data were collected using the PANAS questionnaire. Subjects were briefed on the questionnaire and its procedure, with all items explained before the match. Participants were informed that the same questionnaire would be administered again after the match to assess any change in their mood state.

2.9 Analytical Procedure

Descriptive statistics are reported as mean and standard deviation. A paired-samples *t*-test was used for analysis, with the level of significance set at $p \leq 0.05$. Because of the small sample ($N = 15$), Wilcoxon

signed-rank tests were also computed as a robustness check, effect sizes are reported as Cohen's d_z , and a sensitivity analysis excluding one outlying case (Subject 10, whose post-match Negative Mood score was 32) is reported. PANAS Positive Mood and Negative Mood were analysed separately; they were not summed, because they are independent dimensions.

3 Results and Discussion

3.1 Findings

Data were collected from 15 badminton-player subjects via questionnaire and analysed using a paired-samples t -test. The results are presented in Tables 3 and 4 and Figures 4 and 5.

Table 3: Analytical Table of Pre- and Post-match Positive Mood Scores (Significance Level 0.05)

Positive Mood Score	N	Mean	SD	p value
Pre	15	43.4	5.21	
Post	15	39.4	2.32	0.007

Table 3 shows that the mean pre-match and post-match Positive Mood scores were 43.4 and 39.4 respectively, with standard deviations of 5.21 (pre) and 2.32 (post). The paired-samples t -test indicated a statistically significant decrease, $t(14) = 3.17$, $p = 0.007$, mean difference = 4.0 (95% CI 1.3 to 6.7), $d_z = 0.82$ (large effect). The Wilcoxon signed-rank test agreed ($p = 0.013$). Twelve of the 15 players showed a decrease.

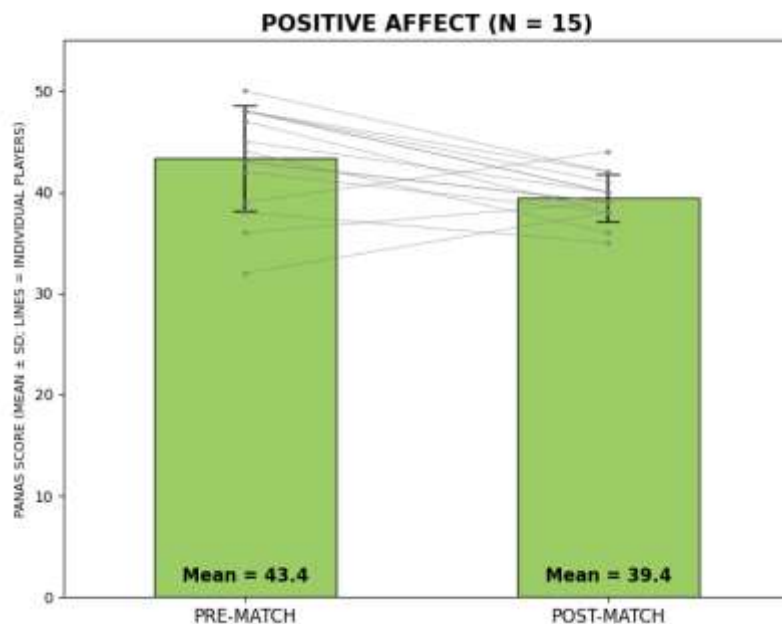


Figure 4: Graphical Representation of Positive Mood Score

Table 4: Analytical Table of Pre- and Post-match Negative Mood Scores (Significance Level 0.05)

Negative Mood Score	N	Mean	SD	p value
Pre	15	18.2	4.23	

Negative Mood Score	N	Mean	SD	p value
Post	15	16.2	6.00	0.213

Table 4 shows that the mean pre-match and post-match Negative Mood scores were 18.2 and 16.2 respectively, with standard deviations of 4.23 (pre) and 6.00 (post). The paired-samples *t*-test indicated no statistically significant difference, $t(14) = 1.30$, $p = 0.213$, mean difference = 2.0 (95% CI -1.3 to 5.3), $d_z = 0.34$, although a slight decrease was observed. The Wilcoxon signed-rank test, which is less affected by extreme values, gave $p = 0.030$.

Sensitivity analysis: Subject 10's post-match Negative Mood score (32) was far outside the range of the other players (10-21) and rose from 15 before the match. When this player was excluded ($n = 14$), pre- and post-match Negative Mood means were 18.4 and 15.1, and the decrease was statistically significant, $t(13) = 4.37$, $p < 0.001$, $d_z = 1.17$. The Positive Mood result remained significant without this player ($p = 0.001$). The Negative Mood conclusion therefore depends on one player and should be interpreted with caution; the original data sheet for this player should be verified.

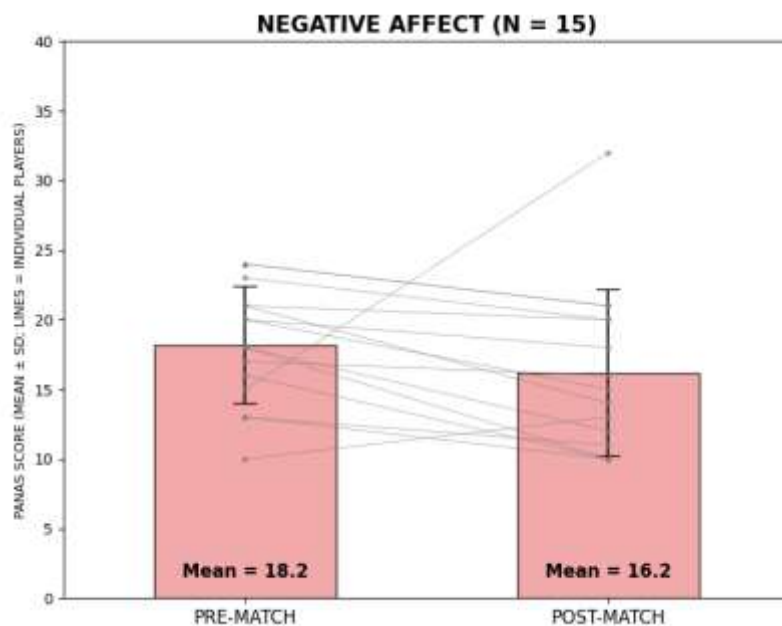


Figure 5: Graphical Representation of Negative Mood Score

3.2 Discussion of Findings

Competitive situations evoke both positive and negative mood in athletes. In the present study the two were analysed as separate dimensions, and both mean scores were lower after the friendly match than before it (Figures 4 and 5). Anxiety is widely seen as a major influence on competitive performance, and because winning is so central to many players' satisfaction and ability to keep performing, pre-match emotions matter for badminton players. Pre-competition emotions in badminton are often mixed. Abián-Vicén et al. (2015) found that young badminton players mostly reported emotional and behavioural stress symptoms before competing, although the players were also enthusiastic about the match. This is consistent with our finding that players reported positive and negative mood together before the match. Whether such emotions help or hinder performance varies from player to player.

Mean Positive Mood was significantly higher before the match than after it (Table 3). Because the Positive Mood items describe feeling excited, enthusiastic, alert and active, a pre-match peak followed by a post-match fall probably reflects the release of pre-competition arousal and the physical fatigue that follows play, rather than any psychological disturbance. This explanation is tentative, since arousal and fatigue were not measured separately. Post-play psychobiosocial states in competitive badminton have also been shown to differ between juniors, adolescents and adults (Chia-Smith, 2019).

Players are also influenced before a match by tension, stress and fear, which tend to raise anxiety. The amygdala is thought to be central to detecting threat and triggering the fight-or-flight response, although brain activity was not measured here. The mean pre-match Negative Mood score was also higher than the post-match score, but the difference was not statistically significant and rested largely on one player whose Negative Mood rose after the match. Before a match, players may worry about winning or losing or doubt their own ability, which can weaken self-confidence. Such worries may persist afterwards, for instance about a tougher future match or how an opponent might play against them.

Evidence from badminton suggests that competitive anxiety does not differ simply by playing level: Reddy et al. (2012) found no overall difference between elite and non-elite players, although cognitive anxiety was related to training experience, and Bhowmik and Bhowmik (2023) found pre-competitive anxiety at similar levels in badminton and table tennis players. Anxiety also appears to be modifiable, as imagery training reduced cognitive and somatic competitive anxiety and raised self-confidence in badminton athletes (Fauzan et al., 2025), in line with the wider evidence that psychological training benefits badminton players (Bafirman et al., 2024). Match outcome was not recorded in this study, so winners and losers could not be compared; work with junior tennis players suggests that outcome can influence post-match anxiety (Villafaina et al., 2022).

In summary, Tables 3 and 4 and Figures 4 and 5 show that Positive Mood was significantly lower after the match, whereas the fall in Negative Mood was small and not statistically significant in the full sample.

4 Conclusion and Recommendations

4.1 Conclusion

Badminton, a game of Indian origin known historically as "Poona" before being renamed badminton, is considered the fastest racket sport in the world, placing significant physiological demands on players in the form of agility, coordination and reaction time, and psycho-physiological demands in the form of emotional stability and rapid decision-making. In this sample of 15 male badminton players, Positive Mood was significantly lower after a friendly match than before it, whereas the decrease in Negative Mood was small and not statistically significant, and it depended on a single player's score. Because performance and match outcome were not measured, and the sample was small and from one centre, the findings describe changes in self-reported mood only and cannot be used to draw conclusions about performance or anxiety in competitive matches.

4.2 Recommendations

- A sport-specific (badminton) anxiety test could be used in future research for a more targeted result.
- The General Sports Anxiety Test could be used to analyse anxiety levels among sportspersons more broadly.
- In addition to this subjective test (PANAS), an objective measure such as skin conductance could be included for greater accuracy.
- Further refinement or adaptation of the PANAS test for sport-specific contexts is recommended.

- Other anxiety tests and scales, such as the Sport Competition Anxiety Test (SCAT) and the Sport Anxiety Scale-2 (SAS-2), could be used in future research.
- The State-Trait Anxiety Inventory (STAI) could be considered as a general measure of anxiety.
- New, badminton-specific anxiety assessment tools may be developed.
- Match outcome (win or loss) and performance indicators should be recorded in future studies so that their relationship with pre- and post-match mood can be examined, using larger and more diverse samples and competitive (not only friendly) matches.

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