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A gender-based study of badminton players: Coping mechanisms and affective executive functioning during university level badminton matches

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Abstract
Background: The present study aimed to explore the patterns of cognitive emotion regulation among university-level badminton players during competitive matches. The term "cognitive emotion regulation" describes the deliberate mental techniques people employ to control and react to emotionally charged circumstances. Comprehending these regulating mechanisms becomes key in competitive sports like badminton, where psychological resilience and emotional control are critical to performance.
Objectives: With an emphasis on detecting any gender-based disparities, this study carefully examined how male and female athletes cognitively control their emotions during university-level matches. 1) To characterize the level of cognitive emotion regulation of university-level male and female badminton players during competitive matches. 2) To compare the mean scores of cognitive Emotion regulation between Male and Female university-level badminton players during competitive matches.
Material and Methods: Badminton Players answered questions about the Cognitive Emotion Regulation Questionnaire, developed by Dr. Nadia Garnefski and Dr. Vivian Kraaij. To determine the cognitive regulation of emotions in players, Descriptive Statistics were used, and to compare mean scores, an Independent T-Test was applied.
In this study, Competitive University Level Female (N=15, Mean=11.22, S.D. =1.40) and Male (N=15, Mean=11.33, S.D. =1.81) Badminton Players were taken into account. Results showed no significant difference (p=0.85) to be found between the mean scores of cognitive emotion regulation of male and female university-level badminton players. It is anticipated that the results of this study will aid in the psychological profiling of athletes and assist sport psychologists and coaches in creating specialized therapies to improve performance under duress.

Keywords: Badminton, cognitive-coping strategies, cognitive-emotion regulation

Introduction
Athletes often encounter emotionally intense moments during matches, and their success can depend significantly on how effectively they manage these emotions. Understanding these regulatory processes offers valuable insights into the psychological resilience and coping mechanisms employed by athletes during competition. In the game of badminton, badminton psychology is crucial, particularly if you're playing competitively (in official or unofficial contests). You may occasionally be forced to play badminton on courts where you have never played before to compete. Some players will have a big "home ground advantage" because they have played on that specific court, which could strengthen their mental toughness (Zhang *et al*., 2013) [12]. Nonetheless, you can become accustomed to rallies and take control of a game with the aid of sound badminton psychology. This might assist you in defeating your opponent's mind tricks in badminton. Psychology of badminton: Things Aiming against You. Due to the quick growth of sports in recent years, more and more individuals are participating in them daily. The benefits of fewer field constraints and ease of learning have made badminton one of the most well-liked sports among them (Xie *et al*., 2022) [11].
Although the origins of the sport are thought to date back more than 2000 years, the Duke of Beaufort is credited with creating the contemporary form of the game in Gloucestershire, England, in 1873 after bringing it back from India. The IBF, which is currently the Badminton World Federation (BWF), was founded in 1934.
Badminton, being a fast game, demands high accuracy in visual abilities, especially at the

elite level. Not just to judge the speeding shuttle but also to estimate the path of trajectory, to place the racket accordingly and analyse its impact, check the position of the opponent; to push the opponent in utmost uncomfortable position forcing him a weak or no return are major challenges one must overcome positively through good interaction of one's visual and motor skill.

Emotion is a multifaceted experience of awareness, physical feeling, and behaviour that expresses the individual meaning of an object, an occasion, or a situation. The family of theories of emotion known as the cognitive theory of emotion contends that thinking or cognition must go hand in hand with emotional experiences. A general phrase for theories of emotion that attempt to address the issue, "How do feelings and thinking interact?" is the cognitive theory of emotion. Cognitive techniques provide a clear connection between psychological research on emotions and how people think about them in daily life. Researchers in cognitive science have concentrated on the relationship between events and other people's concerns and emotions, as well as how emotions affect cognitive functions, including memory, attention, and reasoning (Oatley & Laird, 2014) [7]. Specifically, techniques like self-assurance, mindfulness, inspiration, goal setting, and focus exercises tailored to the unique requirements and characteristics of each athlete can be used (Gülsüm Baştuğ, 2017) [2].

The objective of the sport of badminton, which can be played by two people cooperatively or by two people alone, is to toss a ball composed of plastic or goose feathers over a net with a light racket held in one hand and drop the ball into the opponent's field. The game depends on quick thinking, reflexivity, skill, coordination, and quick decision-making (Gulsum BASTUG, 2017) [2]. For example, when faced with an anxiety-inducing scenario, an athlete may visualize it as either nerve-racking or reappraise it to see it as a chance to learn more about their performance, which lessens the situation's seriousness.

Investigations into Emotion Regulation and Sports Performance

(Wagstaff, 2014) [10]: A single-blind, within-participant, counterbalanced, repeated-measures approach was employed in this study to investigate the connection between emotional control and athletic performance. Four laboratory-based conditions—familiarization, control, emotion suppression, and non-suppression—were completed by twenty competitive athletes. Participants in each condition finished a 10-kilometer cycling time trial that called for self-control. Before beginning the cycle task, participants in the experimental circumstances watched a disturbing movie. In contrast to the non-suppression condition, which involved no video treatment, the suppression condition involved participants suppressing their emotional reactions to the video in order to complete the cycling task more slowly, generate lower mean power outputs, reach a lower maximum heart rate, and perceive greater physical exertion. The findings support earlier studies on the regulation of persistence on physical activities and imply that emotional self-regulatory resource impairment influences perceived exertion, pace, and athletic performance. Relevant psychophysiological theories of fatigue and self-regulation are examined concerning the data, and practical implications for performance and well-being are proposed. (Mark A. Uphill, 2012) [5] Three studies investigate the Emotion Regulation Questionnaire for use with athletes in terms of its factorial validity, internal consistency, test-retest stability, and criterion validity.

(Sergio Costa, 2020) [9]: Athletes and adversities: athletic identity and emotional regulation in time of COVID-19. They told about the cognitive emotion control techniques vary depending on the competitive level and gender. Lastly, there is a tendency for athletes with stronger athletic identities to overthink and overanalyse.

(Salehian, 2021) [8]. The main purpose of this research was to study the effect of emotional regulation on athletic performance. The present research was descriptive-correlational in terms of research method and applied in terms of purpose and survey in terms of data collection method, which was conducted in the field. The statistical population of this study includes all male athletes in Bayburt in team (football, volleyball, and handball) and individual (track and field, judo), with an average age of 16 ±2.6 years. The results showed that the athletic performance of high-school male students can be affected by Cognitive Emotion Regulation, and by training emotions, their performance can improve.

Materials and Methods

The key elements and steps taken to carry out the research are described in the Materials and Methods section. It acts as a thorough guide that enables additional researchers to comprehend, duplicate, or expand the work. The term "materials" in this study refers to the instruments and tools used, most notably the Cognitive Emotion Regulation Questionnaire (CERQ), a standardized scale used to evaluate different cognitive processes people employ to control their emotional reactions. It guarantees the validity and reliability of the assessment of cognitive emotion control. The sampling strategy, participation criteria, overall research design, and statistical procedures used to analyse the data are all referred to as methodologies. In order to measure and compare male and female badminton players objectively, a quantitative comparative design was used. Participants with relevant sports experience were chosen through purposeful sampling, and an independent samples t-test was performed to analyse the data and determine whether there were any significant variations between the genders in the cognitive emotion regulation patterns. The findings' reliability, correctness, and reproducibility are guaranteed by this methodical technique.

Selection of Subjects

To attain the purpose of the study, 15 male and 15 female University Badminton Players were selected as subjects from the West Zone Inter-University Badminton Tournament. The age of the players ranged between 18 to 25years. Before the researcher administered the cognitive emotion regulation test, all individuals were informed about the testing protocol and the study's aims. The researcher sincerely asked the subjects to extend their full cooperation for the accuracy of the research before administering the test.

Administration of Test

Cognitive Emotion Regulation Questionnaire for the participant player's cognitive emotion levels, developed by Nadia Garnefski, Vivian Kraaij, and Philip Spinhoven, was

used (Nadia Garnefski, 2017) [3]. The CERQ is a multifaceted assessment tool designed to pinpoint the cognitive coping mechanisms that individual employs following adverse experiences or circumstances. The questionnaire consists of 36 items, where the items are further classified into nine scales, so that all the subscales of the CERQ contain four items. The scores of the questionnaire are in the form of a five-point Likert scale (1-almost never to 5-almost always). The following are the names of the subscales based on which scoring has been awarded: Self-blame, Acceptance, Rumination, Positive Refocusing, refocus on planning, Positive Reappraisal, Putting into perspective, Catastrophizing, and other blame. The test was administered via a pen and paper version.

Results and Interpretation

Descriptive statistics were utilized to determine the players' emotions and cognitive regulation, and an independent T-test was employed to compare mean results. As seen in Table 1, the Cognitive Emotion Regulation mean scores for the girls and boys calculated are: Mean=11.22(S.D.=1.40) for girls and Mean=11.33(S.D.=1.81) for boys and Table 2, shows that any significant differences were not found between the mean scores calculated between the male and female university level badminton players(p=0.85).

Table 1: Group Statistics

Groups		N	Mean	Std. Deviation	Std. Error Mean
CER	GIRLS	15	11.2293	1.40689	.36326
	BOYS	15	11.3393	1.81014	.46738

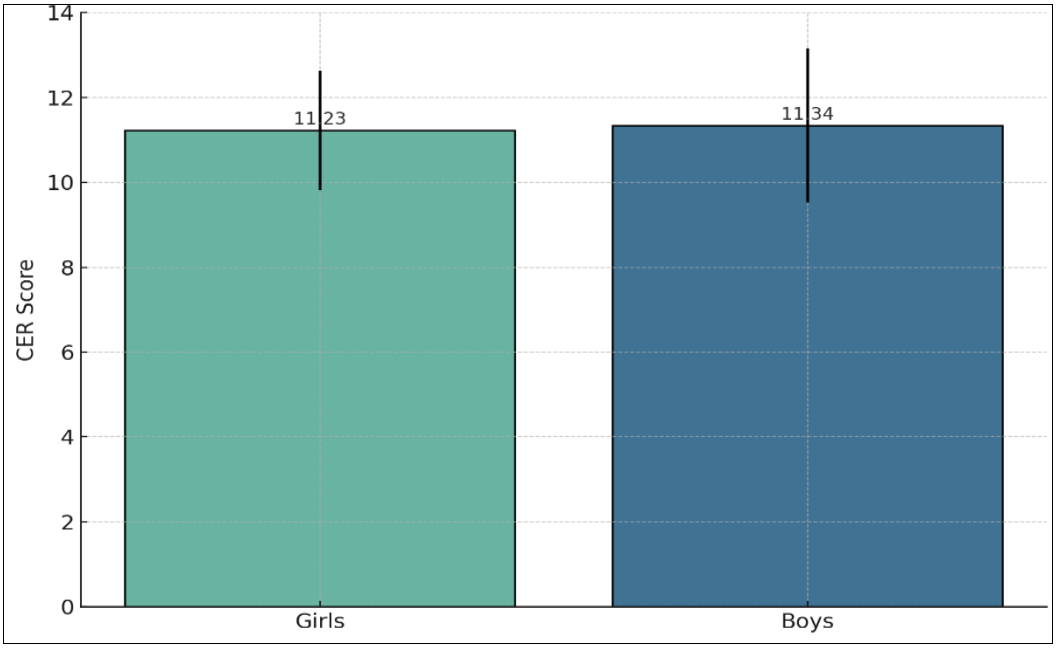

Fig 1: Mean cognitive emotion regulation (CER) Scores with standard deviation

The Group Statistics table presents a comparison of Cognitive Emotion Regulation (CER) scores between university-level male and female badminton players. Both groups consisted of 15 participants, ensuring a balanced representation for gender-based comparison. The mean CER score for girls was 11.2293, while for boys it was slightly higher at 11.3393, indicating a very minimal difference in the average use of cognitive emotion regulation strategies between the two groups. The standard deviation was 1.40689 for girls and 1.81014 for boys, suggesting that boys displayed slightly more variability in their responses, indicating greater individual differences in how they regulate emotions. The standard error of the mean was lower for girls (0.36326) compared to boys (0.46738), implying a slightly more consistent average score among female participants. Overall, these results suggest that both male and female university-level badminton players exhibit similar levels of cognitive emotion regulation, with only marginal gender-based differences observed. However, further statistical analysis, such as an independent samples t-test, would be required to determine whether this difference is statistically significant.

Table 2: t-test for Equality of Means

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
-.186	28	.854	-.11000	.59194	-1.32254	1.10254
-.186	26.392	.854	-.11000	.59194	-1.32588	1.10588

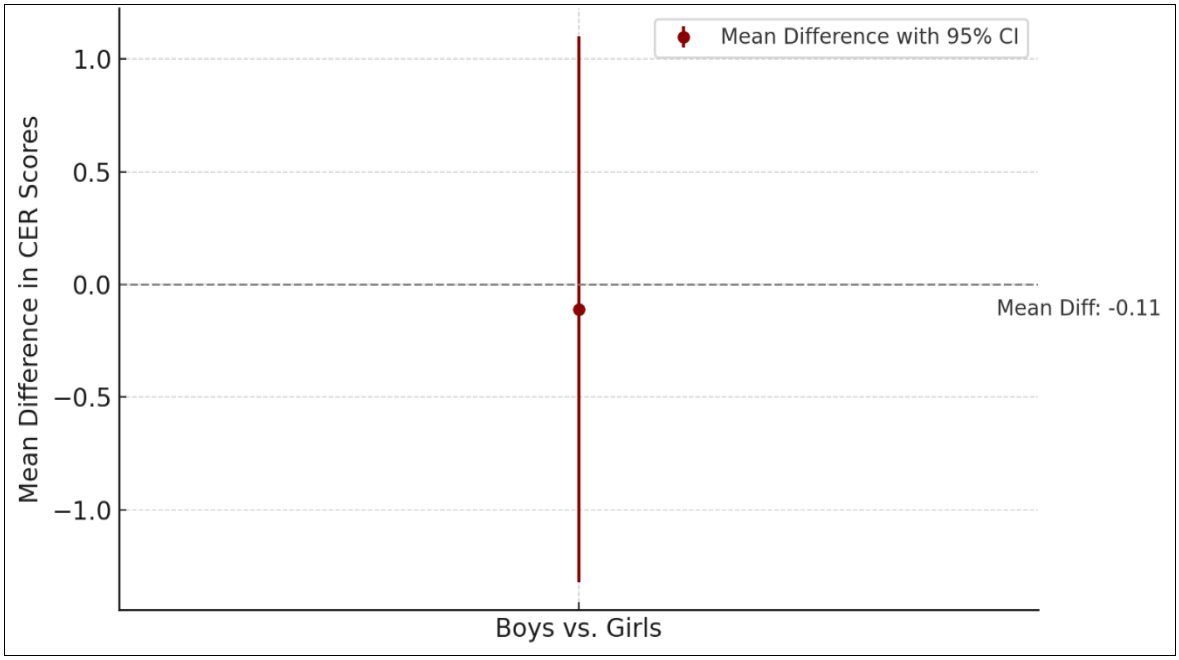

Fig 2: Mean Difference with 95% Confidence Interval (Cognitive Emotion Regulation Scores)

The independent samples t-test was conducted to examine whether there was a significant difference in cognitive emotion regulation between male and female university-level badminton players. The results revealed a t-value of -0.186 with 28 degrees of freedom and a significance level (p-value) of 0.854, which is well above the threshold of 0.05. This indicates that the difference in mean scores between boys and girls is not statistically significant. The mean difference was found to be -0.11000, suggesting that boys scored slightly higher than girls on average. However, this difference is minimal and not meaningful. Additionally, the 95% confidence interval for the difference ranged from -1.32254 to 1.10254, which includes zero, further confirming the lack of a statistically significant difference. Therefore, it can be concluded that both male and female badminton players at the university level exhibit similar patterns of cognitive emotion regulation.

Discussions

This study found no discernible variations between the aforementioned genders in the patterns of cognitive emotion regulation of male and female university-level badminton players. While both groups exhibit similar levels of cognitive emotion regulation, with negligible differences in mean scores, boys show slightly higher variability. This preliminary result suggests no major gender-based difference in how university-level badminton players regulate emotions cognitively. However, a t-test would be required to determine whether this observed difference is statistically significant. The independent samples t-test reveals that gender does not significantly influence the cognitive emotion regulation strategies of university-level badminton players. Both male and female players appear to use similar mental strategies during competition.

Coaches and physical educators should consider integrating cognitive emotion regulation training into regular coaching sessions to enhance athletes' mental preparedness and on-court decision-making. Future research should involve longitudinal designs to examine how cognitive emotion regulation evolves with experience and exposure to high-pressure matches. Similar studies should be conducted across different sports, age groups, and competitive levels to generalize findings and understand sport-specific emotional Demands. Future research may explore the relationship between CER and other psychological constructs such as competitive anxiety, resilience, and performance outcomes. Since no significant gender difference was found, mental training programs can be designed to be inclusive and equally applicable to both male and female athletes.

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