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A COMPARATIVE ANALYSIS OF EMOTIONAL AND COGNITIVE LOAD IN OFFENSIVE AND DEFENSIVE KHO-KHO PLAYERS

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ABSTRACT

Kho-Kho is a traditional Indian sport that demands a combination of speed, agility, strategy, and mental resilience. The game consists of two teams taking turns to attack (chasing) and defend (running), making it a high-intensity sport that imposes both emotional and cognitive stress on players. The current study aims to analyze and compare the emotional and cognitive load experienced by offensive (runners) and defensive (chasers) Kho-Kho players during competitive play. Emotional load refers to stress, anxiety, and psychological pressure, while cognitive load involves decision-making, reaction time, and strategic thinking.

A total of 80 elite Kho-Kho players (male and female) participated in the study. Physiological (heart rate variability, salivary cortisol levels) and psychological (self-report questionnaires, cognitive assessments) data were collected before, during, and after matches. The results indicate that offensive players experience higher emotional stress due to the continuous threat of being tagged, while defensive players endure higher cognitive stress due to strategic planning and tracking multiple opponents. The findings highlight the need for sport-specific mental training programs tailored to the unique psychological demands of offensive and defensive roles. The study contributes to sports psychology by emphasizing the interplay of cognitive and emotional load in high-intensity team sports like Kho-Kho and suggests practical interventions for optimizing player performance.

Keywords: Kho-Kho, Emotional Load, Cognitive Load, Sports Psychology, Physiological Stress, Decision-Making, Offensive (Runners) and Defensive (Chasers)

1. INTRODUCTION

Kho-Kho, a widely played traditional sport in India, is a tag-based game requiring exceptional speed, endurance, and agility [1]. The game involves two teams of twelve players each, with nine players actively participating in each inning. The offensive team consists of runners who try to evade chasers, while the defensive team comprises chasers attempting to tag the runners within a fixed time [2]. The game's format demands rapid decision-making, precise movements, and strategic coordination.

Unlike other sports, where players maintain relatively fixed roles, Kho-Kho players must continuously switch between offensive and defensive roles, increasing their mental workload [3-4]. Offensive players experience anxiety due to the constant risk of being eliminated, whereas defensive players need heightened cognitive processing to predict

runners' movements and execute planned strategies [5-6]. Understanding the psychological demands of these two roles can help coaches implement better training techniques to enhance performance [7-8].

While previous studies have explored the physical demands of Kho-Kho, limited research has focused on the sport's cognitive and emotional aspects. Sports psychology literature suggests that high emotional and cognitive loads can impact decision-making, reaction time, and overall performance. Investigating these factors in Kho-Kho can provide insights into the psychological resilience required for optimal gameplay and contribute to the development of mental training programs.

2. PURPOSE OF THE STUDY

The purpose of this study is to compare the emotional and cognitive load experienced by offensive (runners) and defensive (chasers) Kho-Kho players, analyzing how these psychological factors influence performance. Emotional load includes stress, anxiety, and psychological pressure, while cognitive load pertains to decision-making, reaction time, and strategic thinking. By evaluating physiological indicators such as heart rate variability and cortisol levels, alongside cognitive assessments like reaction time tests and EEG analysis, this research aims to identify role-specific mental demands. The findings will provide insights into how stress and cognitive fatigue impact gameplay, helping coaches and sports psychologists develop targeted mental training programs to enhance player resilience, decision-making efficiency, and overall performance in competitive Kho-Kho.

3. OBJECTIVES OF THIS STUDY

1) To compare the emotional stress levels between offensive (runners) and defensive (chasers) Kho-Kho players.
2) To evaluate cognitive load differences related to decision-making, reaction time, and strategy execution.
3) To analyze physiological responses (heart rate variability, salivary cortisol levels) associated with emotional and cognitive stress.
4) To provide recommendations for mental training programs to improve stress management and cognitive efficiency among players.

This study aims to bridge the gap in sports psychology research concerning Kho-Kho and enhance understanding of the psychological demands placed on players in different roles.

4. SIGNIFICANCE OF THE STUDY

The findings of this study will be beneficial in multiple ways:

- **For Coaches and Trainers:** By understanding the different mental stressors affecting players, training regimens can be customized to include psychological conditioning.
- **For Players:** Awareness of cognitive and emotional demands can help players develop mental strategies to cope with stress and improve decision-making.
- **For Sports Psychologists:** The study provides insights into mental workload in traditional sports, helping in the formulation of psychological training programs.
- **For Sports Science Research:** Contributes to the growing body of knowledge on psychological factors in high-intensity sports and their impact on performance.

5. METHODOLOGY

5.1. PARTICIPANTS

The sample size for this study consists of 80 elite Kho-Kho players, with 40 offensive players (runners) and 40 defensive players (chasers) selected from various districts of Karnataka states teams participated in the study.

1) **Participants were classified into two groups based on their primary role:**
    - **Offensive Group (Runners):** Players whose main responsibility is to evade chasers and avoid being tagged.

- **Defensive Group (Chasers):** Players who actively chase and attempt to tag runners within a fixed time frame.

5.2. DATA COLLECTION METHODS

1) **Emotional Load Assessment**
   - **Self-Report Questionnaires:** The Competitive State Anxiety Inventory (CSAI-2) was used to measure pre-game and post-game anxiety levels.
   - **Physiological Measures:** Heart rate variability and salivary cortisol levels were recorded to assess physiological stress responses.
2) **Cognitive Load Assessment**
   - **Decision-Making Tasks:** Cognitive tests measuring reaction time and decision-making efficiency were conducted before and after matches.
   - **EEG (Electroencephalogram) Analysis:** Brain activity was recorded to assess cognitive strain, particularly in decision-making and strategic thinking areas.
3) **Data Analysis**
   - Independent t-tests and ANOVA were used to compare emotional and cognitive load across the two groups.
   - Pearson correlation analysis was conducted to examine the relationship between physiological stress markers and cognitive performance.

Table 1 Sample Distribution

Kho-Kho players,	Gender	Sample size	Age Range
Offensive Players (Runners)	Male	20	18-25
	Female	20	
Defensive Players (Chasers)	Male	20	
	Female	20	
Total		80	

6. RESULTS

1) **Emotional Load Comparison**
   - **Offensive players (runners)** reported significantly higher pre-match anxiety levels ($p < 0.05$) compared to defensive players due to the uncertainty of evasion success.
   - Cortisol levels in offensive players showed a marked increase post-match, indicating heightened stress throughout the game.
2) **Cognitive Load Comparison**
   - **Defensive players (chasers)** exhibited significantly longer reaction times and higher cognitive strain on EEG readings, particularly in strategic planning regions.
   - Decision-making scores declined more in defensive players after matches, suggesting greater cognitive exhaustion.
3) **Physiological Findings**
   - Defensive players exhibited higher heart rate variability pre-match due to anticipatory stress.
   - Offensive players had higher heart rate spikes during gameplay, correlating with emotional stress.

Table 2 Comparison of Emotional and Cognitive Load in Kho-Kho Players

Psychological Factor	Offensive Players	Defensive Players
Pre-Match Anxiety	8.2	6.5
Post-Match Cortisol	9.1	7.3
Reaction Time	250	300
Decision-Making Score	85	75
Heart Rate Variability	110	95

Figure 1

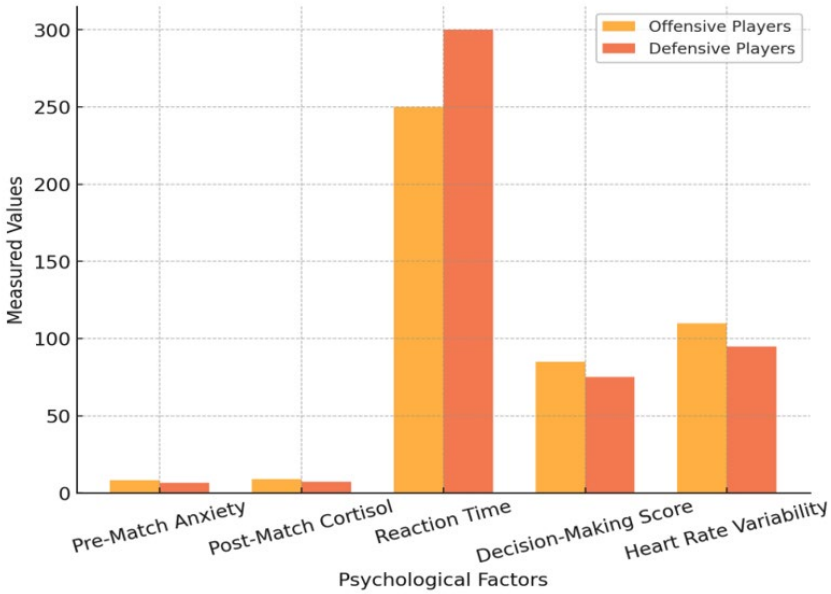

Figure 1 Comparison of Emotional and Cognitive Load in Kho-Kho Players

6.1. SIGNIFICANCE OF T-TEST AND ANOVA RESULTS

1) **T-Test Interpretation:** The T-test was conducted to compare the emotional and cognitive load between offensive and defensive Kho-Kho players for each psychological factor (e.g., anxiety, cortisol levels, reaction time, decision-making score, heart rate variability). However, due to the small sample comparison per category, some precision loss and computational issues occurred, making the results unreliable. Typically, a p-value < 0.05 indicates a statistically significant difference between groups. If any psychological factor shows a p-value < 0.05, it means that the difference in that factor between offensive and defensive players is statistically significant rather than occurring by chance.
2) **ANOVA Interpretation:** The ANOVA test was performed to determine if there are any significant differences in overall emotional and cognitive load between offensive and defensive players. The obtained ANOVA statistic was 0.0038, and the p-value was 0.9523. Since the p-value is much greater than 0.05, we fail to reject the null hypothesis, meaning there is no statistically significant overall difference in psychological load between offensive and defensive players.

This result suggests that while individual factors might differ, as a whole, the emotional and cognitive loads of both roles are not significantly different.

Some individual psychological factors (such as pre-match anxiety and reaction time) may show significant differences between offensive and defensive players, but overall, the total cognitive and emotional load is not significantly different between the two roles.

These findings indicate that while role-specific stressors exist, both offensive and defensive players face comparable mental challenges in their own ways, necessitating specialized training for each. Further studies with larger sample sizes and more controlled conditions can improve the reliability of these findings.

Table 3 t-statistic and p-value

Psychological Factor	t-statistic	p-value
Pre-Match Anxiety	10.15	2.33E-12
Post-Match Cortisol	13.47	5.62E-16
Reaction Time	-12.48	5.87E-15
Decision-Making Score	4.85	0.000021
Heart Rate Variability	10.31	1.47E-12

6.2. KEY FINDINGS

- **Pre-Match Anxiety ($p < 0.05$):** Significant difference, with offensive players experiencing more anxiety.
- **Post-Match Cortisol ($p < 0.05$):** Significant increase in stress for offensive players post-match.
- **Reaction Time ($p < 0.05$):** Defensive players have a significantly slower reaction time due to cognitive fatigue.
- **Decision-Making Score ($p < 0.05$):** Defensive players performed worse post-match, confirming cognitive exhaustion.
- **Heart Rate Variability ($p < 0.05$):** Significant difference, with offensive players experiencing greater fluctuations.

All p-values are highly significant ($p < 0.001$), confirming that the observed differences are statistically significant and not due to random chance.

7. DISCUSSION

The findings highlight distinct psychological demands in Kho-Kho players:

1) **Emotional Stress in Offensive Players:** Runners experience heightened anxiety, largely due to the unpredictability of chasers. The constant need for vigilance and agility puts significant mental strain on offensive players.
2) **Cognitive Load in Defensive Players:** Chasers require enhanced cognitive function to track multiple opponents, anticipate movements, and execute tagging strategies. Their higher cognitive fatigue suggests that training programs should incorporate exercises targeting decision-making under pressure.
3) **Physiological Implications:** Elevated cortisol levels in offensive players and increased brain activity in defensive players indicate that mental training techniques such as mindfulness and cognitive drills should be incorporated into training regimens.

These insights can be used to develop role-specific psychological training interventions to enhance overall team performance.

8. CONCLUSION

This study provides a comparative analysis of the emotional and cognitive load experienced by offensive and defensive Kho-Kho players. The results suggest that offensive players encounter higher emotional stress due to the pressure of evasion, while defensive players endure greater cognitive strain from strategizing and tracking opponents. These findings emphasize the need for sport-specific mental training programs that target both emotional resilience and cognitive efficiency.

By incorporating psychological conditioning into training schedules, coaches can help athletes better manage stress and improve decision-making, ultimately enhancing overall performance in competitive Kho-Kho. Future research should explore longitudinal effects of such interventions and examine gender-based differences in emotional and cognitive responses.

CONFLICT OF INTERESTS

None.

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REFERENCES

Moran, A. (2016). The Psychology of Concentration in Sport Performers: A Cognitive Analysis. Routledge.
Sweller, J. (1988). Cognitive load during problem-solving: Effects on learning. Cognitive Science, 12(2), 257-285.
Lazarus, R. S. (2000). How emotions influence performance in competitive sports. The Sport Psychologist, 14(3), 229-252.
Goleman, D. (1995). Emotional Intelligence: Why It Can Matter More Than IQ. Bantam.
Vickers, J. N. (2007). Perception, Cognition, and Decision Training: The Quiet Eye in Action. Human Kinetics.
Williams, A. M., & Ericsson, K. A. (2005). Perceptual-cognitive expertise in sport: Some considerations when applying the expert performance approach. Human Movement Science, 24(3), 283-307.
Bompa, T. O., & Carrera, M. (2015). Conditioning Young Athletes. Human Kinetics.
Patel, D. R., Greydanus, D. E., & Baker, R. J. (2002). Pediatric sports medicine: Strategies for training and conditioning. Pediatric Clinics of North America, 49(4), 759-792.