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Profiling Motor and Cognitive Response Skills in Football Athletes

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ABSTRACT: Motor and cognitive response skills play a vital role in football performance, where rapid decision-making, precise movement coordination, and quick reactions determine competitive success. This study aims to profile the motor and cognitive response abilities of football athletes by assessing key components such as reaction time, decision-making speed, attention, coordination, and agility. Using standardized motor tests and cognitive performance assessments, data were collected from competitive football players across different playing positions. The findings indicate significant variations in both motor proficiency and cognitive processing among athletes, with midfielders demonstrating higher cognitive flexibility and defenders showing faster reflexive responses.

KEYWORDS: Motor skills, Cognitive response, Reaction time, Decision-making, Football athletes, Psychomotor performance.

I. INTRODUCTION

1.1 Overview of Physical Education and Sports Science

Physical education stands as a vital pillar in the framework of human advancement, weaving together purposeful physical activities that nurture fitness, dexterity, and all-encompassing wellness. It centres on directed movements that bolster muscular power, boost stamina, and cultivate mental acuity alongside emotional equilibrium. For generations, this domain has been esteemed for sparking dynamic ways of living, aiding individuals across age groups to weave exercise seamlessly into their routines for heightened energy and longevity. Within instructional arenas, physical education transcends simple drills, embedding core values like tenacity, unity, and self-regulation. By immersing in athletics and patterns of motion, people hone their equilibrium and vigor while nurturing affirmative bonds and a feeling of triumph. This all-embracing strategy accommodates varied populations, spanning from youthful students in academic halls to mature participants in communal initiatives, tackling concerns like lethargy and linked ailments such as excess body mass and circulatory troubles.

1.2 Definition and scope of physical education

Physical education constitutes a structured educational approach centered on engaging individuals in purposeful physical activities to foster comprehensive growth across multiple dimensions of human capability. It encompasses a systematic curriculum that integrates movement, exercise, and sport to enhance not only bodily functions but also cognitive processes and interpersonal dynamics. At its foundation, physical education is about cultivating an appreciation for active living, where participants learn to harness their physical potential through guided experiences that build endurance, flexibility, and coordination. This field views the body as a vehicle for learning, emphasizing how consistent involvement in activities like running, swimming, or team games can lead to improved health outcomes and a deeper understanding of personal limits and strengths. By promoting habits that encourage regular motion, physical education seeks to equip people with the tools to maintain vitality throughout their lifespan, addressing contemporary issues such as prolonged sitting and digital immersion that often lead to diminished physical well-being.

Expanding on this, physical education can be seen as a holistic pedagogy that blends kinesthetic learning with theoretical knowledge about the human body and its responses to exertion.

1.3 Definition of psycho-motor skills

Psycho-motor skills refer to the intricate blend of cognitive processes and physical actions that enable individuals to perform tasks requiring precise movement and quick decision-making. These skills represent the coordination between the brain's perceptual and interpretive functions and the body's muscular responses, allowing for effective interaction with the environment. In essence, they encompass abilities where mental awareness directs bodily execution, integrating sensory information with motor output to achieve goals efficiently. This domain is particularly relevant in



contexts like sports, education, and rehabilitation, where tasks demand not just strength or endurance but also timing, accuracy, and adaptability. Psycho-motor skills are developmental, meaning they can be honed through practice, and they span a spectrum from basic everyday actions, such as typing on a keyboard, to complex athletic maneuvers, like dodging an opponent in a game. The term "psycho-motor" highlights the psychological component—perception, attention, and judgment—fused with motor elements like force and direction, creating a holistic capability that underlies human performance.

1.4 Brief History and Evolution of Football in India

Football's journey in India began in the mid-19th century, introduced by British colonizers who brought the game as part of their recreational activities during the colonial era. Initially played among army personnel and European expatriates, the sport quickly took root in port cities like Calcutta, Bombay, and Madras, where it evolved from informal matches to organized competitions. By the 1870s, the first formal clubs emerged, with Calcutta FC established in 1872 as the pioneering entity, initially possibly focused on rugby before fully embracing association football. This marked the inception of structured play, as clubs formed by British traders, military units, and local enthusiasts began competing in friendly games that laid the groundwork for a burgeoning football culture. The game's appeal spread beyond the elite, captivating Indian communities who saw it as a means of physical expression and social gathering, even amidst the constraints of colonial rule. Early pitches were rudimentary, often on open grounds or maidan areas, but the enthusiasm grew, fostering a sense of camaraderie and competition that transcended social barriers.

As the 19th century progressed, football gained institutional support with the formation of regional associations and tournaments that solidified its presence. The Indian Football Association, founded in 1893 in Calcutta, became a key governing body, albeit dominated by British officials initially. Landmark events like the Durand Cup, initiated in 1888 in Shimla as Asia's oldest tournament, and the Rovers Cup in Bombay in 1891, provided platforms for clubs to showcase talent. These competitions not only popularized the sport but also highlighted emerging Indian clubs such as Mohun Bagan, Aryan, and East Bengal, which challenged British dominance. A pivotal moment came in 1911 when Mohun Bagan, an all-Indian team, defeated the East Yorkshire Regiment 2-1 to win the IFA Shield, an achievement celebrated as a symbol of nationalist resistance against colonial oppression. This victory ignited widespread interest, drawing massive crowds and inspiring more Indians to participate, transforming football into a vehicle for cultural identity and unity in the pre-independence era. By the 1930s, the sport had spread to other regions, with state-level associations forming in places like Bengal, Maharashtra, and Kerala, organizing local leagues that nurtured grassroots talent.

II. LITERATURE REVIEW

This content not only validates the researcher's familiarity with the field but also prevents duplication of efforts, allowing the study to contribute novelty—such as applying psychomotor assessment tools to state-level athletes where previous works might have focused on elite or amateur levels. Furthermore, it fosters critical thinking by encouraging the researcher to compare methodologies, like quantitative tests for motor proficiency versus qualitative analyses of psychological factors, and to address biases or limitations in prior research, thereby enhancing the credibility and rigor of the new work. As a topic in itself, the review of literature embodies the essence of academic discourse, functioning as a standalone scholarly exercise that can influence policy, practice, and future inquiries; for example, in sports science, a well-crafted review might synthesize decades of literature on how cognitive processes interact with motor functions in team sports like football, revealing patterns such as the impact of stress on reaction times or the role of training interventions in improving coordination, which could guide coaches, educators, and policymakers in talent identification and development programs.

Vanek, Miroslav and Cratty, Bryant J. (1970) *Psychology and the Superior Athlete* is an exploration published by Macmillan, on elite athlete psychology. 212 pages include history, typology, and personality assessment. Arguments for psychological preparation, with findings on motives, relevant for football profiles. It's noted for Olympic case studies, influencing superior performance understanding. The book examines typology of activities by psychological demands, useful for categorizing football's mental requirements. Vanek and Cratty discuss social-psychological training, enhancing team dynamics and individual resilience. Critics value its cross-cultural perspective, drawing from Eastern and Western views. This work provides case studies from 1968 Olympics, illustrating real-world applications. Overall, it bridges theory and elite practice, aiding in profiling top-tier psychomotor traits.

Abrahams, Dan. (2012) *Soccer Tough: Simple Football Psychology Techniques to Improve Your Game* is a



foundational text in sport psychology for soccer players, published by Bennion Kearny, spanning approximately 180 pages. Drawing from the author's experience as a sport psychologist working with professional teams and players, the book demystifies the mental side of soccer through practical techniques aimed at enhancing performance. Structured around chapters that explore mindset shifts, the text uses real-world examples from elite players to illustrate concepts, blending psychological theory with actionable exercises like visualization and self-talk. Methodologically, it incorporates anecdotes and step-by-step strategies, emphasizing how mental training can overcome barriers like fear and pressure.

The main arguments focus on mental toughness as the differentiator for top performers, with findings showing that techniques for focus, energy management, and confidence building lead to consistent play. In relation to psycho-motor profiles of state-level football players, the book is highly applicable, as it addresses how mental states influence motor skills such as reaction time, coordination, and tactical decision-making, particularly under competitive stress. Abrahams discusses body language and scripts to structure mental preparation, aiding profiles by linking psychological resilience to physical execution in dynamic scenarios like dribbling or defending. He critiques over-reliance on physical drills, advocating integrated mental-physical training to avoid slumps and maximize potential.

Critics and users praise its accessibility and immediate impact, with coaches like Terry Mason noting improvements in goalkeepers' confidence and performance after applying the methods, and Matty Nickels reporting a turnaround in team results through self-image enhancement. The text has influenced players across levels, offering a no-nonsense approach that stimulates self-belief and visualization for better motor control. Its enduring relevance lies in making complex psychology simple, essential for state-level athletes developing adaptive psycho-motor traits. Overall, Abrahams' work provides a balanced guide to mental mastery, though some desire more empirical data; it remains seminal for optimizing psycho-motor proficiency in soccer.

III. PROCEDURE AND METHODOLOGY

3.1. Selection of Subjects

The selection of subjects for this study was a meticulously planned process aimed at capturing a representative sample from the target population of state-level male football players in Madhya Pradesh, India. This population was strategically chosen to reflect the study's core focus on psycho-motor profiles within a regional framework, where football serves as a growing avenue for youth development amid varying levels of infrastructure and support. State-level players in Madhya Pradesh are those who have demonstrated sufficient skill to compete in organized tournaments sanctioned by the Madhya Pradesh Football Association, such as inter-district championships and state leagues, but have not advanced to national or professional circuits. They represent a vital segment of Indian football, bridging grassroots enthusiasm with competitive ambition, and often face unique challenges like limited access to advanced coaching or facilities. By concentrating on this group, the research seeks to provide insights into how psycho-motor abilities—such as coordination, agility, reaction time, balance, and speed—are shaped by local training environments, cultural influences, and resource availability. This target population is particularly relevant in Madhya Pradesh, a state with diverse geographical and socioeconomic landscapes, where football has gained traction in urban centres like Bhopal and Indore, as well as rural districts such as Shivpuri and Gwalior, fostering community bonds and physical education initiatives.

3.2 Sample size determination

Sample size determination is a pivotal aspect of research methodology, ensuring that the study has sufficient statistical power to detect meaningful effects while remaining feasible within resource constraints. In the context of a study employing purposeful or convenience sampling based on availability during state competitions, with inclusion criteria limiting participants to those aged 18-25 years, actively participating in state-level events, and free from recent injuries, the rationale for selecting a sample size of 30-50 players stems from a balance between qualitative depth, quantitative reliability, and practical considerations. This range is commonly recommended in exploratory or mixed-methods research, particularly in fields like sports science, psychology, or performance studies, where the goal is not large-scale generalization but rather in-depth insights into specific phenomena, such as competitive strategies, mental resilience, or team dynamics among young athletes. For instance, a sample of 30 participants often serves as a minimum threshold for basic statistical analyses, allowing for the application of parametric tests like t-tests or ANOVA with reasonable assumptions of normality, while 50 provides a buffer for potential attrition or variability, enhancing the robustness of findings without overwhelming logistical demands during time-limited events.



IV. RESULT AND DISCUSSION

4.1 Descriptive Statistics for Coordination

Coordination, as a foundational psycho-motor skill, plays an indispensable role in the multifaceted demands of football, enabling players to synchronize multiple body parts and actions seamlessly during dynamic gameplay. In this study, coordination was assessed using the Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2), specifically focusing on the Bilateral Coordination subtest, as detailed in Chapter III's methodology. This standardized instrument evaluates fine and gross motor integration through tasks such as simultaneous foot and finger tapping, jumping jacks with synchronized sides, and pivoting on one foot while touching the nose with the opposite hand. Raw performance is converted to scaled scores, with a theoretical range of 10 to 30 for this adapted athletic context (higher scores indicating superior coordination proficiency).

The test's selection aligns with its established reliability (inter-rater reliability coefficients exceeding 0.90 in prior validations) and validity for assessing motor skills in young adults, making it apt for state-level athletes aged 18-25 who must exhibit precise limb integration amid high-pressure scenarios like passing under duress or maintaining ball control during tackles.

4.2 Descriptive Statistics for Reaction Time

Reaction time, a cornerstone psycho-motor variable in sports science, measures the interval between stimulus presentation and motor response initiation, crucial for football players in anticipating shots, intercepts, or passes amid fast-paced action. In this study, reaction time was assessed using the Vienna Test System (VTS), a sophisticated computerized platform detailed in Chapter III, incorporating both visual (e.g., flashing lights) and auditory (e.g., tones) stimuli to simulate game-like cues. The VTS Reaction Test (ReT) protocol records simple and choice reaction times in milliseconds (ms), with lower values denoting faster responses; normative data for athletes typically range from 200-300 ms for visual stimuli, as per established benchmarks in sport psychology research.

V. CONCLUSIONS

This change shows commitment to proven ways, where what is found shapes training and choices all over. For India, I have talked about how physical education comes from old times before many world things. From about 1500 BCE in old books, poses focused on balance of body, mind, soul. Big stories showed people good at fighting and outside activities, showing value for strength and quick in society. Later, outside influences brought games like horse riding and group things. Under rule from others, organized exercises and group sports came to schools. After 1947 when free, physical education became part of country teaching, with special places for sports training. This history shows how in India it grew from old ways to organized, mixing past with now needs. The joined part of sports science has grown a lot lately, for top games and health pushes. Things like body response studies show changes to training, explaining better endurance and strength.

Mind ideas help with learning skills, letting coaches make step by step plans that make brain connections stronger. Using devices like wearables and smart math has changed the field, giving right now looks at important measures. This together goes to getting better from hurts, where experts in fix, food, and mood work for full come back. In big games, teams look at data from many sides to make personal plans, showing how sports science is needed for win and long play. I have put three hypotheses: (1) these state players have better psycho-motor than normal; (2) positions make difference in specific things; (3) money and place link to changes, to guide my work.

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