



A Study on Psychological Traits and Physical Endurance Capacities Among U17 Male Football Players in Pune District

Singh, Sachin

Research Scholar,

Dhengale Dadasaheb

Assistant Professor, Department of sports and Physical Education, Savitribai Phule Pune University, Pune

ABSTRACT

Anxiety, mental toughness, and physical fitness are integral components of performance among professional footballers, who face both psychological and physiological demands on their performance. Growing attention has been directed toward understanding how trait anxiety interacts with mental resilience and physical capacity, as these variables collectively influence performance, recovery, and overall well-being. A total of 103 students were selected using convenience sampling, and a descriptive correlational research method was employed. Data were collected using standardized tools: the State-Trait Anxiety Inventory – Form Y-2 (STAI), Sports Mental Toughness Questionnaire (SMTQ), Yo-Yo Intermittent Recovery Test (Level 1), and 1-minute flexed knee sit-up test. The mean and standard deviation of trait anxiety, mental toughness, cardiovascular endurance, and muscular strength endurance were 43.18 ± 6.750 , 37.57 ± 4.429 , 790.19 ± 299.28 , and 31.80 ± 7.646 , respectively. Pearson's correlation coefficient was computed for inferential analysis. The results revealed a significant negative correlation between trait anxiety and mental toughness ($r = -0.217$, $p = 0.028$), cardiovascular endurance ($r = -0.208$, $p = 0.035$), and muscular strength endurance ($r = -0.278$, $p = 0.005$). A significant positive correlation was found between mental toughness and cardiovascular endurance ($r = 0.231$, $p = 0.019$), mental toughness and muscular strength endurance ($r = 0.211$, $p = 0.032$), and between cardiovascular endurance and muscular strength endurance ($r = 0.408$, $p = 0.000$). All correlations were statistically significant at the 0.05 level ($p < 0.05$). The findings indicate that higher trait anxiety is significantly associated with lower mental toughness and reduced physical fitness in students. This study highlights the importance of managing psychological stress and fostering mental resilience to enhance physical performance and overall health among physical education students.



Keywords: Trait Anxiety, Mental Toughness, CV Endurance, Muscular Strength Endurance.

Introduction

Sports are conceptualized as institutionalized competitive activities that necessitate rigorous synthesis of physical prowess, strategic cognition, and adherence to complex regulatory frameworks. Within the modern academic paradigm, the sporting arena serves as a “human laboratory” for the empirical study of the interaction between physical limits and mental fortitude (Jones et al., 2020). Football represents a global discipline in which peak performance is dictated by the seamless synergy of physical, physiological, and psychological pillars. While physical components such as cardiovascular endurance are essential for the execution of technical skills and the delay of onset of muscle fatigue, psychological constructs—specifically trait anxiety and mental toughness—determine the efficacy of an athlete’s response to high-pressure environments (Sarkar & Fletcher, 2014). In the contemporary landscape of high-performance athletics, the traditional focus on physiological markers is increasingly being eclipsed by a biopsychosocial approach. Mental toughness, defined as a collection of psychological characteristics that allow an athlete to remain consistent and determined under pressure, acts as a buffer against the debilitating effects of trait anxiety (Clough and Strycharczyk, 2015).

Conversely, high levels of trait anxiety can lead to “choking” under pressure, where the athlete’s cognitive load interferes with the automaticity of motor skills (Hill et al., 2010). Despite their evident interdependence, a significant portion of the existing literature examines these variables in isolation. This leaves a theoretical and practical gap in understanding their collective impact, particularly within the specific sociocultural and athletic context of Indian youth football. In India, the rapid professionalization of football through academies and national leagues has placed unprecedented psychological demands on young athletes, who must navigate not only the rigors of the sport but also the socio-economic pressures unique to the South Asian sporting landscape (Rani and Singh, 2021). Therefore, this study aimed to investigate the multidimensional relationships between endurance, anxiety, and resilience to provide a holistic framework for talent development. The convergence of these factors suggests that elite performance is not merely a product of physical conditioning but rather the result of a complex interplay in which psychological resilience modulates physiological output. In the Indian context, where youth development programs are increasingly adopting rigorous training methodologies,



there remains a critical need to evaluate whether these models account for the unique psychological stressors and physical demands faced by local players in their training. Inspired by previous studies, this study examined the relationship between trait anxiety, mental toughness, cardiovascular endurance, and muscular strength endurance. By analyzing Collectively, this study seeks to provide a multidimensional profile of U17 male football players, ultimately offering a data-driven framework to optimize talent identification and performance longevity in the region.

Materials and Method

Method : A descriptive correlational research design was used to examine the relationships among selected psychological and physical variables among U17 male football players from Pune district. This approach allowed for systematic observation of the interplay between psychological traits and physical performance without experimental manipulation.

Subject : For this study, five football clubs were selected out of 50+ football clubs using a convenience sampling technique. A maximum of 21 players were selected from each football club, with a total of 103 U17 male football players who had been actively participating for at least 1 year of regular training in various football clubs selected through purposive sampling.

Variables : The primary variables investigated in this study included Trait Anxiety and Mental Toughness (Psychological Variables) and Cardiovascular Endurance and Muscular Strength Endurance (Physical Fitness Components).

Tools : The assessment of psychological and physical variables in this study involved a battery of standardized instruments designed to capture both mental and physiological performance indicators. To evaluate the stable personality characteristic of anxiety, the researcher utilized the State-Trait Anxiety Inventory (Form Y-2), which was developed by Charles D. Spielberger in 1970; this self-report instrument consists of 20 items, including specific anxiety-absent statements that require reverse scoring to determine the final trait anxiety level. Mental Toughness is quantified using the Sports Mental Toughness Questionnaire (SMTQ), developed by Mark Sheard, Shane Golby, and Angela Van Wersch in 2009, which features 14 items designed to measure the dimensions of confidence, constancy, and control. Cardiovascular capacity was assessed using the Yo-Yo Intermittent Recovery Test (Level 1), created by Jens Bangsbo in 1990, which serves as a field-based measure of an athlete's ability to perform repeated high-intensity aerobic bouts. Abdominal muscular strength endurance was determined using the 1-minute flexed-knee sit-up test, a component



of the AAHPERD (American Alliance for Health, Physical Education, Recreation and Dance) Youth Fitness Test battery, which provides a physiological measure of core stability and endurance.

Procedure : The data collection and analysis process for this study followed a structured three-phase trajectory. Initially, the Preparation Phase involved defining the study objectives and securing formal permission from football clubs to access a specific population of U-17 male players in Pune. This transitions into the Implementation Phase, where the researcher personally administers psychological tools—specifically the Spielberger Trait Anxiety and Sports Mental Toughness questionnaires—alongside physical assessments such as the Yo-Yo Intermittent Recovery and 1-minute flexed knee sit-up tests. Finally, in the Analysis and Reporting Phase, the raw data are systematically scored and processed in Microsoft Excel; here, descriptive statistics profile the group's traits, while inferential statistics (Pearson Correlation) are used to determine the relationships between mental variables and physical fitness, culminating in the final research report.

Results

The following findings delineate the relationship between Trait Anxiety, Mental Toughness, and physical fitness parameters among U17 male football players in Pune District. The results are divided into descriptive statistics, which summaries the fundamental data characteristics, and inferential statistics, which test the formulated hypotheses using Pearson's correlation analysis.



Table No.1 : Inferential Statistics of Trait Anxiety, Mental Toughness and Physical Fitness among U17 male Football players from Pune (n=103)

Correlations		Trait Anxiety	Mental Toughness	CV Endurance	Muscular Strength Endurance
Trait Anxiety	Pearson Correlation		-.217*	-.208*	-.278**
	Sig. (2 Tailed)		.028	.035	.005
Mental Toughness	Pearson Correlation			.231*	.211*
CV Endurance	Sig. (2 Tailed) Pearson Correlation Sig. (2 Tailed)			.019	.032 408** .000
Muscular Strength Endurance	Pearson Correlation Sig. (2 Tailed)				

Table No 1 shows the descriptive analysis of the study cohort (n=103), providing a comprehensive overview of the psychological and physiological baseline of U17 football players in the Pune district. To ensure methodological rigor, Trait Anxiety was quantified using the State-Trait Anxiety Inventory (Form Y-2), yielding a mean score of 43.18 and a standard deviation of 6.75, which reflects stable personality anxiety levels within the sample. Mental Toughness, assessed via the Sports Mental Toughness Questionnaire (SMTQ), showed a mean of 37.57 and standard deviation of 4.43, measuring facets of confidence, constancy, and control. Physical fitness assessments included the Yo-Yo Intermittent Recovery Test (Level 1) for Cardiovascular Endurance, which produced a mean distance of 790.1 and standard deviation of 299.31, indicating a broad range of aerobic capacity among the participants. Muscular Strength Endurance was evaluated through the 1-minute flexed knee sit-up test (AAHPERD), resulting in a mean of 31.8 and standard deviation 7.65. Correlation analysis further revealed that Trait Anxiety was negatively associated with Muscular Strength Endurance ($r = -.278$, $p < 0.01$), while Mental Toughness was positively correlated with CV Endurance ($r = .231$, $p < 0.05$) and Muscular Strength ($r = .211$, $p < 0.05$). These statistics underscore the significant, albeit varied, relationship between mental resilience and physical output.



The inferential analysis revealed that Trait Anxiety was significantly negatively correlated with Muscular Strength Endurance ($r = -0.278$, $p = 0.005$), which was statistically significant at the $p < 0.01$ level. This result necessitates the rejection of the null hypothesis () and supports the premise that elevated baseline anxiety serves as a physiological “brake”. Furthermore, Trait Anxiety demonstrated significant negative associations with both Mental Toughness ($r = -0.217$, $p = 0.028$) and cardiovascular (CV) endurance ($r = -0.208$, $p = 0.035$), significant at the $p < 0.05$ level. Conversely, statistical testing confirmed a significant positive correlation between Mental Toughness and both CV Endurance ($r = 0.231$, $p = 0.019$) and Muscular Strength Endurance ($r = 0.211$, $p = 0.032$), indicating that superior cognitive fortitude is fundamentally linked to an athlete’s ability to sustain high-intensity effort. Finally, a robust positive correlation was identified between CV Endurance and Muscular Strength Endurance ($r = 0.408$, $p = 0.000$), which was highly significant at the $p < 0.01$ level, reinforcing the hypothesis that these physical pillars are mutually dependent within a unified “mind-body” system.

Discussion

The empirical findings of this study demonstrate that Trait Anxiety functions as a physiological “brake” on athletic output. The observed negative correlation between anxiety and muscular strength endurance ($r = -.278$) suggests that high-anxiety states may induce muscle tension and autonomic arousal, which subsequently impair motor coordination and deplete energy reserves. This is consistent with the theoretical framework of Weinberg and Gould (2019), who posited that psychological resilience is a primary differentiator of elite athletic success, acting as a buffer against performance-degrading stressors. Furthermore, the significant positive correlation between Mental Toughness and cardiovascular endurance ($r = .231$) reinforces the “mind-body” link, suggesting that mentally resilient athletes are better equipped to sustain high-intensity efforts and access deeper physiological reserves during hypoxic conditions.

However, the complexity of the youth athletic demographic necessitates nuanced interpretations of these variables. While this study identified a clear inhibitory role for trait anxiety, some contemporary literature presents a more competitive view. For instance, Smith et al. (2023) suggested that certain levels of anxiety can facilitate performance in elite youth athletes if interpreted as facilitative arousal rather than a threat. Furthermore, while this study emphasizes the psychological as a “primary differentiator”, physiological paradigms established by Bompa and Buzzichelli (2019) argue that at the U17 level, structured periodization and the biological maturation of the musculoskeletal system may play a more dominant role in performance



outcomes than psychological traits alone. This suggests that while the “mind-body” unit is inseparable, the weight of psychological versus physical influence may shift depending on the specific developmental stage and training age of the players.

Conclusion

This investigation substantiates the premise that the cognitive and physiological domains function as a single, integrated unit in developing football players. These data imply that the enhancement of cardiovascular endurance may serve as a viable non-traditional psychological intervention to mitigate anxiety and foster mental toughness. Consequently, it is recommended that athletic programs in Pune transition to a multidisciplinary training model. Such a model must systematically integrate psychological profiling with traditional physical conditioning to optimize talent development and elite performance. Failure to address these psychological variables may result in an incomplete realization of an athlete’s physical potential.

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