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Comparative study: Personality dimension of neuroticism and reactive stress tolerance in Indian Athletes

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Abstract

Reactive stress tolerance refers to the capacity to maintain a range of adaptive responses when confronted with quickly changing stimuli. It is crucially significant in all sports that demand swift and accurate responses to various types of stimuli. The VTS Sport assesses reactive stress tolerance through the DT (Determination Test, S1). The BFSI (Big Five Structure Inventory) test of VTS Sport is a comprehensive modular personality assessment tool designed to evaluate the Big Five factors: Neuroticism, Extroversion, Openness, Conscientiousness and Agreeableness. Pearson's correlation coefficient was used to determine the relationship between neuroticism and reactive stress tolerance. This research seeks to explore whether there are significant variations of neuroticism in reactive stress tolerance among Indian athletes. There was no significant relationship between neuroticism and reactive stress tolerance among Indian athletes. Although the findings may be considered modest in scale, they contribute to the broader conversation on stress resilience and emotional stability. This research incorporates recommendations to improve practical applications and outcomes. Further research should be conducted to gain insights on this relatively unexplored topic.

Keywords: Vienna test system, neuroticism, reactive stress tolerance, big five structure inventory, determination test

1. Introduction

In the ever-evolving world of sports, the exceptional skills exhibited by elite athletes not only capture the interest of spectators but also prompt thought-provoking inquiries about the complex interplay between the mental and physical aspects. With the ongoing emphasis on achieving greatness in sports, this study explores a captivating aspect frequently eclipsed by physical abilities - the cognitive aspects that form the foundation of athletic proficiency.

The investigation into abilities that contribute to explaining proficiency in sports has been a longstanding focus of research. While athletic and physiological factors have traditionally taken precedence in expertise studies, there is a growing emphasis on psycho-cognitive factors like personality and cognitive abilities and their connection to expertise (Spielmann *et al.*, 2023) ^[12]. In the last ten years, there has been a notable increase in interest regarding the intersection of cognitive abilities, particularly executive functions, and personality traits in relation to athletic performance. Researchers have ventured beyond the observable achievements on the field, delving into the cognitive realms of elite athletes and revealing intriguing connections that extend beyond mere physical prowess.

Over the past decade, research has shown that elite athletes exhibit superior general cognitive abilities, specifically in the realm of executive functions. Additionally, they manifest distinct variations in personality traits compared to individuals with lower skill levels or those who are not engaged in athletic activities. (Steca *et al.*, 2018) ^[13].

1.1 Personality

Personality, the complex blend of traits that distinguishes individuals, invites an exploration into the core of human distinctiveness. As we navigate the intricacies of human connections and self-exploration, delving into the study of personality and its traits becomes an engaging expedition to comprehend the factors that render each person unique.

There is a belief that success in various sports necessitates specific personality traits, and these traits, in turn, might play a role in shaping particular personal characteristics during development (Samulski & Parreiras, 2009) ^[10]. Numerous studies within the realm of competitive sports have also indicated a correlation between certain personality traits and achievement (Allen & Laborde, 2014) ^[11].

As we delve into the realms of personality, a key nexus arises in understanding the roles of neuroticism and reactive stress tolerance. This study aims to uncover how neuroticism influences stress tolerance of Indian athletes.

1.2 Neuroticism

Neuroticism, a significant dimension in the Five-Factor Model (Big Five) of personality, gauges the extent to which an individual encounters negative emotions like anxiety, depression and vulnerability. Those with elevated neuroticism levels often exhibit heightened emotional reactivity, susceptibility to mood fluctuations, and an increased likelihood of experiencing stress.

In a 2013 investigation conducted by Bell, Mawn, and Poynor, the influence of neuroticism levels on the trade-off between speed and accuracy was examined in English cricket athletes. Their findings indicated that higher neuroticism was linked to improved accuracy with quicker response times, whereas lower neuroticism was associated with diminished accuracy.

1.3 Reactive Stress Tolerance

Reactive stress tolerance is a distinct facet of the capacity to respond effectively, specifically highlighting the aptitude to react promptly and accurately in stressful situations. Stress tolerance, as defined by Schrott (2003) ^[11], refers to an individual's ability to withstand stress and minimize its impact on their abilities and mental state. It pertains to the capacity to remain resilient in situations demanding quick responses, specifically measuring the extent to which one's ability to react can be maintained in the presence of stressors.

The sources and categories of stressors, which are stimuli causing stress, are highly varied and contingent on the specific context. These may include physical stimuli such as heat or noise, physical triggers like pain or thirst, or social stressors such as interpersonal conflicts or dealing with loss.

Due to the limited number of investigations that explore the relationship between neuroticism and reactive stress tolerance, particularly in the realm of Indian sports, this study aims to examine the correlation between the neuroticism profiles of Indian athletes and their reactive stress tolerance.

1.4 Objectives

1. To examine the impact of neuroticism on reactive stress tolerance.

1.5 Hypothesis

1. There will be a significant relationship between neuroticism and reactive stress tolerance.

2. Method

2.1 Participants: The sample consisted of 19 male athletes whose data was collected using purposive sampling technique. The mean age of the sample was 25.26 years ($SD \pm 10.72$) and ranged from 19-66 years.

2.2 Measures: The following scales were used in this research.

2.3 Determination test

The determination test of the Vienna Test System assesses one's capacity for handling reactive stress and the corresponding ability to respond. This test entails utilizing cognitive abilities to differentiate between various colors and sounds.

Participants are tasked with memorizing pertinent details related to stimulus configurations, response buttons, and assignment rules. Subsequently, they must choose appropriate responses based on the instructions provided or the rules acquired during the test. S1 represents an adaptive short form, while S2 is an adaptive form. S3 to S6 are different versions characterized by variations in their reaction mode, duration, or stimulus material. For this test, the S1 form was used.

For all test forms the internal consistencies for the main variables lie between $r=0.98$ and $r=0.99$. Karner's (2000) ^[4] extreme-group validation revealed noteworthy distinctions in the Determination Test outcomes between drivers with a history of alcohol-related offenses and the normative reference group. The drivers involved in alcohol-related offenses exhibited significantly poorer test results compared to the norm population. Additionally, Neuwirth and Dorfer's (2000) ^[5] study demonstrated the ability of the Determination Test to differentiate among various referral groups in traffic-psychological assessments, including individuals with psychiatric and neurological conditions and those with a history of alcohol abuse, in contrast to the norm group.

Moreover, Karner and Neuwirth's (2000) ^[5] investigation established significant correlations between Determination Test results and performance in a driving test. The test's convergent validity was further supported by Karner and Biehl (2000) ^[4], who observed correlations with the construct-related RST3 test. The overall validity of the Determination Test has been reinforced by additional studies conducted within the field of traffic psychology.

2.4 Big Five Structure Inventory

The BFSI (Big Five Structure Inventory) is a comprehensive questionnaire designed for the measurement of the Big Five personality dimensions, namely Emotional Stability, Extroversion, Openness, Conscientiousness and Agreeableness. Each of these dimensions is assessed through six specific subscales. The selection of these subscales was informed by an analysis of various existing Big Five questionnaires in both German and English, as well as studies examining the predictive validity of the Big Five and its sub-facets in the fields of educational and occupational psychology. The questionnaire's development involved a methodical approach that combined both top-down and bottom-up strategies across multiple phases.

In the developmental phase, the construction of items was shaped by contemporary concepts of automatic item generation. This approach played a crucial role in maintaining scaling fairness across various language versions of the questionnaire. The assessment of scaling fairness and dimensionality of the test has been substantiated through several studies, employing the Partial Credit Model (Masters, 1982) ^[6] and multi-group confirmatory factor analysis.

Given the application of the Partial Credit Model (Masters, 1982) ^[6], the internal consistency of the 30 subscales is ensured within and across the two language versions. The reliability coefficients, measured by Cronbach's Alpha, for the individual subscales range from 0.70 to 0.90. As for the higher-level Big five factors, the reliability coefficients range from 0.80 to 0.97, depending on the specific subscale

considered. Importantly, these results are consistent for both the German and English versions of the BFSI.

The content validity of the individual subscales is established through the theory-based construction of each scale. Furthermore, the author presents evidence that respondents' test behavior can be entirely accounted for by the characteristics of the items and the individual differences in the latent personality traits being measured. Additional validation is derived from factor analysis studies that explore the questionnaire's factor structure. These studies confirm the theoretically proposed factor structure within each language version and across both versions.

The validity of the BFSI is reinforced by meta-analytical investigations into the criterion validity of the Big Five and specific studies examining the criterion validity of the described questionnaire. The collective findings indicate that the personality traits measured by the BFSI can effectively contribute to predicting success in work or training.

2.5 Design and Procedure

The examination was conducted for individuals sequentially. Prior to the test, a comprehensive introduction to the tests and clear instructions were provided to all participants. A detailed demonstration session familiarized participants with the computer testing modules, and possessing prior computer knowledge was not obligatory for completion of the tests. Each step of the process was carefully explained to the participants, and their consent was obtained before proceeding

with the tests. A quiet and disturbance-free environment was maintained throughout the administration, ensuring that all participants were at ease and physically prepared for the tests. Administrative guides were available during the tests to address any difficulties, although such situations did not arise. A quantitative research design was used to conduct this study. Quantitative research design is a type of research method used to gather and analyze data that can be expressed in numerical form. Correlation method was used to examine the relationship between the variables.

The statistical analysis of the data was done using SPSS 25.0 (IBM®). Pearson's correlation was used to determine the significant relationship between:

1. Neuroticism and reactive stress tolerance.

3. Results

Initial check was conducted to look for extreme outliers and missing values. No extreme outliers and missing values were found. Normality test using skewness and kurtosis was done. The acceptable values for skewness and kurtosis are below 1.96 for sample size of < 50. The values of all the variables for the skewness and kurtosis were below 1.96. So, it can be determined that the data is normally distributed and can be subjected to further analysis.

The result of Pearson's correlation analysis on each scale shows that neuroticism shows an insignificant correlation with reactive stress tolerance. Neuroticism and reactive stress tolerance were found to have no significant relation.

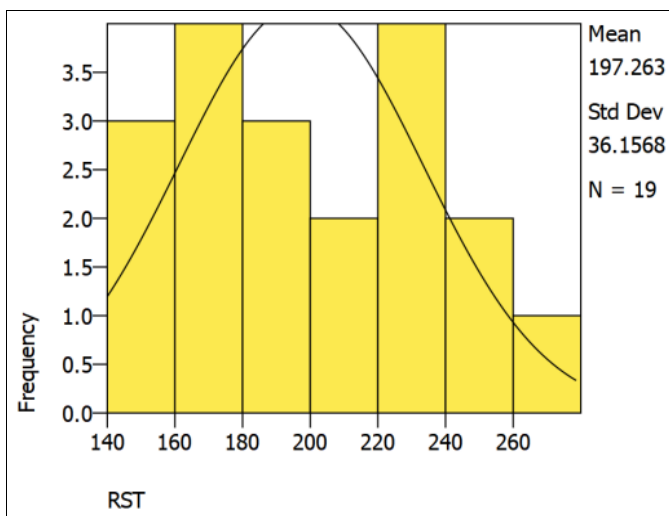


Fig 1: Normal curve of Reactive Stress Tolerance (RST) scores

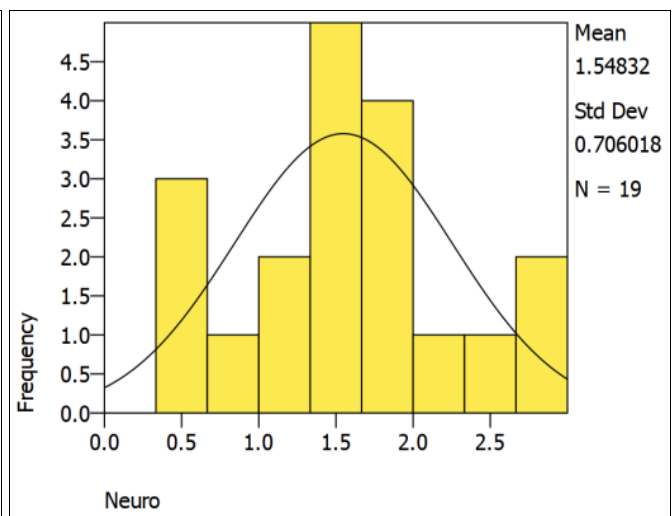


Fig 2: Normal curve of Neuroticism scores

Table 1: Correlation of Neuroticism with reactive stress tolerance

	Neuroticism
Reactive Stress Tolerance	-.129

4. Discussion

The general findings that emerged from the present study were that there exists no significant correlation between neuroticism and reactive stress tolerance. Hence, hypothesis (1) can be refuted. To the best of our knowledge, there are no previous studies which explore the relation between neuroticism and reactive stress tolerance among Indian athletes. This study found no significant relation between the two factors.

It is suggested that athletes may generally have lower levels of neuroticism compared to non-athletes. This inclination might be attributed to the notion that quick emotional arousal

could potentially disrupt athletic performance, and athletes, therefore, tend to demonstrate a more stable emotional profile. (McKelvie *et al.*, 2003) [7].

A poor response to stress is often associated with emotional lability, indicating a heightened susceptibility to emotional fluctuations. Individuals with poor stress responses may find it challenging to regulate their emotions effectively, experiencing rapid and intense emotional reactions that linger for an extended period. This emotional lability can contribute to difficulties in coping with stressors, as the individual may struggle to return to a baseline emotional state promptly. Consequently, understanding and addressing emotional lability becomes crucial in developing effective stress management strategies.

In the context of the intricate relationship between stress and emotional lability, this research sought to explore the nuances

of how individuals with emotional fluctuations vary in terms of levels of stress tolerance. Although the findings may be considered modest in scale, they contribute to the broader conversation on stress resilience and emotional stability.

By delving into the subtle connections between stress response patterns and emotional lability, this study's significance lies in its potential to contribute incrementally to the growing body of knowledge in this dynamic field.

5.1 Limitations

1. The sample size was small.

6. Recommendations

The present study represents an initial exploration into the relationship between neuroticism and stress tolerance among Indian athletes. It serves as a foundational step in shedding light on this relatively unexplored area within the Indian sporting context. However, caution is advised in interpreting the results, given the study's limitation stemming from a small sample size. While the findings offer preliminary insights, future research with larger and more diverse samples is essential to validate and extend the understanding of how neuroticism influences stress tolerance in the context of Indian athletes.

Future research endeavors could delve deeper into the examination of variances in reactive stress tolerance concerning neuroticism among Indian athletes. Such investigations have the potential to enhance our comprehension of the intricate connections between emotional lability, stress resilience, and the impact of neurotic tendencies on athletes' responses to stressors. By exploring these dimensions more extensively, researchers can contribute valuable insights that aid in refining strategies to bolster athletes' emotional well-being and optimize performance under stress within the Indian sports milieu.

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