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Exploring relevance of personality traits in athletes: A correlation research between anxiety and reactive stress tolerance

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Abstract

This study investigates the correlation between reactive stress tolerance and anxiety among 22 male archers aged 18-25 from a private sports academy. Utilizing the Determination Test and Eysenck's Personality Profiler within the Vienna Testing System, data were collected and analyzed using Spearman's rho correlation. Results indicate a moderate negative correlation (-0.525) between anxiety and reactive stress tolerance, suggesting that athletes with higher stress tolerance experience lower anxiety, thereby enhancing performance in archery. The mean scores of 6.18 for anxiety and 160.64 for reactive stress tolerance highlight a favorable psychological profile for these athletes. Despite the small sample size, the study underscores the importance of psychological factors in sports performance and adds to the literature on sports psychology. Effective interventions such as Cognitive Behavioral Therapy (CBT), mindfulness-based techniques, biofeedback, neuro feedback, physical conditioning, and social support are discussed as strategies to manage anxiety and improve stress tolerance. The findings emphasize the need for personalized approaches in enhancing athlete performance and mental well-being, and suggest further research to explore long-term effects and individual differences in these interventions.

Keywords: Reactive stress tolerance, anxiety, archery performance, sports psychology, cognitive behavioral therapy (CBT) & mindfulness techniques

Introduction

Chronic Low Back Pain (CLBP) is characterized as lower back pain lasting more than 12 weeks^[1, 2]. Its prognosis is considered good, as a significant percentage of patients suffering from CLBP recover before 12 months^[3]. However, as with all chronic pain conditions characterized by prolonged duration of symptoms, there is an adverse effect on both the functional ability and the quality of life of people of productive age^[4].

In the realm of competitive sports which has now turned into an extremely commercialized enterprise (Khan, Ahmed, & Abid, 2016)^[14]. It is essential to not only evaluate the athletes based on their talent but also their personality attributes and anxiety levels (Allen, *et al*, 2014)^[2]. These psychological domains provide an insight into the performance of the athletes under pressure, ability to remain calm and focused as well as their mental fortitude. Personality traits and anxiety levels do not only determine the short term performance but also the long term success, interpersonal relationships and the mental well-being before, after and during the competition for the athletes (Allen, Greenlees, & Jones, 2013b)^[2].

Archery is one of these sports that requires a synergy of physical skills and mental strength to stay focused among other things. In order to aim and fire arrows at a target, long in the distance, an archer must possess a very strong hand/eye coordination, strength, and precision. Archers do not just come in the form of equipment, above and beyond the equipment, a competitor's personality and skill in dealing with the pressure could have a dramatic impact on the competition (Balyan, *et al*, 2016)^[3]. This study concentrates on the relationship among personality traits of anxiety and reactive stress tolerance.

While the physical aspects of archery have been considerably studied, the psychological factors affecting an archer's performance have not received much attention.

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The following research intends to explore the levels of anxiety and stress tolerance that competitive archers typically have, and how focusing on the mental attributes they may drive consistent and successful execution in high-stakes situations.

Coaches, trainers and athletes themselves can benefit from the valuable insights provided by studying the interrelationships between personality attributes, anxiety management and archer prowess (Marín-González *et al.*, 2022) ^[17]. Identifying and understanding the optimal mindset and psychological techniques that can be used may further shape performance enhancement techniques and inform training programs, ultimately increasing the overall caliber of the sport (Stephen, *et al.*, 2022) ^[28].

Through an in-depth look at personality evaluation tools, measurement scales for anxiety, and performance assessment in archery, the present research will make an attempt to determine the vast psychological elements that influence and mold an archer's pursuit of excellence. Findings from this study could be useful not only to members of the archery community but also to further the psychological knowledge of sport performance across domains.

Personality assessments can be incredibly helpful for athletes since it allows athletes to understand themselves, trait by trait with the help of these psychometric tools. It enables athletes to gain self-awareness, understanding their strengths and weaknesses, focusing on each trait identifying where one can easily succeed and where one needs to put more work. Examples of such evaluations are the Big Five Inventory or Myers-Briggs Type Indicator which help in identification of openness, conscientiousness, extraversion, agreeableness and neuroticism (McCrae & John, 1992) ^[18].

Take for example conscientiousness is often linked to better self-discipline and drive that are essential in any training program. A related study showed that conscientious individuals are linked to traits like goal-setting, reliability and discipline and hence, were likely to follow strict training schedules; thus improving performance and contributing to long-term success as athletes (Piedmont, 1999) ^[22]. Versus, athletes with a high level of neuroticism may experience increased stress levels and anxiety which can lead to a decline in their performance.

In addition, understanding extraversion levels can be beneficial in group dynamics. For example, extroverted athletes might do well in team games because of their outgoing personalities; however introverted athletes could shine more in individual sports that require concentration and self-dependence (Allen, *et al.*, 2013) ^[2]. This information helps coaches to assign roles and create an environment based on an athlete's innate potential, enabling a more effective and supporting training environment and overall a better relationship amongst the coach and athlete (Kristiansen & Roberts, 2010) ^[26]. Understanding traits can help facilitate better mental health and better performance by focusing on a plan that leads to a balanced approach to training.

In the current study we aim to assess a correlation between reactive stress tolerance and anxiety scores using the Determination test and Eysenck's Personality Profiler respectively.

Reactive stress tolerance, which refers to an individual's capacity to handle sudden and intense stressors, plays a significant role in an athlete's performance. In competitive sports, the ability to maintain composure and perform under pressure is critical. Reactive stress tolerance is the ability to maintain adaptive responses when faced with rapidly

changing stimuli, a crucial skill in many sports. Athletes who exhibit high reactive stress tolerance can manage unexpected challenges and maintain their performance levels. This skill is particularly valuable in sports requiring quick decision-making and precision, such as archery.

One of the primary benefits of high reactive stress tolerance is enhanced performance under pressure. Athletes with high reactive stress tolerance often perform better in high-stress situations. Studies have shown that elite athletes, who typically have higher reactive stress tolerance, can maintain their performance during high-stress situations. This ability to stay calm and focused directly impacts performance, especially in sports like archery, where precision is paramount. Reactive stress tolerance helps archers maintain their concentration, resulting in more accurate shots (Balyan *et al.*, 2016) ^[3].

Another benefit is the improved focus and accuracy that comes with high reactive stress tolerance. Reactive stress tolerance allows athletes to maintain their concentration, leading to better performance (Marín-González *et al.*, 2022) ^[17]. Furthermore, training programs that include relaxation techniques and stress management strategies can improve reactive stress tolerance. For example, a study involving student-athletes demonstrated significant improvements in reactive stress tolerance after a six-month intervention involving PRM relaxation and imagery. This can lead to reduced anxiety and better overall mental health (Allen *et al.*, 2013) ^[2].

Athletes with high reactive stress tolerance also exhibit better adaptability. They can adjust to unexpected changes in their environment, such as weather conditions or equipment failures, without a significant drop in performance. This adaptability is crucial for consistent performance across different competitions and training sessions.

Archery requires a unique combination of physical skill and mental fortitude. The precision needed in archery demands that archers remain calm and focused, even when faced with distractions or pressure. Archers with high reactive stress tolerance are able to maintain a steady performance, which is crucial in a sport where even a slight deviation can result in a missed target. Consistency is key to success in archery, and managing stress effectively helps archers achieve this (Balyan *et al.*, 2016) ^[3]. Moreover, the ability to block out external distractions and focus solely on the target is essential for archers. High reactive stress tolerance allows archers to concentrate better, leading to improved accuracy and performance (Stephen *et al.*, 2022) ^[28].

In case of Anxiety it especially involves somatic anxiety that is associated with athletes, fear of performing and increased levels of sympathetic activity. This can easily reduce focus, cause distraction and affect the physical ability of an athlete through tension and nervousness thus greatly affecting his/her performance (Parnabas *et al.*, 2013) ^[21].

Thus, anxiety assessment is a valuable tool in an athlete's life serving several important objectives. Firstly, it can be used to diagnose such athletes that might be suffering from high levels of anxiety thus help can be provided for them. If these problems arise, proper measures can be taken at the right time using the appropriate interventions like the CBT, relaxation methods, and psychological robustness programs. Such intercessions are supposed to reduce the level of anxiety and provide athletes with useful strategies to cope with stress (Hasanah & Refanthira, 2020) ^[9].

Second, rating anxiety can reveal if an athlete has reduced the level of anxiety or not, so that the efficiency of the

psychological methods and interventions can be estimated. Cohort monitoring is important for modification of the training models as well as for checking on the psychological well-being and cumulative performance of the athletes (Nazarov, 2020) [19]. Studies have found that state anxiety or anxiety that is situation-specific, can fluctuate throughout the course of a competition and relate to the athlete's level of confidence (Ford *et al.*, 2017) [6].

Self-reported anxiety can be described as the assessment of how an athlete responds in stress or anxiety provoking situations. The subscale of anxiety is rated under the Eysenck Personality Profiler (EPP6) S1 in the Vienna Testing System (VTS). The VTS is best described as a holistic psychological testing tool that is popular among sports psychologists to evaluate the psychological health or/and well-being of athletes in regard to several dimensions, or, potential for improvement in the mentioned spheres (Ong, 2015) [20].

Measures

Eysenck's Personality Profiler

The Eysenck Personality Profiler (EPP) is grounded exclusively on the theoretical foundation of the personality assessment expert Hans Eysenck. The theory suggests that personality tests are based on genetic determinants and neurophysiological processes. The test is based on his "giant three" system of personality classification, which posits that personality can be understood through three primary dimensions: namely extraversion, neuroticism and psychoticism. specific biological mechanisms and behavioral tendencies underlie each of these aspects. The EPP6 asserts that it is independent of culture and has global applicability. Additionally, it makes the claim to be a paradigm that is, a description and measurement system mostly independent of particular samples or measurement tools.

Form S1 has twenty-one subscales. These can be separated into three classes of second-order factors; these are the three primary variables that make up the EPP6's central component. Thus, seven subscales, each of the three primary variables, are also provided as normed variables. The variable of Anxiety used in the current study is part of the Emotionality subscale. For Form S1 the reliability scores (internal consistency) range from $r=0.56$ (tough-mindedness) to $r=0.85$ (inferiority, unhappiness) for men and from $r=0.41$ (tough mindedness) to $r=0.89$ (unhappiness) for women. Factor analysis reveals a clear three-factor structure. The emotionality factor explains 27.2% of the variance, the adventure factor 17.9% and the extraversion factor 10.1% (cumulatively 55.1%). These findings were replicated by Eysenck, Barrett, Wilson & Jackson (1992)). In addition, Costa & McCrae (1995) provide some alternative factor solutions that are of particular interest with regard to the Five Factor theory.

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), 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) 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) 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), 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.

Objective

The current study aims to assess a correlation between reactive stress tolerance and anxiety scores using the Determination test and Eysenck's Personality Profiler respectively.

Hypothesis

There will be Negative Correlation (Inversely Proportional) between both variables.

Participants and Sampling

The sample consisted of 22 male athletes (Archers) from a Private Sports Academy, age range 18-25 years. Data was collected using Purposive sampling technique. Both the tests were administered sequentially for all participants on the Vienna Testing System. Participants were prior informed regarding the study procedure and a comfortable environment was maintained during the test.

Results and Discussion

Table 1: Descriptive Statistics

Variable	N	Mean	Std Dev	Min	Max
Anxiety	22	6.18	6.18	0.00	25.00
Stress Tolerance	22	160.64	28.18	71.00	198.00

Table 2: Correlation scores for Eysenck personality profiler and determination test

Variable	Value
Determination Test (DT)	-0.525
Spearman rho	
N	22

The current study focused on a comparative analysis of the personality dimension anxiety and the trait of reactive stress tolerance in Indian athletes focusing on the sport of Archery. A spearman's rho correlation was performed using the SPSS tool on the data. The findings suggest a moderate negative correlation of -0.525 (Table 2) between Anxiety and Reactive stress tolerance, i.e. there is an opposite relationship between both variables. The mean score of 6.18 for Anxiety and

160.64 (Table 1) for reactive stress tolerance suggest a higher average score of reactive stress tolerance than anxiety which has a low average score. Hence the current set of athletes are said to be ideal performers in their respective sport of archery. This is a unique study and no prior investigation has been done on these specific parameters. However due to the small sample size of 22 participants the results cannot be generalized to a larger population. Nevertheless, this can be a crucial part of the literature in sports sciences especially catering to mental health concerns of athletes.

Research in the area of sport-related anxiety suggests that anxiety continues to have spiraling effects on an athlete's performance in a number of instances. Such as, sport-related anxiety can 1) have a negative impact on sport performance during practice and competitions, 2) lead to increased risk of injury occurrence, 3) delay and obstruct injury rehabilitation and the return to sport process, and 4) increase subsequent reinjury risk during post-rehabilitation practice and competitions (Ford *et al.*, 2017) [6] and stress tolerance also seems to have a great impact on the athlete's performance as discussed in a related study, how stress tolerance significantly impacts athletes' performance. Athletes with higher stress tolerance can maintain focus, make better decisions, and perform consistently under pressure. Conversely, low stress tolerance can lead to anxiety, decreased concentration, and performance deterioration. Effective stress management techniques are crucial for athletes to enhance their mental resilience, ultimately improving their overall performance and competitive outcomes (Kerr & Leith, 1993) [13]. Hence, low levels of anxiety and high stress tolerance will ensure an athlete to perform successfully.

Furthermore, a similar study of neuroticism and reactive stress tolerance among Indian athletes yielded significant insights into stress management in athletic situations. It was discovered that lower levels of neuroticism and reactive stress tolerance were linked to improved performance and well-being among these athletes. This is in agreement with previous research indicating that moderate stress levels may encourage optimal athletic performance, whereas severe stress can decrease performance.

In Addition to the correlation the study provides a brief but important literature review on the future implications, measures that may be taken into account for betterment and improvement of athlete performance and Mental Well-being.

Research on Cognitive Behavioral Therapy (CBT) has shown remarkable effectiveness in lowering anxiety and improving stress tolerance in athletes. The goal of CBT is to modify dysfunctional thought patterns, which lowers anxiety and enhances emotional control (Hanton *et al.*, 2008) [8]. Athletes can develop a more resilient and balanced mindset by using strategies like cognitive restructuring to recognise and question irrational thinking processes. Regular training routines that include CBT can give athletes the tools they need to effectively manage anxiety before competitions.

Similarly, the effectiveness of mindfulness-based interventions, such as meditation, in the management of anxiety has gained popularity. According to research, by encouraging present-moment awareness and decreasing rumination, mindfulness techniques can dramatically reduce anxiety levels (Gardner & Moore, 2007) [7]. Mindfulness-trained athletes are better able to concentrate on their performance without being sidetracked by thoughts that cause anxiety, which increases their reactive stress tolerance. Bringing regular mindfulness into practice can also help in improvement of athletes' emotional stability and mental

clarity.

Athletes can learn to recognise and regulate their bodies' reactions to stress through the use of biofeedback and neurofeedback techniques. Research has indicated that biofeedback has the potential to assist athletes in managing heart rate variability, which is a crucial indicator of stress tolerance (Strack *et al.*, 2011) [29]. It has been demonstrated that neurofeedback, which trains brain wave patterns, improves focus and lowers anxiety. By incorporating these technologies into athletic training regimens, coaches can give athletes useful skills for regulating their anxiety and enhancing their ability to handle stress.

Furthermore, to effectively manage anxiety and improve stress tolerance, physical conditioning and sufficient recuperation are essential. Regular exercise has been shown to improve sleep quality and release endorphins, which in turn reduce symptoms of depression and anxiety (Ensari *et al.*, 2015) [5]. Maintaining a healthy balance in both the body and mind and preventing burnout are further benefits of getting enough sleep and recuperation time. The value of a well-rounded training programme that incorporates both physical activity and recuperation techniques should be emphasized by coaches.

Getting social support from family, friends, and coaches is essential for controlling anxiety and increasing stress tolerance. According to Rees and Freeman (2010) [24], a supportive atmosphere decreases stress and feelings of loneliness while fostering a sense of belonging. Reduced anxiety and improved stress management have been connected to team cohesion, which occurs when athletes have a close bond with their teammates. Activities that foster open communication and teamwork can strengthen social support systems and improve mental health in general.

Finally, to understand how these interventions affect various types of athletes over a long period of time and in combination, more research is required. The impact of individual differences, such as personality traits and genetic predispositions, on the efficacy of anxiety management techniques should also be taken into account in studies.

Conclusion

To Conclude this study explored the relationship between reactive stress tolerance and anxiety scores among 22 male archers from a private sports academy. The findings revealed a moderate negative correlation (-0.525) between these variables, indicating that higher reactive stress tolerance is associated with lower anxiety levels. This suggests that athletes with better stress tolerance tend to experience less anxiety, which is beneficial for their performance in archery.

Despite the small sample size limiting the generalizability of the results, this study adds valuable insights into the mental health and performance of athletes. The results support the idea that low anxiety and high stress tolerance are crucial for optimal athletic performance.

The study also highlights the significance of interventions such as Cognitive Behavioral Therapy (CBT), mindfulness-based techniques, biofeedback, neurofeedback, physical conditioning, and social support in managing anxiety and enhancing stress tolerance. Future research should focus on the long-term effects of these interventions and consider individual differences in personality traits and genetic predispositions to develop more personalized and effective strategies for improving athlete performance and mental well-being.

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