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EFFECTS OF STRESS ON SPORTS PERFORMANCE

Brief systematic review

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ABSTRACT

Stress is an integral component of modern sport and has a significant impact on athletes' physical, emotional, and cognitive functioning. The aim of this review paper is to analyze existing literature on the effects of stress on sports performance, the underlying mechanisms through which stress operates, and potential strategies for mitigating its negative effects. Research findings indicate that stress may have both positive and negative consequences for athletic performance, depending on individual athlete characteristics, situational perception, and coping strategies. A proper understanding and effective management of stress can contribute to performance enhancement, burnout prevention, and the preservation of athletes' mental health.

Keywords: stress, sports performance, anxiety, mental health, stress management

INTRODUCTION

Stress can be defined as a state of concern or psychological tension caused by a challenging or demanding situation. It is a natural human response that motivates individuals to confront challenges and threats in their lives. Everyone experiences stress to some extent; however, the way individuals respond to stress plays a crucial role in overall well-being (World Health Organization, 2023).

Just as stress affects mental health, emotions, and behavior, it also has a significant influence on sport and physical activity. Stress can affect athletic performance, motivation, and overall physical condition. When individuals are under stress, the body responds through various physiological changes, such as increased heart rate, muscle tension, and elevated secretion of stress hormones, including cortisol. These changes can directly influence the ability to maintain focus, make rapid decisions, and sustain physical effort during sports activities. It has been widely observed that a dynamic,

bidirectional relationship between stress and physical activity likely exists; however, the direction of this influence is often overlooked. In this paper, the relationship between stress and physical activity or exercise has been considered open to interpretation, with the suggestion that „individuals who are less distressed by stress may simply be more willing to engage in physical exercise“. Indeed, numerous studies indicate that stress is associated with increased smoking, alcohol consumption, and substance abuse. Although less harmful, stress has also been linked to changes in dietary habits, including overeating, increased caffeine intake, and sedentary behaviors such as excessive television viewing (Stults-Kolehmainen, M.A., & Sinha R., 2014).

The biological response to stress involves the activation of three major, interconnected systems. First, stressors are perceived by the brain's sensory systems, which evaluate and compare

the stressful challenge with the individual's current physiological state and previous stress experiences. Second, once the brain detects a threat to homeostasis, it rapidly releases catecholamines—namely norepinephrine and epinephrine. These catecholamines increase cardiac output and blood pressure, redirect blood flow from the skin and gastrointestinal tract to skeletal muscles, and stimulate the release of glucose from the liver into the bloodstream. Third, the brain simultaneously activates the hypothalamic–pituitary–adrenal (HPA) axis, resulting in the secretion of adrenal glucocorticoids, most notably cortisol in humans (Fink, G., 2016).

The stress–injury model suggests that anxiety, as a personality trait, may function as a key factor influencing the relationship between stress responses and injury frequency. Specifically, research has demonstrated that competition-related anxiety, when considered alongside other psychosocial variables, plays a significant role in predicting athletic injuries. These variables include cognitive worry, which refers to excessive rumination and concern about performance, as well as mood disturbances such as increased irritability and nervousness. Furthermore, life stressors—encompassing events and situations outside the sporting context, including personal difficulties or academic pressures—also contribute to this complex relationship. The presence or absence of effective coping skills, defined as an athlete's ability to manage stress efficiently, further influences the likelihood of injury occurrence (Ford, J. L., Ildefonso, K., Jones, M. L., & Arvinen-Barrow, M., 2017).

According to Ford, J. L., Ildefonso, K., Jones, M. L., & Arvinen-Barrow, M., (2017) given the importance of anxiety in sports performance, it is essential that anxiety be addressed at an early stage by appropriately trained mental health professionals. Although anxiety is a normal emotional experience commonly encountered by many individuals, if left unmanaged it may develop into more serious psychological disorders. The identification of early signs and symptoms of anxiety typically falls to professionals who interact with athletes on a daily basis. Any medically unexplained changes in resting heart rate or muscle tension should be carefully monitored, and when combined with an increase in life-related and sport-specific stressors, sudden mood fluctuations and the emergence of unusual behaviors may serve as indicators of elevated stress levels and/or anxiety.

METHODS

Study type

This study was conducted as a systematic literature review in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-

Analyses) methodology, which enables a transparent, replicable, and methodologically rigorous process for the identification, selection, and analysis of relevant scientific studies.

Literature Search Strategy

The literature search was carried out using the Google Scholar electronic database, which provides access to a wide range of relevant scientific sources in the fields of sports science, sport psychology, and health sciences. The search was conducted using combinations of the following keywords:

- stress
- sports performance
- impact
- stress management

The keywords were used both individually and in various combinations to ensure a broad yet thematically relevant coverage of the available literature.

Inclusion and Exclusion Criteria

In line with the research objectives, only studies that met predefined inclusion criteria were considered for analysis. Scientific publications released between 2010 and 2024 were included to ensure the contemporary relevance of the sources.

Inclusion criteria were as follows:

- studies published in English or Bosnian;
- studies focusing on stress among athletes;
- research in which stress is examined as a cause or contributing factor influencing sports performance;
- studies with clearly defined stressors;
- studies analyzing the impact of stress on athletes' physical and mental health;
- studies incorporating aspects of stress management and coping strategies aimed at improving sports performance.

Chart 1. Flow chart according to the PRISMA recommendations; search, inclusion and exclusion of the published papers.

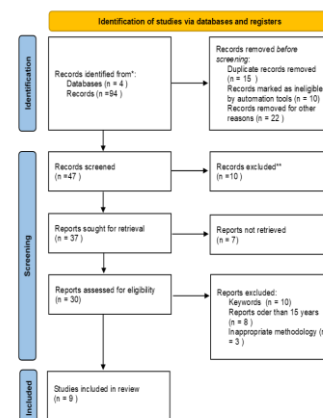


Table 1. Overview of the studies, including basic information, considered in the results analysis

Title	Year	Authors	Study objective	Study conclusion
1. EFFECT OF STRESS AND ANXIETY IN SPORTS PERFORMANCE AND INVENTIVE APPROACHES TO OVERCOME	2021	Choudhary, P.	To examine the effects of stress and anxiety on sports performance.	The study emphasizes the importance of identifying innovative strategies for overcoming stress and anxiety in order to enhance athletic performance.
2. Burnout in athletes	2018	Gustafsson, H., Madigan, D. J., & Lundkvist, E.	To investigate the phenomenon of burnout among athletes.	The findings highlight the importance of early recognition and effective management of burnout to preserve athletes' mental health and sports performance.
3. The effects of stress on physical activity and exercise	2014	Stults-Kolehmainen, M. A., & Sinha, R.	To understand how stress influences physical activity and exercise behavior.	The study summarizes the identified effects of stress on physical activity and proposes potential stress management strategies aimed at improving exercise engagement.
4. Demographic differences in sport performers' experiences of organizational stressors.	2016	Arnold, R., Fletcher, D., & Daniels, K.	To examine how demographic differences influence athletes' experiences of organizational stressors and their perception of stress within sports organizations. The aim of this research is to examine how various demographic characteristics influence the perception and experience of stress in sports organizations.	Demographic factors such as gender, age, and level of experience significantly influence perceptions of stress in sports organizations. Understanding these differences is crucial for developing effective stress management strategies and improving sports performance.
5. Associations between personality, sports participation and athletic success. A comparison of Big Five in sporting and non-sporting adults	2018	Steca, P., Baretta, D., Greco, A., D'Addario, M., & Monzani, D.	To investigate the relationship between personality traits, including the Big Five model, sports participation, and athletic success among adults	The study demonstrates significant associations between personality traits, sports participation, and athletic success, with specific Big Five characteristics influencing sports engagement and achievement.
6. Mindfulness and its relationship with perceived stress, affect, and burnout in elite junior athletes	2015	Gustafsson, H., Skoog, T., Davis, P., Kenttä, G., & Haberl, P.	To analyze how mindfulness practices affect perceived stress, emotional well-being, and burnout prevention among elite junior athletes.	The study highlights that the application of mindfulness-based approaches can be beneficial in reducing perceived stress, improving emotional well-being, and preventing burnout syndrome among elite athletes. This indicates the potential benefits of mindfulness practices in maintaining mental health and enhancing athletic performance among young athletes competing at a high level.
7. Stress, definitions, mechanisms, and effects outlined: Lessons from anxiety	2016	Fink, G.	The goal is to provide a comprehensive overview of stress, including its definitions, mechanisms, and effects, drawing on key insights from anxiety research.	The study emphasizes the importance of a deeper understanding of stress through analysis of its definitions, mechanisms, and effects, highlighting lessons from anxiety research as valuable guidelines for stress management and prevention.
8. Personality Traits and Stress Coping Strategies as Predictors of Athlete Burnout	2019	Karaleić, N.	The goal is to analyze which specific personality traits and stress-coping strategies are associated with an increased risk of burnout in athletes, in order to identify risk factors and develop preventive measures in sports.	Extraversion and conscientiousness play a key role in predicting burnout syndrome, with more extraverted and conscientious athletes showing a lower tendency toward emotional and physical exhaustion.
9. Sport-related anxiety: current insights	2017	Ford, J. L., Ildefonso, K., Jones, M. L., & Arvinen-Barrow, M.	To explore and provide current insights into sport-related anxiety, including contributing factors, consequences, and coping strategies.	The article examines the impact of anxiety on multiple aspects of sports performance, including injury occurrence, rehabilitation, and return to sport, highlighting the negative consequences of unaddressed sport-related anxiety and emphasizing the importance of effective anxiety management for optimal performance and athlete well-being.

Exclusion criteria included:

- studies not directly related to athletic populations;
- publications published prior to 2010;
- studies that do not examine stress within the context of sports performance or athlete health;
- non-peer-reviewed sources and inadequate theoretical accounts lacking a clear scientific methodology.

RESULTS and DISCUSSION

An individual becomes vulnerable to burnout when stress accumulates and assumes a chronic form. However, reducing burnout to a simple reaction to stress would constitute an oversimplification, as not everyone who experiences stress develops burnout. When stress exposure becomes chronic, it is assumed to significantly increase the likelihood of burnout (Gustafsson, H., Skoog, T., Podlog, L., Lundqvist, C., & Wagnsson, S., 2015).

The study also found strong support for the relationship between hope and burnout. Furthermore, the findings

provided empirical support for the principles of hope theory, demonstrating the important role of stress in athlete burnout as well as the protective value of positive psychological influences (Gustafsson et al., 2015). Based on the analyzed results, it is evident that stress has a significant impact on sports performance; however, its effects may be either positive or negative, depending on various factors. Specifically, stress may enhance performance in athletes who are able to perceive it as a challenge and a source of motivation, whereas in others it may lead to increased anxiety and performance deterioration (Fink, 2010; Stults-Kolehmainen & Sinha, 2014). This variability in stress responses underscores the importance of individual characteristics and coping strategies employed by athletes (Fink, 2016). One particularly noteworthy finding of this review is the influence of personality traits on stress perception and stress responses. Athletes with certain personality characteristics, such as high levels of neuroticism or lower stress resilience, tend to exhibit poorer performance under pressure, which consequently results in inferior competitive outcomes. These findings suggest that personalized approaches that take individual athlete characteristics

into account may be more effective in improving sports performance. The effects of stress on sports performance may vary considerably and depend on multiple factors, including individual athlete characteristics, the type of sport, and the circumstances under which stress occurs. Certain effects of stress on performance may be positive, such as enhanced concentration or faster reaction times; however, stress may also lead to negative outcomes, including anxiety, burnout, fatigue, muscle tension, exhaustion, and reduced self-confidence. Furthermore, the analysis indicates that stress-related effects may also be psychological in nature, manifesting as mood disturbances, diminished self-confidence, and tendencies to avoid competition.

CONCLUSION

This study examined the effects of stress on sports performance by exploring how different types of stress influence athletes' physical, mental, and emotional functioning. The findings demonstrate that stress is a complex phenomenon that can exert both beneficial and detrimental effects on athletes, including performance enhancement or performance decline, depending on individual characteristics, stress perception, and coping strategies. The importance of effective stress management is emphasized, particularly through mental resilience training, relaxation techniques, and team support, in order to minimize the negative impact of stress on athletic outcomes. This review provides a foundation for further research and the development of stress management strategies within the sporting context, which may have a substantial impact on athletic performance across all levels of competition. Given the complexity and individual variability in stress perception, it is essential to investigate sport-specific stressors affecting individual athletes. For example, research focusing on elite athletes may identify specialized strategies that effectively reduce the negative effects of stress, while studies involving amateur athletes may highlight the need for education on stress management as an integral component of sports training. Additionally, the integration of psychological support within sports programs may play a critical role in optimizing athletic performance and preserving athletes' mental health. Future research in this area may contribute to the development of personalized stress management approaches in sport, ultimately leading to improved performance outcomes and enhanced athlete well-being.

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Conflict of Interest

The authors do not have any conflicts of interest to disclose. All co-authors have reviewed and concurred with the manuscript's content, and no financial interests need to be reported.