

Physical and Psychological Factors Affecting sportsman Performance: The moderating role of sports training: A case on Saudi Arabia Athletics

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Abstract

Using a questionnaire-based technique and Partial Least Squares Structural Equation Modeling, this study examined the moderating effect of sports training on the relationship between physical characteristics, psychological factors, and athletic performance among Saudi Arabian athletes (PLS-SEM). Using a straightforward sampling technique, the study recruited 250 male and female athletes from various Saudi Arabian sports groups and organizations. The study outcomes indicated that sports training significantly moderated the relationship between physical attributes and athletic performance among Saudi Arabian athletes. The data also revealed that sports training mediated the association between psychological factors and athletic performance, indicating that regular sports training can augment the positive effect of psychological factors on athletic performance. This study contributes to the literature on the moderating influence of sports training on the association between physical and psychological characteristics and athletic performance among Saudi Arabian athletes. The findings indicate frequent sports training can boost physical fitness and mental resiliency, enhancing athletic performance. The study emphasizes the relevance of adding sports training to athlete development programs in Saudi Arabia. More studies are advised to investigate other variables that may influence the association between physical and psychological components and athletic performance in Saudi Arabian athletes.

Keywords: sports training, physical factors, psychological factors, Saudi Arabia.

Introduction

Sport is an essential component of human existence due to its vital role in maintaining physical fitness, mental health, and social well-being (Feltz, 2007). Sports have garnered significant attention in Saudi Arabia in recent years, and the government has taken several measures to encourage participation (Knudson & Kluka, 1997). Despite these efforts, the performance of Saudi Arabian athletes in international competitions remains variable, and many things must be addressed to improve athletic performance. Several scholars have suggested that athletic performance is a multifaceted concept influenced by various physical and psychological elements (Feltz, 2007). Physical elements such as physical exercise have been found to contribute to athletic performance (McKenzie et al., 2019). Nevertheless, psychological aspects such as motivation, confidence, and stress management also contribute to sports success (Weinberg & Gould, 2023). Salmon, Hanneman, and Harwood (2010) also argue that physical and psychological factors greatly influence sports performance.

Together with substantial physical and psychological aspects of sports performance, studies on these factors are incompletely understood. Some studies have revealed, for

instance, that physical elements are more significant determinants of sports success than psychological ones (Wang et al., 2022). Others, however, have proposed that psychological elements significantly influence the physical success (Weinberg & Gould, 2023). Hence, there is a vacuum in the literature addressing the relative importance of physical and psychological components in predicting athletic performance and the moderating effect of sports training. In addition to these contradictory results, earlier research has indicated that other variables, such as sports training, can influence the relationship between these variables and athletic performance (Luthans et al., 2005) because earlier research has also yielded contradictory results between sports training and athletic performance (Bali, 2015; Drew & Finch, 2016; Jarvis et al., 2022).

Consequently, time is required to examine the link in a different setting. Hwang et al. (2019) conducted a study on the effect of sports training on the relationship between physical and psychological factors and athletic performance in Korean high school athletes. Higher levels of sports training led to a stronger favorable association between physical and psychological components and athletic performance, as indicated by the study. In addition, they suggested that sports could

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control other psychological characteristics such as self-confidence, motivation, stress, and physical factors such as physical activity. According to Social Learning Theory (Bandura & Hall, 2018), athletes can acquire new abilities and behaviors through observation, imitation, and reinforcement. Athletes can learn and enhance physical talents and build psychological skills, such as motivation, confidence, and focus, through sports training (Weinberg & Gould, 2023). In this study, therefore, sports training served as a moderating variable.

In addition, the specific physical components contributing to sports performance are poorly understood. While some researchers have studied the significance of physical qualities such as strength and stamina, others have shown that balance and flexibility may also be significant (McKenzie et al., 2019). This lack of consensus on the physical components contributing to athletic performance has led to conflicting findings among studies. Prior studies have also suggested that physical activity significantly enhances athletic performance (Faria et al., 2022; Kaulback et al., 2022). This study was conducted on physical exercise to determine its effect on athletic performance. Likewise, there is no unanimity regarding the psychological aspects that affect athletic performance. Some research has revealed that self-efficacy is one of the most important predictors of performance (Horcajo, Santos, & Higuero, 2022; Lee et al., 2022), while others have focused on self-confidence, motivation, and stress management (Pettersen, Adolfsen, & Martinussen, 2022). This lack of consensus on the psychological aspects that influence athletic performance has also resulted in varied findings among studies (Lochbaum et al., 2022; Pettersen et al., 2022). Furthermore, studies argued that any moderating or mediating variable could improve the association between psychological aspects and physical performance (Lochbaum et al., 2022).

In addition, there is no research on the effect of sports training on the interplay between physical and psychological components and athletic performance among Saudi Arabian athletes in the existing literature. Past research indicates that cultural influences and societal norms can influence Saudi Arabian sports participation and performance (Aljehani, 2021). Consequently, exploring how sports training can modify the association between physical and psychological characteristics and athletic performance among Saudi Arabian athletes is crucial. In light of the preceding discussion, this study aims to investigate the moderating effect of sports training on the association between physical, psychological, and athletic performance in Saudi Arabian athletes.

The proposed study on the moderating effect of sports training on physical factors, psychological factors, and athletic performance among Saudi Arabian athletes will make significant theoretical, contextual, and practical contributions to the existing literature on sports psychology to summarize the discussion. The study was separated into five chapters. The first chapter is organized as follows: discussion in the first section, literature review in the second section, research technique in the third portion, data analysis in the fourth section, and discussion and future directions in the fifth section.

Literature Review

Physical exercise and athletics performance

Physical activity is an essential element of athletic performance. It improves physical fitness, increases endurance and strength, and enhances overall athletic performance. Regularly exercising athletes are likelier to excel in their chosen sports than those who do not. Moreover, exercise reduces the chance of injury and accelerates recovery from injury. Together with regular exercise, good nutrition is essential for athletic performance. A well-balanced diet of sufficient carbs, proteins, and fats is necessary for athletes to maintain their energy levels and fuel their training regimens. Athletes must also stay hydrated to avoid dehydration, which can significantly affect their performance.

Moreover, mental preparation is essential for athletic performance. Athletes must retain concentration, remain motivated, and control tension and anxiety. Athletes can develop their mental toughness and attain their sports goals using visualization, goal setting, and positive self-talk.

Alfonsi et al. (2020) investigated the correlation between physical activity, sedentary behavior, and youth athletes' athletic performance. Guest et al. (2019) analyzed the influence of physical activity on athletic performance in various sports. According to the authors, regular physical activity can increase fitness and overall sports performance, although the type and intensity of physical activity required to vary by sport. Melero-Cañas et al. (2021) did a meta-analysis to investigate the relationship between physical activity and sports participation and body composition and physical fitness in children and adolescents. According to the findings, physical activity and sports participation were favorably associated with improved body composition and physical fitness in this cohort. Mueller (2015) examined exercise's function in treating tendinopathy, a typical athletic injury. The authors discovered that exercise could be an effective

treatment for tendinopathy and that specific workouts can be adjusted to the location and degree of the disease for each athlete.

These empirical investigations indicate that physical activity is a significant factor that contributes to enhanced athletic performance. Regular exercise can boost overall athletic performance, improve fitness, and reduce the risk of injury. Many sports require different types and intensities of physical activity, and customized exercise plans can be designed for specific players based on their needs and objectives. Thus, the following study hypothesis is formulated.

Psychological factors and athletics performance

Several empirical studies indicate that psychological elements play a vital influence on sports performance. Researchers have investigated the relationship between such factors and sports performance. [Utesch et al. \(2019\)](#) conducted a meta-analysis to investigate the relationship between athletes' mental health and athletic performance. The study indicated that athletes with higher mental health performed better in sports and that therapies focusing on mental health could enhance athletic performance. [Gómez-López et al. \(2020\)](#) discovered that young elite athletes' self-confidence was favorably correlated with their performance. Researchers found that confident athletes were more likely to excel in competition. [Cronin et al. \(2020\)](#) further studied the effect of motivation on high school athletes' athletic performance. The study indicated that athletes with greater intrinsic motivation performed better in various sports, including cross-country running, soccer, and track and field. [Wu et al. \(2020\)](#) discovered that different types of motivation, such as intrinsic and extrinsic, were positively connected with sports performance. Researchers found that athletes who were more enthusiastic about their sport were more likely to do well.

[Lipowski et al. \(2021\)](#) examined the effect of stress on athletes' sporting performance. The researchers found that stress can positively and negatively affect athletic performance, and athletes who efficiently control their stress can perform better in competition. [Wang, Lei, and Fan \(2023\)](#) also discovered that a stress-management intervention program improved collegiate athletes' stress-management skills. It was determined that the program, which includes mindfulness, relaxation, and cognitive restructuring, was beneficial in reducing stress and anxiety among athletes. [Al-Adawi et al. \(2022\)](#) evaluated the relationship between psychological characteristics and the athletic performance of elite Omani athletes. Many psychological elements, such as goal-setting, self-efficacy,

and mental imagery, were positively related to sports performance. [Haslam et al. \(2021\)](#) discovered that mental visualization improved performance in various sports. Researchers found that athletes who utilized mental imagery to visualize their best performance performed better in competitions.

This empirical research indicates that psychological elements, such as self-confidence, mental health, motivation, stress management, goal-setting, and mental imagery, impact athletic performance. These factors can affect an athlete's mindset, emotions, and habits, and thus their athletic performance.

The moderating role of sports training

Physical and psychological elements affect athletic performance. Yet, the significance of sports training as a mediator between these characteristics and athletic performance remains unclear. [Gagnon et al. \(2019\)](#) investigated the moderating effect of sports training on the association between physical parameters, particularly cardiovascular fitness and muscular strength, and athletic performance in adolescent athletes. The study discovered that sports training positively moderated the association between cardiovascular fitness and athletic performance but not the association between physical exercise and athletic performance. [Chen et al. \(2022\)](#) investigated the moderating effect of sports training on the association between psychological characteristics, notably self-efficacy and self-determination, and collegiate athletes' athletic performance. The study indicated that sports training favorably regulated the association between self-efficacy, self-determination, and athletic performance but did not mention other variables such as self-confidence, motivations, stress and athletic performance. [Cho, Choi, and Kim \(2019\)](#) examined the interaction effect of sports training on the relationship between physical and psychological components and athletic performance in Korean high school players. Higher levels of sports training led to a stronger favorable association between physical and psychological features and athletic performance, as indicated by the study. In addition, they suggested that athletics could modify psychological elements such as self-esteem, motivation, and stress.

This research indicates that sports training can moderate the relationship between physical and psychological components and athletic performance. Thus, the following study hypothesis is formulated.

Research Framework and Hypothesis Development

Based on previous gaps, the research has the following research framework, which is predicted in [Figure 1](#) below,

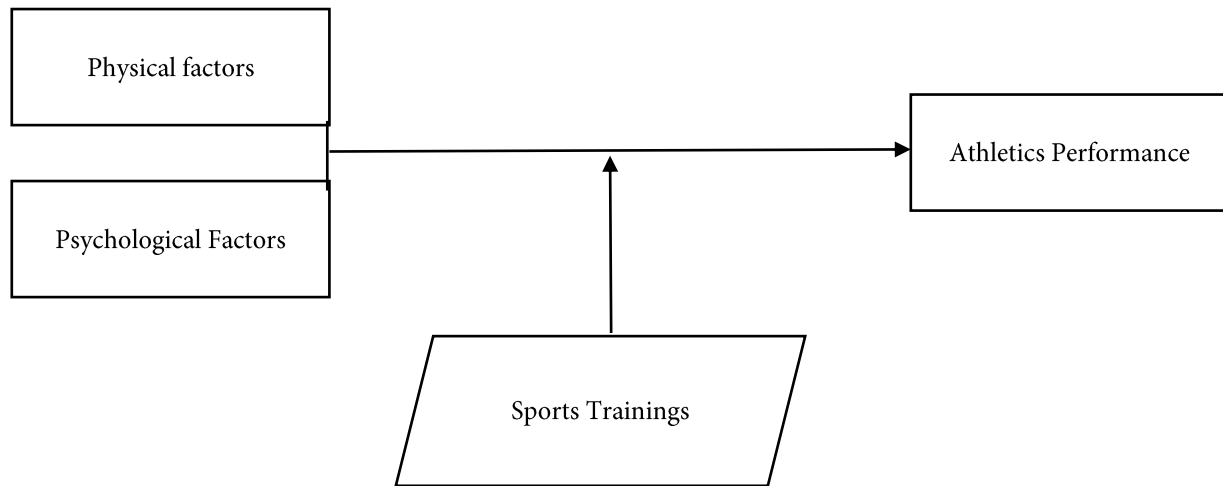


Figure 1. Conceptual Framework

The research follows research hypotheses predicted based on previous literature gaps.

H1: Physical factors have a positive influence on athletic performance.

H2: Psychological factors have a positive influence on athletic performance.

H3: Sports training moderates the association between physical factors and athletic performance.

H4: Sports training moderates the association between psychological factors and athletic performance.

Research Design

A cross-sectional survey collected data from a representative sample of Saudi Arabian athletes (Lindell & Whitney, 2001). Participants were selected using a non-probability convenience selection method because the study population was unknown (Vehovar, Toepoel, & Steinmetz, 2016). The target population consisted of Saudi Arabian athletes currently participating in competitive sports. The sample size for the Partial Least Square (PLS)-Structural Equation Modeling (SEM) has been determined to be 500 respondents following the power analysis and the minimum sample size required to identify significant impacts (Hair & Alamer, 2022). The questionnaire was delivered to participants via self-administered questionnaire, comparable to an internet survey (Jenkins & Dillman, 1995). 500 questionnaires were distributed. However, only 400 were returned; this number is considered adequate for PLS-SEM analysis (Hair et al., 2017). The questionnaires distributed were adapted from prior investigations. For example, the study (Puetz, Flowers, & O'Connor, 2008) incorporated physical components measured by physical activity and 5 items. On the other hand, psychological aspects were measured by three dimensions: social confidence by five things, motives

by five items, and stress management by five items. These items were taken from the research of Jaenes et al. (2021). Alternatively, athletic training is measured by five items borrowed from the study by Saw, Main, and Gustin (2016). All items were measured using a five-point Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree).

Data Analysis

The analysis was conducted on the measurement and structural models, which are discussed in the following two sections.

Measurement model

Measurement models are essential in research as they help ensure that the studied constructs are accurately measured. Smart PLS is a commonly used software for conducting structural equation modeling (SEM), including measurement model evaluation.

Convergent Validity

Convergent validity refers to the extent to which many measures of the same construct correlate (Hair & Alamer, 2022). Strong convergent validity suggests that the measures measure the same underlying construct and are compatible (Hair et al., 2017). To evaluate convergent validity, consider the "factor loadings, average variance extracted (AVE), and composite reliability (CR) of the indicators." These values should have the following thresholds: factor loadings, which indicate how strongly each indicator is related to its corresponding latent variable, should have a value greater than 0.5; AVE, which is a measure of convergent validity and indicates the amount of variance in the indicators that are explained by the latent variable, should have a value greater than 0.5; and for convergent validity, AVE values of 0.5 or greater are generally considered acceptable (Ahmad, Bin Mohammad,

& Nordin, 2019). Moreover, CR, a measure of internal consistency that reflects the latent variable's dependability, should have a value greater than 0.7 to indicate solid internal consistency (Henseler, Ringle, & Sarstedt, 2015). In addition, the construct's reliability could be evaluated using Cronbach alpha, whose values should be greater than 0.7. The values in Table 1 and Figure 2 indicate that this concept has convergent validity.

Table 1

Convergent Validity Results

Construct	T Statistics	Alpha	AVE	CR
Sports Training	3.784	0.893	0.610	0.921
Physical Factors	4.874	0.783	0.513	0.823
Psychological Factors	5.983	0.812	0.731	0.935
Athletic Performance	8.894	0.783	0.612	0.923

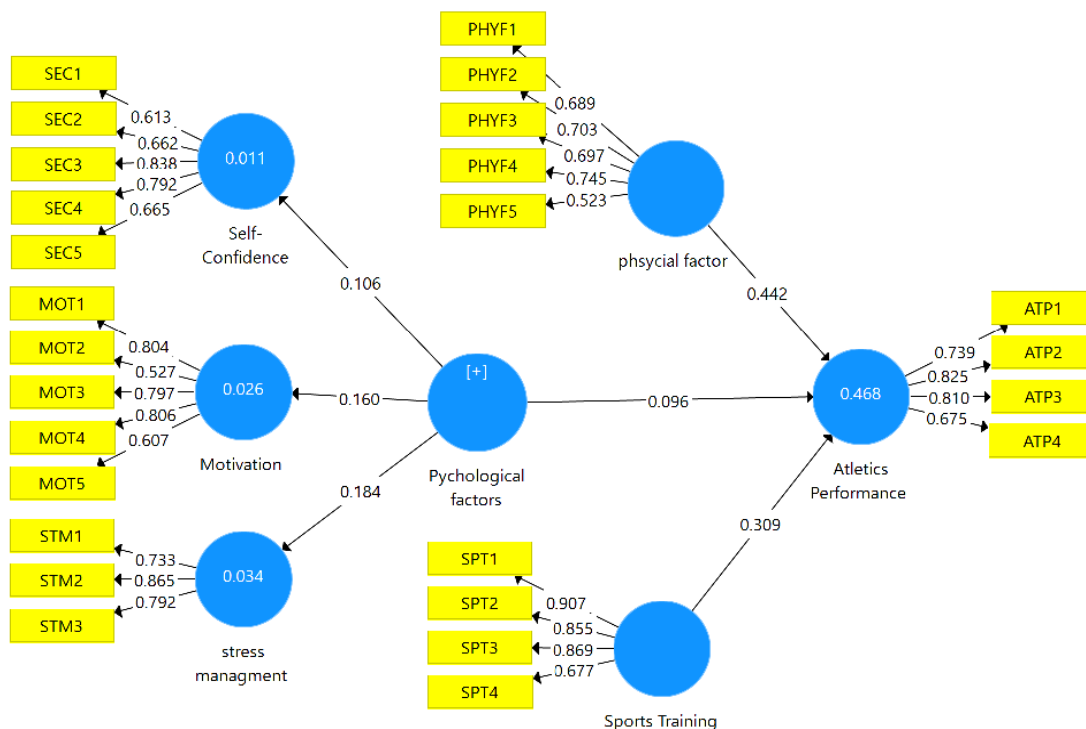


Figure 2. Factors Loadings

Discriminant Validity

In addition to convergent validity, discriminant validity describes the amount to which different measurements of different constructs were unrelated to one another. High discriminant validity suggests that the measures do not measure the same underlying construct and are separate from one another. To evaluate discriminant validity, studying the cross-loadings of variables separately and in relation to other constructions is

possible. At the same time, It is common practice to compare the AVE values of each structure to the inter-correlations between the structure and other structures. To establish solid discriminant validity, the AVE must be greater than the squared correlation between the construct of interest and every other construct (Fornell & Larcker, 1981). The desk. All diagonal values are more significant than the below values, indicating that the concept has discriminant validity, indicated by its three values.

Table 2

Discriminant validity

	VIF	Sports Training	Physical Factors	Psychological Factors	Athletic Performance
Sports Training	1.456	0.75			
Physical Factors	1.763	0.22	0.80		
Psychological Factors	2.74	0.19	0.30	0.85	
Athletic Performance	----	0.25	0.28	0.22	0.75

Structural Model

Table 3 displays the path coefficients, standard errors, t-values, and p-values for each path in the model, including the moderation effects, along with the standard errors and t-values. Significant positive coefficients for the routes from Sports Training, Psychological Factors, and Physical Factors to Athletic Performance indicate that these dimensions are favorably related to athletic performance. Significant moderation results show that Sports Training moderates the

associations between Psychological Factors and Athletic Performance, as well as Physical Factors and Athletic Performance. This indicates that the relationship between these characteristics and athletic performance is vital for those with greater degrees of sports training. In addition, practical values of 0.02, 0.15, and 0.35 are classified as having small, middling, and substantial effects, respectively (Cohen, 1992; Kock, 2014). Table 2 suggests that all effect sizes influence the dependent variable. The results of the structural model are anticipated in Table 3 below.

Table 3

Regression results

	F square	Coefficient	Standard Error	t-value	P-value
Psychological Factors -> Athletic Performance	0.273	0.184	0.058	3.171	0.002
Physical Factors -> Athletic Performance	0.163	0.47	0.079	5.918	0.000
Sports Training * Psychological Factors -> Athletic Performance	0.373	0.12	0.05	2.34	0.019
Sports Training * Physical Factors -> Athletic Performance	0.189	0.09	0.03	2.90	0.004

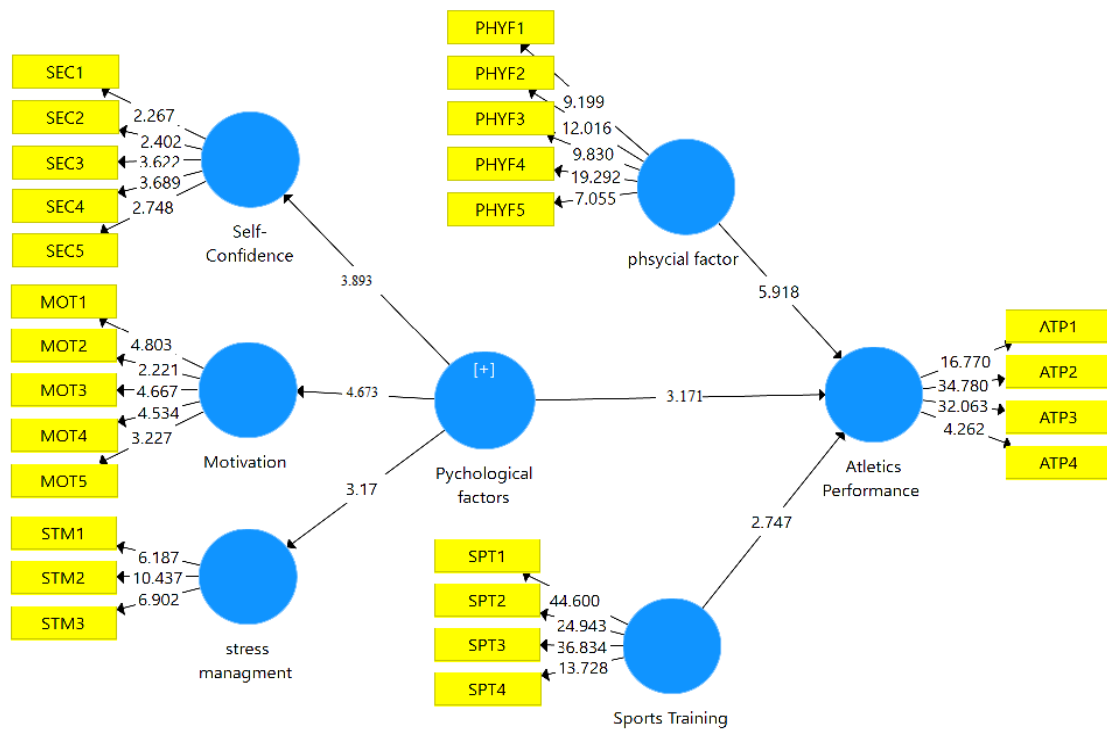


Figure3. Structural Model

Discussion and conclusion

Physical elements have a positive and substantial effect on athletic performance, according to the findings of this study. These data indicate that as the physical demands of athletics increased, so did an athletic performance. These findings are consistent with past studies (Chen et al., 2022; Kassiri et al., 2009; Lee,

Komar, & Chia, 2021). On the other hand, there are favorable and substantial findings about the moderating effect of sports training on the relationship between physical parameters, psychological factors, and athletic performance among Saudi Arabian athletes, according to the research findings. The results indicate that sports training considerably moderates the relationship between physical activity and athletic performance

among male and female Saudi Arabian athletes. Consequently, it is essential to include sports training in athlete development programs to increase the physical fitness and athletic performance of Saudi athletes. Also, it has been observed that the psychological aspects of the physical performance of Saudi Arabian players are positive. This study suggests that the Saudi Arabian sports sector played a significant impact in enhancing athletic performance. This result is consistent with previous studies (Aljehani, 2021; Cahill et al., 2020; Chen et al., 2022). According to a recent study, sports training significantly moderates the relationship between psychological factors and athletic performance. To improve the athletic performance of Saudi Arabian athletes, it is crucial to promote positive psychological elements through frequent sports training. Those findings are consistent with previous research indicating that sports training moderates considerably and favorably (Cahill et al., 2020).

Frequent sports training significantly moderates physical elements, psychological aspects, and athletic performance among Saudi Arabian athletes. Physical and psychological elements can favor athletic performance more favorably when enhanced by sports training. Incorporating sports training into athlete development programs is vital for improving the athletic performance of Saudi athletes.

Contributions

The significance of this work is multifaceted. By analyzing the moderating effect of sports training on the relationship between physical and psychological factors and athletic performance, this study aims to address a theoretical gap in the existing literature. Despite previous research on the independent effects of physical and psychological factors on athletic performance, there is a lack of research on how sports training may mitigate this correlation. This study examines how sports training might strengthen the interplay between physical and psychological elements and improve Saudi Arabian athletes' athletic performance to fill this knowledge gap. The second objective of this study is to fill a vacuum in the literature by evaluating the moderating influence of sports training on athletic performance in the Saudi Arabian environment. Past research has revealed that cultural and societal norms can affect sports participation and performance in Saudi Arabia (Aljehani, 2021; García-Hermoso et al., 2020). Hence, this study contributed to investigating how sports training might improve athletic performance and

help Saudi Arabian athletes overcome cultural and socioeconomic barriers to sports participation and performance.

Thirdly, this study addresses contradictory literature findings about the relative importance of physical and psychological elements in predicting athletic performance. This study led to a more nuanced understanding of the relative contributions of physical and psychological aspects to an athletic performance by studying the moderating effect of sports training on these connections. This study could have practical ramifications for Saudi Arabian coaches, athletes, and organizations. This study can inform the development of training programs and methods that optimize the potential of Saudi Arabian athletes by identifying the unique ways in which sports training might improve athletic performance.

Limitations and Future Directions

With noteworthy findings, the study contains several limitations that may become new research areas in the future. The study focuses on a subset of Saudi Arabian athletes and may not apply to other contexts or demographics. Future research could replicate the study with different populations to determine the generalizability of the findings. Second, research focuses entirely on the influence of sports training on the relationship between psychological and physical components and athletic performance. To deepen our understanding of athletic performance, future research should investigate additional potential moderators, such as social support and cultural influences. As the study was cross-sectional, it is impossible to discern cause and effect. Future research may investigate the causal relationship between athletic performance, physical and psychological features, and sports training using longitudinal methods. Lastly, future research might investigate the impact of individual variations, such as gender and experience level, on the moderating effect of sports training on athletic performance. This could provide more nuanced insights into the impact of sports training on the athletic performance of various athlete groups.

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