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The Relationship Between Mental Toughness, Emotional Intelligence, and Stress Coping With the Incidence of Unstable Ankle Injury in Athletes

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A B S T R A C T

Objective: The objective of this study was to examine the relationships between mental toughness, emotional intelligence, and stress coping skills with the incidence of unstable ankle injury among university volleyball and basketball athletes.

Methods and Materials: This applied, correlational study was conducted among male and female university athletes competing in volleyball and basketball at regional university competitions in 2017. A total of 118 athletes who met the inclusion criteria were selected using convenience sampling. Data were collected using standardized self-report instruments assessing mental toughness, emotional intelligence in sport, stress coping styles, and ankle instability. Questionnaires were administered during official competitions following coordination with university sports authorities. Data analysis was performed using SPSS (Version 20). Normality of distributions was assessed using the Kolmogorov–Smirnov test. Pearson correlation coefficients were calculated to examine bivariate relationships, and multiple regression analysis was conducted to determine the predictive contribution of psychological variables to unstable ankle injury incidence at an alpha level of .05.

Findings: Inferential analyses showed a significant positive correlation between mental toughness and unstable ankle injury ($r = 0.277$, $p = .003$), as well as significant correlations with right ankle injury ($r = 0.249$, $p = .007$) and left ankle injury ($r = 0.200$, $p = .033$). Stress coping skills were significantly correlated with overall unstable ankle injury ($r = 0.215$, $p = .021$) and left ankle injury ($r = 0.184$, $p = .050$), while the correlation with right ankle injury was not statistically significant ($r = 0.174$, $p = .063$). Emotional intelligence was not significantly associated with unstable ankle injury ($r = -0.035$, $p = .708$), right ankle injury ($r = -0.033$, $p = .726$), or left ankle injury ($r = -0.024$, $p = .804$). Multiple regression analysis indicated that mental toughness ($\beta = 0.286$, $t = 3.23$, $p = .002$) and stress coping ($\beta = 0.253$, $t = 2.73$, $p = .007$) were significant predictors of unstable ankle injury, whereas emotional intelligence was not ($\beta = -0.144$, $t = -1.55$, $p = .124$).

The model explained 13% of the variance in unstable ankle injury ($R = 0.372$, $R^2 = 0.139$, adjusted $R^2 = 0.115$; $F(3,111) = 5.96$, $p = .01$).

Conclusion: The findings suggest that mental toughness and stress coping skills are significant psychological correlates of unstable ankle injury among university athletes, while emotional intelligence does not independently predict injury incidence. These results highlight the complex and context-dependent role of psychological resources in sport injury and underscore the importance of integrating psychological factors into injury prevention and athlete support programs.

Keywords: *mental toughness; emotional intelligence; stress coping; unstable ankle injury*

1. Introduction

In contemporary sport and performance psychology, mental toughness has emerged as one of the most influential psychological constructs for understanding how individuals adapt to pressure, adversity, and performance-related stressors. Mental toughness is commonly conceptualized as a multidimensional psychological resource that enables individuals to maintain optimal functioning, persistence, and confidence under challenging conditions. It encompasses elements such as commitment, control, challenge appraisal, and confidence, which together shape how athletes interpret and respond to both internal and external demands. Recent advances in the field emphasize that mental toughness is not merely a fixed trait but a dynamic and developable capacity influenced by cognitive, emotional, and contextual factors (Akbar et al., 2024; Guszkowska & Wójcik, 2021; Hsieh et al., 2023).

A growing body of empirical research has documented the central role of mental toughness in athletic performance, well-being, and adaptation to stress. Systematic reviews and meta-analyses indicate that higher levels of mental toughness are associated with superior performance outcomes, enhanced resilience, and more effective coping strategies across a wide range of sports and competitive levels (Hsieh et al., 2023; Soundara Pandian et al., 2023). Beyond performance, mental toughness has also been linked to broader psychological outcomes, including subjective well-being, life satisfaction, and reduced psychological distress, highlighting its relevance beyond elite sport contexts (Akoğlu, 2024; ÖZcan, 2022; Parsaiezadeh et al., 2024). These findings position mental toughness as a core psychological construct bridging performance optimization and mental health.

Recent research has expanded the scope of mental toughness studies to include diverse populations and contexts, such as students, adolescents, and individuals facing health-related challenges. For example, mental toughness has been shown to predict academic achievement, critical thinking, and self-worth among students, underscoring its transcontextual applicability (Emesi et al., 2024). In adolescent populations, mental toughness has been found to buffer the negative effects of family dysfunction and depressive symptoms, suggesting its protective role during critical developmental periods (Ni, 2024). Similarly, studies in clinical and health-related contexts indicate that mental toughness contributes to distress tolerance, psychological vitality, and adaptive coping among parents of children with chronic illnesses and patients facing serious medical conditions (Abedini & Joibari, 2023; Razavian et al., 2021). Collectively, these findings reinforce the view that mental toughness functions as a general psychological resilience resource.

Within sport-specific contexts, mental toughness has been examined in relation to motor learning, skill acquisition, and confidence, further emphasizing its functional importance. Evidence from wrestling, sailing, fencing, and team sports demonstrates that mentally tougher athletes tend to exhibit more efficient learning processes, greater confidence, and more consistent performance under pressure (Ceylan, 2023; Ranjbar et al., 2023; Sallam et al., 2022; Yalçın et al., 2022). Qualitative investigations among elite university athletes also reveal that mental toughness is shaped by social environments, coaching practices, and cultural expectations, suggesting that it is both individually constructed and socially reinforced (De La Cerna & Diego, 2022; Rintaugu et al., 2022). These insights underscore the necessity of examining mental toughness within broader psychosocial frameworks.

An important extension of mental toughness research concerns its relationship with stress, coping, and emotional regulation. Athletes routinely encounter stressors such as competitive pressure, injury risk, performance evaluation, and role expectations. Mental toughness has been consistently associated with lower perceived stress and more adaptive coping strategies, including problem-focused

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coping and cognitive reappraisal (Turkington et al., 2023; Zhong et al., 2025). Studies conducted during the COVID-19 pandemic further demonstrated that mental toughness served as a psychological buffer against anxiety, emotional exhaustion, and reduced quality of life among elite athletes and sport professionals (Dagnall et al., 2021; Omrani et al., 2022). These findings highlight the stress-regulatory function of mental toughness in highly demanding environments.

In parallel, research has increasingly examined the intersection between mental toughness and emotional processes, particularly emotional intelligence, mindfulness, and self-compassion. Emotional intelligence, defined as the ability to perceive, understand, regulate, and utilize emotions effectively, has been proposed as a complementary construct that supports adaptive functioning in sport. Empirical evidence suggests that emotional intelligence and mindfulness-based skills may indirectly enhance mental toughness by improving emotional regulation, attentional control, and cognitive flexibility (Wang et al., 2021; Wu et al., 2021; Zhong et al., 2025). Moreover, studies exploring self-compassion and psychological safety indicate that emotionally supportive environments can foster mental toughness while reducing maladaptive fear responses and self-criticism, particularly in injury contexts (Johnson et al., 2023; Ojio et al., 2024).

The role of mental toughness in injury-related outcomes has gained particular attention in recent years. Sport injuries not only impose physical limitations but also generate psychological challenges, including fear of re-injury, pain catastrophizing, and reduced confidence. Emerging evidence suggests that mental toughness beliefs influence how athletes interpret pain, adhere to rehabilitation, and cope with injury-related stress (Tawil et al., 2025). Mental toughness has also been identified as a moderator or mediator in the relationship between psychological stressors and maladaptive outcomes such as aggression, avoidance behavior, and emotional dysregulation (Hassan et al., 2023; Kinrade et al., 2022). These findings underscore the relevance of mental toughness for understanding injury vulnerability and recovery processes.

Despite the growing literature, several gaps remain. First, much of the existing research has focused on performance outcomes or general well-being, with comparatively fewer studies examining the relationship between mental toughness, emotional intelligence, stress coping, and specific musculoskeletal injuries. Second, the majority of injury-related studies emphasize rehabilitation and post-injury adaptation, while less attention has been paid to psychological factors associated with the incidence or recurrence of injuries. Third, cultural and contextual diversity in mental toughness research remains limited, particularly in non-Western university sport settings (Ramirez & Delariarte, 2023; Rintaugu et al., 2022). Addressing these gaps is essential for developing more comprehensive injury-prevention and psychological support models in sport.

Unstable ankle injury represents one of the most prevalent and recurrent musculoskeletal problems among athletes, especially in sports involving jumping, rapid direction changes, and high-impact landings. Recurrent ankle instability is associated with impaired performance, chronic pain, and increased risk of subsequent injuries. While biomechanical and physiological risk factors have been extensively studied, psychological determinants of ankle instability remain underexplored. Given the documented links between mental toughness, stress perception, emotional regulation, and coping behaviors, it is plausible that psychological skills may influence athletes' vulnerability to recurrent ankle injuries through attentional focus, risk appraisal, and stress-related motor control mechanisms (Tian et al., 2022; Zhong et al., 2025).

Integrating mental toughness with emotional intelligence and stress coping frameworks offers a more holistic perspective on injury-related outcomes. Mental toughness may shape how athletes cognitively appraise challenging situations, emotional intelligence may influence emotion regulation during high-risk movements, and coping strategies may determine how stress translates into physiological tension or attentional lapses. Understanding the interplay among these variables can provide valuable insights for preventive interventions, psychological skills training, and athlete education programs (Akbar et al., 2024; Soundara Pandian et al., 2023; Vella-Fondacaro & Romano-Smith, 2023). Such integrative approaches align with contemporary sport psychology models that emphasize multidimensional and context-sensitive explanations of athletic health and performance.

In light of the theoretical and empirical considerations outlined above, examining the relationships between mental toughness, emotional intelligence, stress coping, and the incidence of unstable ankle injury among university athletes represents a meaningful contribution to the sport psychology literature. This focus not only extends existing knowledge on mental toughness beyond performance and well-being but also addresses a critical applied concern in athletic

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populations. Therefore, the aim of the present study was to investigate the relationships between mental toughness, emotional intelligence, and stress coping skills with the incidence of unstable ankle injury among university volleyball and basketball athletes.

2. Methods and Materials

2.1. Study Design and Participants

Based on its purpose and application, this study is classified as applied research, and in terms of analytical approach, it is correlational in nature. The statistical population of the study consisted of male and female volleyball and basketball players who participated in the Region 9 competitions of universities and higher education institutions in 2017. A total of 118 participants were selected using convenience sampling. The research instruments included the following measures.

For data collection, the questionnaires were distributed to male and female volleyball and basketball student-athletes participating in the Region 9 competitions of universities and higher education institutions who were willing to cooperate. These competitions were held at Ferdowsi University of Mashhad, Shahrood University of Technology, and Semnan University. Following coordination with the directors of physical education at Ferdowsi University of Mashhad, Semnan University, and Shahrood University of Technology, permission was granted to distribute the questionnaires during the Region 9 competitions. At the time of distribution, instructions for completing the questionnaires were explained to the participants. It should be noted that these competitions were held in February and March 2017, and the distribution of questionnaires was carried out with the assistance of several undergraduate and graduate students in physical education. A total of 387 participants completed the questionnaires, of which 118 questionnaires met the criteria for inclusion in the statistical analysis.

2.2. Measures

Mental Toughness Questionnaire–48 (MTQ48): This questionnaire is used to assess athletes' mental toughness skills. It consists of 48 items rated on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The questionnaire can be scored using either a four-factor structure, including challenge, commitment, control, and confidence, or a six-factor structure, including challenge, commitment, emotional control, life control, confidence in abilities, and interpersonal confidence. The overall internal consistency of the questionnaire is reported as 0.93, and the reliability coefficients for the subscales of challenge, commitment, control, emotional control, life control, confidence, confidence in abilities, and interpersonal confidence are reported as 0.77, 0.80, 0.84, 0.78, 0.81, 0.86, 0.81, and 0.81, respectively.

Sport Emotional Intelligence Questionnaire: This questionnaire is a self-report measure consisting of 33 items and six factors, reflecting an individual's tendency and determination to maintain participation in sport activities. The six factors include appraisal of others' emotions, self-regulation, appraisal of one's own emotions, social skills, optimism, and utilization of emotions. The items are presented in declarative and interrogative forms and are scored on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The reliability coefficients calculated using Cronbach's alpha for the subscales range from 0.76 to 0.79, while the overall emotional intelligence scale has a reliability coefficient of 0.80.

Coping Inventory for Stressful Situations (CISS; Endler & Parker, 1990): This inventory consists of 48 items, with responses rated on a five-point scale ranging from never (1) to very much (5). The first 16 items assess task-oriented coping, the second 16 items assess emotion-oriented coping, and the final 16 items assess avoidance-oriented coping. Reviews of studies conducted in Iran, including those by Akbarzadeh (1997), Bahrami (1998), and Tabatabaei (1998), indicate relatively high internal consistency and correlations of the scale with various variables, demonstrating satisfactory reliability and validity. The reliability coefficients reported by Endler and Parker (1990) are 0.90 for task-oriented coping, 0.85 for emotion-oriented coping, and 0.82 for avoidance-oriented coping. Tabatabaei (1998) reported Cronbach's alpha coefficients of 0.81 and 0.78 for task-oriented and emotion-oriented coping styles, respectively (as cited in Momeni & Ebrahimi, 2017).

Cumberland Ankle Instability Tool (CAIT): This questionnaire consists of nine items scored on a five-point Likert scale. The validity and reliability of this instrument were reported as 0.84 and 0.83, respectively, by Hiller and colleagues (2006).

2.3. Data Analysis

To examine the normality of data distribution, the Kolmogorov–Smirnov test was used, and Pearson's

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correlation coefficient was applied to assess the relationships between variables. All data analyses were conducted using SPSS software (Version 20), and hypothesis testing was performed using Pearson's correlation coefficient at an alpha level of .05.

3. Findings and Results

The results showed that 39% of the respondents were female and 61% were male. In terms of sport specialization, 61% of the respondents were volleyball players and 39% were basketball players. Regarding age distribution, 28.8% of the respondents were between 18 and 20 years old, 44.1% were between 21 and 23 years old, and 27.1% were between 24 and 26 years old. With respect to educational level, 82.2% of the respondents held a bachelor's degree and 17.8% held a master's degree. In addition, 83.9% of the respondents were single and 16.1% were married.

Table 1

Means and Standard Deviations of the Research Variables

Scale	Mean	Standard Deviation
Mental toughness skills	3.30	0.50
Emotional intelligence skills	3.80	0.40
Stress coping skills	3.10	0.40
Unstable ankle injury	0.90	0.50
Unstable right ankle injury	0.70	0.60
Unstable left ankle injury	1.00	0.60

The results presented in Table 1 indicate that the mean score for mental toughness skills was 3.30, the mean score for emotional intelligence skills was 3.80, the mean score for stress coping skills was 3.10, the mean score for unstable ankle injury was 0.90, the mean score for unstable right ankle injury was 0.70, and the mean score for unstable left ankle injury was 1.00.

For the mental toughness variable, the Kolmogorov–Smirnov test statistic was 0.92 with a significance level of .05. For emotional intelligence, the Kolmogorov–Smirnov statistic was 0.99 with a significance level of .28. For stress coping, the Kolmogorov–Smirnov statistic was 0.52 with a significance level of .94. For unstable ankle injury, the Kolmogorov–Smirnov statistic was 0.78 with a significance level of .57. Therefore, the results indicated that all research variables followed a normal distribution.

Table 2

Cronbach's Alpha Coefficients of the Research Instruments

Questionnaire	Cronbach's Alpha
Mental toughness skills	0.86
Emotional intelligence skills	0.85
Stress coping skills	0.88
Unstable ankle injury	0.78

The set of indicators designed for the mental toughness skills questionnaire consisted of 48 items, with a total Cronbach's alpha coefficient of 0.86. The emotional intelligence skills questionnaire, with 33 items, had a Cronbach's alpha coefficient of 0.85. The stress coping skills questionnaire, with 48 items, had a Cronbach's alpha coefficient of 0.88. The unstable ankle injury scale, with 9 items, had a Cronbach's alpha coefficient of 0.78. Therefore, all reliability coefficients of the questionnaire components were above 0.70, indicating acceptable and satisfactory reliability.

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Table 3

Pearson Correlation Coefficients Between Mental Toughness, Emotional Intelligence, Stress Coping, and the Incidence of Unstable Ankle Injury

Predictor Variable	Unstable Ankle Injury (r)	Right Ankle Injury (r)	Left Ankle Injury (r)	p (Unstable)	p (Right)	p (Left)	N
Mental toughness	0.277**	0.249**	0.200*	.003	.007	.033	115 / 114
Emotional intelligence	−0.035	−0.033	−0.024	.708	.726	.804	115 / 114
Stress coping	0.215*	0.174	0.184*	.021	.063	.050	115 / 114

*p<0.05; **p<0.01

The results presented in Table 3 indicate differential patterns of association between the psychological variables and the incidence of unstable ankle injury. Mental toughness showed a positive and statistically significant correlation with overall unstable ankle injury as well as with both right and left ankle injuries, indicating that higher levels of mental toughness were associated with higher reported incidence of ankle instability. In contrast, emotional intelligence demonstrated weak and non-significant correlations with unstable ankle injury across all indicators, suggesting no meaningful relationship between emotional intelligence skills and ankle instability. Stress coping skills were significantly correlated with overall unstable ankle injury and left ankle injury, while the association with right ankle injury did not reach statistical significance. Overall, these findings suggest that mental toughness and stress coping are meaningfully related to the incidence of unstable ankle injury, whereas emotional intelligence does not appear to play a significant role in this context.

After examining construct indicators and ensuring that the model was identifiable, model fit was evaluated. As can be seen, the fit indices for the evaluated models reached acceptable levels.

Table 4

Entered Variables, Model Summary, and Regression Coefficients

Model	R	R^2	Adjusted R^2	Standard Error of Estimate
1	0.372	0.139	0.115	0.473

Table 4 presents the values of R, R^2, adjusted R^2, and the standard error of estimate. When mental toughness, emotional intelligence, and stress coping were entered as predictors of the incidence of unstable ankle injury, the R value was 0.37 and the R^2 value was 0.13, indicating that 13% of the variance in unstable ankle injury incidence was explained by mental toughness, emotional intelligence, and stress coping.

Table 5

Analysis of Variance for the Significance of the Predictor Variables

Model	Sum of Squares	df	Mean Square	F	p
Regression	3.996	3	1.332	5.956	.01
Residual	24.825	111	0.224		
Total	28.822	114			

Table 5 presents the results of the analysis of variance for the significance of the regression model. In this model, mental toughness, emotional intelligence, and stress coping were entered into the regression equation. The obtained F value was 5.956, which was significant at the .05 level.

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Table 6

Standardized and Unstandardized Regression Coefficients for Mental Toughness, Emotional Intelligence, Stress Coping, and the Incidence of Unstable Ankle Injury

Predictor	B	Standard Error	Beta	t	p
Constant	−0.240	0.514		−0.466	.642
Mental toughness	0.289	0.090	0.286	3.230	.002
Stress coping	0.275	0.101	0.253	2.728	.007
Emotional intelligence	−0.177	0.114	−0.144	−1.549	.124

Table 6 presents the standardized and unstandardized regression coefficients, t statistics, and significance levels for the effects of mental toughness, emotional intelligence, and stress coping on the incidence of unstable ankle injury. The t value for the effect of mental toughness on unstable ankle injury was 3.23, with a standardized beta coefficient of 0.28, which was significant at the .05 level. The t value for the effect of stress coping on unstable ankle injury was 2.72, with a standardized beta coefficient of 0.25, which was significant at the .05 level. In contrast, the t value for the effect of emotional intelligence on unstable ankle injury was −1.54, with a standardized beta coefficient of −0.14, which was not statistically significant.

4. Discussion

The findings of the present study provide an understanding of how psychological resources are associated with the incidence of unstable ankle injury among university athletes. The results demonstrated that mental toughness and stress coping skills were significantly associated with unstable ankle injury, whereas emotional intelligence did not show a statistically significant relationship with injury incidence. Moreover, regression analyses indicated that mental toughness and stress coping were significant predictors of unstable ankle injury, while emotional intelligence did not contribute meaningfully to the predictive model. Collectively, these findings highlight the differentiated roles of psychological constructs in injury-related outcomes and underscore the importance of examining mental toughness and coping processes within injury prevention frameworks.

The positive and significant relationship observed between mental toughness and unstable ankle injury is a complex and theoretically meaningful finding. Although mental toughness is commonly conceptualized as a protective psychological resource associated with resilience, performance consistency, and adaptive functioning, emerging evidence suggests that higher levels of mental toughness may also be linked to increased risk-taking, persistence through pain, and reduced sensitivity to physical warning signals. Athletes with high mental toughness may be more inclined to continue participation despite discomfort or minor injuries, potentially increasing their exposure to injury risk. This interpretation is consistent with research indicating that mental toughness influences how athletes interpret pain, fear, and physical limitations, particularly in injury contexts (Johnson et al., 2023; Tawil et al., 2025). In this regard, mental toughness may function as a double-edged construct, simultaneously supporting performance while increasing vulnerability to overuse or recurrent injuries.

Prior studies have shown that mentally tough athletes often demonstrate greater tolerance for physical and psychological strain, which may lead to higher training loads and greater exposure to biomechanical stressors (Akbar et al., 2024; Soundara Pandian et al., 2023). Furthermore, qualitative and quantitative investigations suggest that mental toughness is associated with a strong commitment to goals and persistence under adversity, traits that may reduce injury-related caution during competition or training (De La Cerna & Diego, 2022; Rintaugu et al., 2022). The present findings align with these perspectives and extend them by demonstrating that mental toughness is positively associated with the incidence of unstable ankle injury, particularly in sports characterized by rapid directional changes and high-impact movements.

The significant association between stress coping skills and unstable ankle injury further emphasizes the role of psychological stress processes in injury occurrence. Athletes who rely on certain coping strategies may experience variations in attentional focus, muscle tension, and motor coordination under stress, which can directly affect injury risk. Stress has been shown to impair neuromuscular control and increase susceptibility to musculoskeletal injuries, particularly in the lower extremities. Effective coping

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strategies are therefore critical in regulating stress responses during high-risk movements. The present findings indicate that stress coping skills are meaningfully related to ankle instability, supporting theoretical models that link stress appraisal and coping to injury vulnerability (Turkington et al., 2023; Zhong et al., 2025).

Previous research has consistently demonstrated that mental toughness is closely intertwined with coping styles and stress regulation. Athletes with higher mental toughness tend to report lower perceived stress and greater use of adaptive coping strategies, such as problem-focused coping and cognitive reappraisal (Dagnall et al., 2021; Omrani et al., 2022). However, the present results suggest that stress coping skills, independent of emotional intelligence, play a direct role in injury-related outcomes. This finding is consistent with studies indicating that coping mechanisms can influence physiological arousal, attentional control, and movement efficiency, all of which are critical in preventing ankle instability (Tian et al., 2022; Zhong et al., 2025). Thus, stress coping may serve as a proximal psychological factor influencing injury occurrence, whereas mental toughness may exert both direct and indirect effects.

In contrast to mental toughness and stress coping, emotional intelligence did not demonstrate a significant relationship with unstable ankle injury. This finding suggests that the ability to perceive, understand, and regulate emotions may be more relevant to performance quality, interpersonal functioning, and psychological well-being than to the direct occurrence of musculoskeletal injuries. While emotional intelligence has been linked to improved emotional regulation, reduced anxiety, and enhanced social functioning in athletes, its role in injury incidence appears to be limited. Previous studies have emphasized the contribution of emotional intelligence to coping with competitive stress and maintaining motivation, rather than to biomechanical or neuromuscular outcomes (Wang et al., 2021; Wu et al., 2021). The present findings align with this body of literature by indicating that emotional intelligence alone may not be sufficient to influence injury risk.

It is also possible that emotional intelligence exerts its influence indirectly through other psychological constructs, such as mental toughness, mindfulness, or self-compassion. Recent studies have proposed integrative models in which emotional intelligence enhances self-regulation capacities that subsequently strengthen mental toughness and adaptive coping (Abedini & Joibari, 2023; Zhong et al., 2025). In this context, emotional intelligence may function as a distal psychological resource that supports overall psychological functioning but does not directly translate into reduced injury incidence. This interpretation is consistent with findings showing that emotional and mindfulness-based skills contribute to mental toughness development, rather than serving as independent predictors of injury-related outcomes (Vella-Fondacaro & Romano-Smith, 2023; Wu et al., 2021).

The regression results further clarify the relative contributions of the examined psychological variables. Mental toughness and stress coping emerged as significant predictors of unstable ankle injury, collectively explaining a meaningful proportion of variance in injury incidence. Although the explained variance was modest, this is consistent with the multifactorial nature of sport injuries, which are influenced by a combination of biomechanical, physiological, environmental, and psychological factors. Psychological variables are unlikely to account for a large proportion of injury variance independently; however, their contribution is nonetheless meaningful, particularly when integrated into comprehensive injury prevention models (Guszkowska & Wójcik, 2021; Hsieh et al., 2023). The present findings therefore support the inclusion of psychological skills assessment and training as complementary components of injury prevention strategies.

These results also contribute to the broader literature on mental toughness by highlighting its context-dependent effects. While numerous studies have documented the benefits of mental toughness for performance, resilience, and well-being (Akoğlu, 2024; Emesi et al., 2024; Parsaiezadeh et al., 2024), fewer studies have examined its potential costs or unintended consequences. The positive association between mental toughness and injury incidence observed in this study suggests that excessively high levels of mental toughness, particularly when not balanced by injury awareness and self-regulation, may increase physical risk. Similar concerns have been raised in studies examining aggression, ego-threat, and maladaptive persistence, where mental toughness moderated the relationship between personality traits and risky behavior (Hassan et al., 2023; Kinrade et al., 2022). These findings collectively underscore the importance of conceptualizing mental toughness as a nuanced and context-sensitive construct.

From a theoretical perspective, the present findings align with stress–injury models that emphasize the interaction between psychological stress, coping resources, and injury risk. According to these models, psychological variables influence injury occurrence by affecting attentional focus, muscle tension, and decision-making under pressure. Mental

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toughness and coping skills appear to play central roles in these processes, whereas emotional intelligence may exert more distal or indirect effects. Integrating these constructs into a unified framework may enhance the explanatory power of psychological models of sport injury (Tian et al., 2022; Zhong et al., 2025). Such integration is particularly relevant for team sports like volleyball and basketball, where rapid situational changes and high cognitive demands amplify the impact of psychological factors on motor control.

5. Conclusion

Overall, the findings suggests that mental toughness and stress coping are key psychological correlates of unstable ankle injury among university athletes, while emotional intelligence does not independently predict injury incidence. These results extend existing literature by shifting attention from performance and well-being outcomes to injury-related processes and by highlighting the potential dual role of mental toughness. They also underscore the need for balanced psychological development that promotes resilience and performance without increasing physical risk.

6. Limitations & Suggestions

One limitation of the present study is its cross-sectional design, which precludes causal inferences regarding the relationships between psychological variables and injury incidence. Additionally, reliance on self-report measures may have introduced response bias, and the use of convenience sampling limits the generalizability of the findings to other athletic populations and competitive levels.

Future research should employ longitudinal and experimental designs to examine causal pathways linking mental toughness, coping strategies, and injury occurrence over time. Studies incorporating objective injury records, biomechanical assessments, and physiological stress indicators would provide a more comprehensive understanding of how psychological factors interact with physical risk mechanisms.

From a practical perspective, sport psychologists, coaches, and athletic trainers should consider integrating mental toughness training with injury awareness, self-regulation, and adaptive coping education. Emphasizing balanced persistence, body awareness, and stress management may help athletes harness the benefits of mental toughness while minimizing the risk of recurrent injuries.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

N.G. conceptualized the study, designed the research framework, and supervised data collection in the participating universities. B.G. contributed to the methodological design, selection of measurement instruments, and coordination with university sports authorities. A.N. conducted the statistical analyses, interpreted the results, and prepared the initial draft of the manuscript. All authors participated in revising the manuscript, approved the final version, and take responsibility for the accuracy and integrity of the study.

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