INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 15, Issue 2, (2026) E-ISSN: 2226-6348

A Cross-Sectional Comparative and Correlational Study of Physical Fitness and Psychological Distress among University Basketball Student-Athletes in China and Malaysia

Gao Yili[1,2], Hadafi Fitri Mohd Latip[3*]

[1]School of Electrical Engineering, Faculty of Biomedical Engineering and Health Science Universiti Teknologi Malaysia, 81310, Johor Bahru, Johor, Malaysia, [2]College of Physical Education, Zheng Zhou University of Technology, 450000, zhengzhou, Henan, China

[3]Sports Innovation Technology Centre, Institute Human Centered Engineering,Faculty Educational Sciences and Technology, Universiti Teknologi Malaysia, 81310 Skudai， JB Malaysia

Email: gaoyili@graduate.utm.my, hadafifitri@utm.my

DOI Link: http://dx.doi.org/10.6007/IJARPED/v15-i2/27998

Published Online: 02 April 2026

Abstract

This study compared physical fitness and psychological distress among male university basketball players in China and Malaysia and examined the relationship between the two. A total of 60 male basketball players participated, including 30 from Zhengzhou University of Technology (ZUT), China, and 30 from Universiti Teknologi Malaysia (UTM), Malaysia. Physical fitness was assessed through agility, balance, and power, while psychological distress was measured using the DASS-21 scale. Mann–Whitney U tests and Spearman rank correlation analyses were used for statistical analysis. The results showed that the ZUT group performed significantly better than the UTM group in agility, balance, and power (all $p < .05$). The UTM group had significantly higher levels of anxiety and depression than the ZUT group (both $p < .05$), while the difference in stress was not statistically significant ($p > .05$). Correlation analysis showed that, in the overall sample and the China group, power was significantly negatively correlated with stress, anxiety, and depression (all $p < .05$), whereas no significant correlation was observed in the Malaysia group. The findings suggest that the China group had better physical fitness performance, while the Malaysia group had higher levels of psychological distress; power may be an important physical fitness indicator related to psychological distress.

Keywords: Physical Fitness, Psychological Distress, Depression, Anxiety, Stress, University Basketball Student-Athletes

Introduction

University student-athletes are a special group within the higher education system because they have the dual identity of students and athletes and need to cope simultaneously with multiple demands such as academic study, training, and competition(Jabbarzadeh Ganjeh et

al., 2024). In university sports, athlete development is no longer regarded only in terms of competitive performance as the sole goal, but increasingly emphasizes the coordinated unity of performance, health, and overall adaptation(Quinaud et al., 2022). For this group, long-term exposure to academic pressure, training load, competition demands, and recovery arrangements may have a combined impact on their physical condition, mental health, and ability to continue participation(M. J. Hamlin et al., 2019). Therefore, in higher education sport research, focusing only on competitive results or single performance indicators is no longer sufficient to fully understand the developmental status of university student-athletes, and their physical condition and psychological well-being should both be included in a more complete research framework and receive more support (Mao, 2025).

Among the many university sports, basketball particularly deserves separate attention because it is a sport characterized by high intensity, intermittence, rapid offensive and defensive transitions, and continuous physical confrontation(Wellm et al., 2024). University basketball athletes need to repeatedly perform actions such as acceleration, deceleration, rapid changes of direction, jumping, landing, and body control during training and competition, and these demands make physical fitness an important foundation for supporting game performance(Huynh et al., 2024). In this sport, agility, balance ability, and power are not only directly related to movement efficiency, movement stability, and confrontation performance, but also reflect, to a certain extent, the athletes' state of physical preparedness(Wang et al., 2025). For university basketball student-athletes, a good physical fitness condition therefore should not only be understood as a condition for improving sport-specific performance, but may also be regarded as an important foundation for adapting to training demands, maintaining readiness for competition, and supporting continued participation(Papadakis, 2025).

In addition to physical fitness demands, psychological distress is also an important issue that cannot be ignored among university basketball athletes (Reardon et al., 2019). Existing studies have shown that university student-athletes often need to cope simultaneously with multiple pressures from training, competition, academic study, and daily life, and these cumulative demands may further lead to negative psychological responses such as depression, anxiety, and stress (Kaishian & Kaishian, 2021; Rice et al., 2016). For university basketball student-athletes, this kind of psychological distress may not only interfere with game performance and training recovery, but may also affect the maintenance of attention, academic engagement, emotion regulation, and the ability to continue participating in sport (Kaishian & Kaishian, 2021). Therefore, in the university basketball context, the understanding of student-athletes condition should not be limited only to physical performance or physical fitness level, and psychological distress should also be regarded as an important component in student-athletes assessment, monitoring, and support (Reardon et al., 2019). Based on this, the use of measurement tools that can systematically assess depression, anxiety, and stress has important research and practical value for understanding the psychological state of university basketball student-athletes (Makara-Studzińska et al., 2022).

In recent years, more and more studies have begun to pay attention to the potential relationship between physical condition and mental health (Peters & LoBue, 2024; Singh et al., 2023). Existing evidence shows that higher levels of physical activity and better physical fitness are usually associated with more positive psychological outcomes, such as lower levels

of anxiety and depression (Singh et al., 2023). However, this association is not consistently shown across all components of physical fitness, and the relationships between different physical abilities and psychological outcomes may vary (Hale et al., 2021). For university basketball student-athletes, poorer physical fitness condition may mean a higher fatigue burden, greater recovery pressure, and a lower level of physical preparedness, and these factors may further increase the experience of psychological stress during training and competition (Gabbett, 2016). In turn, higher levels of depression, anxiety, and stress may also affect athletes' attention, motivation, recovery quality, and physical fitness performance (Reardon et al., 2019). Therefore, physical fitness and psychological distress in the university basketball context may not be independent of each other, but may have an association that deserves further examination (Singh et al., 2023). Even so, current evidence regarding the relationship between specific physical fitness indicators and psychological distress among university basketball athletes is still limited, and the findings are not yet fully consistent (Guszkowska, 2025).

Although research on physical condition and mental health has continued to increase in recent years, the existing literature still has several clear limitations in the population of university basketball student-athletes (Guszkowska, 2025; Kegelaers et al., 2024). First, related studies are mostly based on samples from a single country or a single cultural background, and therefore it is difficult to fully reveal the differences that may exist under different educational environments, training systems, and sport support conditions (Kegelaers et al., 2024). Second, existing studies often examine physical fitness or psychological distress separately, while relatively few place the two within the same research framework and analyze them simultaneously in the same group of university basketball athletes (Mao, 2025). Third, the evidence from cross-cultural comparative studies on the specific group of university basketball student-athletes is still relatively limited, especially in the Asian context, where comparative studies on the physical fitness characteristics, levels of psychological distress, and their interrelationships among university basketball athletes in China and Malaysia are still insufficient (Mao, 2025). More importantly, at present, few studies have simultaneously combined between-group comparison and within-group correlation analysis within the same research framework in order to comprehensively examine the differences between student-athletes from different countries and the patterns of association among variables (Mao, 2025; Sato et al., 2023).

Based on the above research gaps, it is necessary to further examine the relationship between physical fitness and psychological distress in a cross-cultural population of university basketball student-athletes (Mao, 2025). For this reason, this study took university basketball student-athletes from China and Malaysia as the subjects and aimed to achieve two objectives: first, to compare the differences in physical fitness indicators and levels of psychological distress between university basketball athletes in the two countries; second, to examine the associations between physical fitness indicators and each dimension of psychological distress in the overall sample and in the country-specific samples. This study selected agility, balance ability, and power as the physical fitness indicators, and assessed psychological distress from the three dimensions of stress, anxiety, and depression. The contributions of this study are mainly reflected in three aspects: first, it supplements the cross-cultural comparative evidence on physical fitness and psychological distress among university basketball athletes in China and Malaysia; second, it incorporates between-group

comparison and within-group association analysis into the same research framework in order to more comprehensively reveal the association patterns between physical condition and psychological distress; third, it provides empirical reference for athlete monitoring, psychological support, and targeted intervention in the context of higher education sports.

Materials and Methods

Study Design

This study adopted a cross-sectional comparative and correlational research design to compare the differences in physical fitness performance and psychological distress between university basketball student-athletes in China and Malaysia, and to further examine the relationship between physical fitness indicators and psychological distress. The physical fitness variables included agility, balance ability, and power, while psychological distress was assessed through the three dimensions of depression, anxiety, and stress.

Participants

The participants in this study were university basketball student-athletes from Zhengzhou University of Technology (ZUT), China, and Universiti Teknologi Malaysia (UTM), Malaysia. Purposive sampling was used in this study, and a total of 60 male basketball players were recruited, including 30 in the China group and 30 in the Malaysia group. All participants were aged between 19 and 24 years, and no racial background restrictions were applied.

The sample size for the physical fitness assessment was determined with reference to comparable small-sample between-group studies in sports science, while also considering participant availability and field-testing feasibility. For example, Singh et al. (2019) adopted a balanced comparative design with 30 participants per group. Therefore, a total sample of 60 participants (30 per group) was considered appropriate for the present study.

The inclusion criteria were as follows: participants were physically healthy, had no known chronic or acute diseases, had no current injuries or physical conditions that might affect sports performance, and had continuously and regularly participated in university or club basketball training. The exclusion criteria were as follows: age below 19 years or above 24 years; non-male; diagnosed with any chronic or acute disease; having had an injury in the past 6 months that might affect sports performance; or not having continuously and regularly participated in university or club basketball training.

Research Instruments

This study collected data using a combination of physical fitness tests and a psychological questionnaire. The physical fitness measurements included three indicators: agility, balance ability, and power, while psychological distress was measured using the Depression Anxiety Stress Scales-21 (DASS-21).

Agility Test

Agility was measured using the Quadrant Jump Test, following the method of Haj-Sassi et al. (2011). After marking four quadrants of 50 cm × 50 cm on the ground, the participants continuously jumped into each quadrant in the prescribed order, and the number of valid jumps completed within the specified time was recorded. Each participant performed the test

three times, and the best score was used for analysis. This test was used to assess rapid change of direction ability and lower limb coordination.

Balance Ability Test

Balance ability was measured using the Standing Balance Test, following the method of Melam et al. (2016). The participants performed a single-leg stance with eyes closed, and the duration for maintaining balance was recorded. Timing was stopped when the supporting posture was broken or the other foot touched the ground. Each participant performed the test three times, and the best score was used for analysis. This test was used to assess static balance control ability.

Power Test

Power was measured using the Seated Basketball Chest Throw Test, following the method of Harris et al. (2011). The participants sat on the ground with their back against the wall and pushed the basketball forward as far as possible from the chest. The horizontal distance between the landing point of the ball and the starting line was recorded. Each participant performed the test three times, and the longest distance was taken as the final score. This test was used to assess upper limb power.

Psychological Distress Measurement: DASS-21

This study used the Depression Anxiety Stress Scales-21 (DASS-21) to measure the level of psychological distress among the participants. The scale was developed by Lovibond and Lovibond (1995) and includes three dimensions: depression, anxiety, and stress, with 7 items in each dimension, for a total of 21 items. Participants rated the items based on their actual feelings over the past week using a 4-point Likert scale (0–3). The total score for each dimension was multiplied by 2 to maintain consistency with the scoring standard of the full DASS-42. Higher scores indicate a higher level of psychological distress in the corresponding dimension. In the present study sample, the Cronbach's alpha coefficients for depression, anxiety, and stress were 0.907, 0.868, and 0.881, respectively, indicating that the scale had good internal consistency.

Data Collection Procedure

Data collection was carried out at Zhengzhou University of Technology (ZUT), China, and Universiti Teknologi Malaysia (UTM), Malaysia. Prior to the formal assessment, all participants were briefed on the purpose of the study, the overall testing procedure, and the relevant precautions. Written informed consent was obtained from each participant before any data were collected. The data collection process was conducted in a fixed order, with physical fitness testing completed first, followed by administration of the DASS-21 questionnaire.

All physical fitness assessments were conducted on standard basketball courts under similar environmental conditions, with the temperature in both countries being approximately 30°C during testing. To maintain measurement consistency between the two groups, the same testing equipment, standardized operational procedures, and unified verbal instructions were used throughout the assessment process. Each physical fitness test was performed three times, and the best performance was retained as the final score for analysis. This approach was adopted to improve the reliability and stability of the physical fitness measurements.

Following the physical fitness assessment, participants completed the paper-based DASS-21 questionnaire on site. Standardized instructions were provided by the researcher before questionnaire completion, and the researcher remained available during the process to clarify any questions when necessary. This was done to ensure accurate understanding of the questionnaire items and to minimize missing or invalid responses. All questionnaires were checked immediately after completion, and any incomplete responses were addressed on site whenever possible.

After all data had been collected, the data were systematically organized, coded, and entered into IBM SPSS Statistics 26 for statistical analysis. The same data collection procedures were applied in both study sites to improve data comparability and to strengthen overall methodological rigor.

Statistical Analysis

All data in this study were analysed using IBM SPSS Statistics 26. First, descriptive statistical analysis was conducted for all study variables. Second, Cronbach's alpha coefficients were used to examine the internal consistency of each DASS-21 dimension in the present study sample. Then, the Shapiro–Wilk test was used to assess the distribution of each variable to determine whether it met the assumption of normality.

As some variables did not meet the requirement of normal distribution, non-parametric statistical methods were used for further analysis. Specifically, the Mann–Whitney U test was used to compare the differences in physical fitness indicators and the dimensions of psychological distress between university basketball student-athletes in China and Malaysia, while Spearman rank correlation analysis was used to examine the relationship between physical fitness indicators and psychological distress. All statistical tests used $p < .05$ as the level of significance.

Ethical Considerations

This study was approved by the Universiti Teknologi Malaysia Research Ethics Committee (UTMREC), with the ethical approval number UTMREC-2025-137. All procedures in this study complied with the ethical requirements for human research. All participants were informed of the purpose of the study before data collection and signed the informed consent form.

Results

The results of the Shapiro–Wilk test showed that several variables, especially the DASS dimensions and some physical fitness indicators, did not meet the assumption of normality. Therefore, non-parametric statistical methods were used in the subsequent analyses. The Mann–Whitney U test was used for between-group comparisons, and Spearman rank correlation analysis was used to examine the relationships between physical fitness indicators and psychological distress variables.

Descriptive Statistics of Physical Fitness and DASS Variables

Table 1 shows that there were clear differences between ZUT and UTM university basketball players in physical fitness performance and psychological distress. As all variables were presented by median, interquartile range, and minimum–maximum values, the data were considered to be non-normally distributed. Overall, the median scores of the ZUT group were

higher than those of the UTM group in agility, balance ability, and power, whereas the median scores of the UTM group were higher than those of the ZUT group in stress, anxiety, and depression, indicating that the Chinese university basketball players had better physical fitness performance, while the Malaysian university basketball players had higher levels of psychological distress.

Table 1
Descriptive statistics of physical fitness and DASS variables by group

Variable	Group	N	Median (IQR)	Min–Max
Agility	ZUT	30	12.00 (2)	9–13
	UTM	30	8.00 (2)	6–11
Balance	ZUT	30	01:05 (00:58)	00:12–03:25
	UTM	30	00:30 (00:47)	00:10–02:51
Power	ZUT	30	10.4150 (1.27)	8.75–12.00
	UTM	30	10.0300 (2.01)	7.98–11.30
Stress	ZUT	30	2.00 (9)	0–24
	UTM	30	7.00 (12)	0–28
Anxiety	ZUT	30	2.00 (6)	0–24
	UTM	30	7.00 (11)	0–40
Depression	ZUT	30	1.00 (5)	0–26
	UTM	30	4.00 (10)	0–32

Note: Balance values are presented in minutes:seconds.

Between-Group Differences in Physical Fitness and Psychological Distress Indicators
As the variables did not meet the assumption of normal distribution, the Mann–Whitney U test was used to compare the differences between the ZUT group and the UTM group (Table 2). The results showed that there were significant differences between the two groups in agility ($U = 48.500$, $p < .001$), balance ability ($U = 285.000$, $p = .015$), power ($U = 289.500$, $p = .018$), anxiety ($U = 297.500$, $p = .021$), and depression ($U = 284.000$, $p = .012$), whereas the difference in stress did not reach statistical significance ($U = 322.500$, $p = .057$).
Based on the median values, the ZUT group performed better in agility, balance ability, and power, whereas the UTM group had higher scores in anxiety and depression, indicating that their level of psychological distress was relatively higher.

Table 2
Between-group differences in physical fitness and psychological distress

	Agility	Balance	Power	Stress	Anxiety	Depression
Mann-Whitney U	48.500	285.000	289.500	322.500	297.500	284.000
Z	-5.990	-2.440	-2.373	-1.907	-2.309	-2.523
Asymp. Sig. (2-tailed)	.000	.015	.018	.057	.021	.012

Correlation Results Between Physical Fitness and DASS in the Overall Sample
Spearman correlation analysis of the combined sample (N = 60) showed that power was significantly negatively correlated with stress, anxiety, and depression (Table 3). In contrast,

agility and balance ability were not significantly correlated with any dimension of the DASS scale (all $p > 0.05$). Agility was positively correlated with balance ability ($r = 0.578$, $p < 0.01$) and weakly correlated with power ($r = 0.262$, $p < 0.05$). Significant positive correlations were found among stress, anxiety, and depression ($r = 0.819–0.848$, all $p < 0.01$), indicating substantial overlap among the three psychological distress dimensions. Overall, in the combined sample of university basketball players from China and Malaysia, power was the only physical fitness indicator that showed a stable relationship with psychological distress.

Table 3
Spearman correlations in the overall sample

Variable	Agility	Balance	Power	Stress	Anxiety	Depression
Agility	1.000					
Balance	.578**	1.000				
Power	.262*	.228	1.000			
Stress	-.141	-.100	-.347**	1.000		
Anxiety	-.135	-.082	-.302*	.819**	1.000	
Depression	-.137	-.002	-.321*	.846**	.848**	1.000

Note: * $p < .05$, ** $p < .01$.

Correlation Results Between Physical Fitness and DASS in the China Group

Spearman correlation analysis of the China group sample (ZUT, N = 30) Table 4 showed that power was significantly negatively correlated with stress ($r = -0.565$, $p < 0.01$), anxiety ($r = -0.490$, $p < 0.01$), and depression ($r = -0.415$, $p < 0.05$). In contrast, agility and balance ability did not reach significant correlations with any DASS dimensions (all $p > 0.05$). In addition, stress was significantly positively correlated with anxiety ($r = 0.746$, $p < 0.01$) and depression ($r = 0.857$, $p < 0.01$), and anxiety was also significantly positively correlated with depression ($r = 0.794$, $p < 0.01$). Overall, in the sample of Chinese university basketball players, power was the only physical fitness indicator that showed a stable negative correlation with all dimensions of psychological distress.

Table 4
Spearman correlations in the China group

Variable	Agility	Balance	Power	Stress	Anxiety	Depression
Agility	1.000	.353	-.166	.095	.232	.119
balance	.353	1.000	.012	.063	.129	.143
Power	-.166	.012	1.000	-.565**	-.490**	-.415*
Stress	.095	.063	-.565**	1.000	.746**	.857**
Anxiety	.232	.129	-.490**	.746**	1.000	.794**
Depression	.119	.143	-.415*	.857**	.794**	1.000

Note: * $p < .05$, ** $p < .01$.

Correlation Results Between Physical Fitness and DASS in the Malaysia Group

Spearman correlation analysis of the Malaysia group sample (UTM, N = 30) Table 5 showed that no significant correlations were found between the physical fitness indicators and any DASS dimensions (all $p > 0.05$), indicating that agility, balance ability, and power were not significantly associated with psychological distress in the sample of Malaysian university basketball players. Among the physical fitness indicators, only agility was significantly positively correlated with balance ability ($r = 0.688$, $p < 0.01$). In addition, stress was significantly positively correlated with anxiety ($r = 0.883$, $p < 0.01$) and depression ($r = 0.857$, $p < 0.01$), and anxiety was also significantly positively correlated with depression ($r = 0.862$, $p < 0.01$). Overall, the psychological distress dimensions in the Malaysia group were strongly correlated with one another, but no significant relationships were found between psychological distress and the physical fitness indicators.

Table 5
Spearman correlations in the Malaysia group

Variable	Agility	Balance	Power	Stress	Anxiety	Depression
Agility	1.000					
Balance	.688**	1.000				
Power	.154	.168	1.000			
Stress	.015	-.072	-.110	1.000		
Anxiety	.052	-.059	-.087	.883**	1.000	
Depression	.227	.115	-.156	.857**	.862**	1.000

Note: * $p < .05$, ** $p < .01$.

Overall, the between-group comparison showed that the China group had better physical fitness performance, whereas the Malaysia group had higher levels of psychological distress; the correlation analysis further indicated that power was the physical fitness indicator most stably related to psychological distress, but this relationship was mainly found in the overall sample and the China group.

Discussion

Discussion of Differences in Physical Fitness Between Chinese and Malaysian University Basketball Players

The results of this study showed that there were significant differences between Chinese and Malaysian university basketball players in the three physical fitness indicators of agility, balance ability, and power, and that the China group performed better overall. This indicates that, in the present sample, Chinese university basketball players had certain advantages in the core physical fitness components closely related to basketball performance.

This result may be related to the training background and physical fitness training arrangements of the two groups. Comparatively, systematic physical preparation, repeated sport-specific movements, and performance-oriented training are generally helpful for improving agility, balance ability, and power(Wang et al., 2025). Therefore, the better performance of the China group in these indicators may partly reflect a higher level of physical preparation and sport-specific adaptation(Wang, 2025). In contrast, the relatively lower

performance of the Malaysia group in these indicators may be related to differences in training intensity, physical fitness training structure, or support for sport-specific physical training(Ghorbanzadeh et al., 2025). However, this explanation still needs to be verified by more training process data.

From the perspective of sport characteristics, agility, balance ability, and power are all important physical fitness foundations in basketball(Wang et al., 2025). Agility is related to rapid changes of direction and defensive movement, balance ability affects posture control and movement stability, and power is closely related to jumping, body contact, and the rapid execution of technical actions(Abdelkader et al., 2024). Therefore, the advantage of the China group in these three indicators not only reflects a higher overall physical fitness level, but also to some extent indicates that their physical preparation was more consistent with the demands of basketball(Wang et al., 2025).

The findings of this study also have practical significance. For Malaysian university basketball players, future training may place greater attention on the development of agility, balance ability, and power, especially through strengthening systematic and sport-specific physical fitness training design(Arazi & Asadi, 2011). Overall, this study suggests that university basketball players under different training backgrounds may show clear differences in core physical fitness indicators, and that physical fitness factors should be regarded as an important component in cross-cultural research on basketball training and sports performance(Zhou et al., 2024).

Discussion of Differences in Psychological Distress Between Chinese and Malaysian University Basketball Players

This study found that the differences in psychological distress between Chinese and Malaysian university basketball players were mainly reflected in the dimensions of anxiety and depression, with the Malaysia group scoring significantly higher than the China group, while the difference in the stress dimension did not reach a significant level. This indicates that Malaysian university basketball players showed more obvious negative emotional symptoms in some aspects.

This result may be related to the academic, training, and future development pressures faced by university athletes, as well as differences in emotional regulation and psychological support resources(Harris & Maher, 2022). Compared with general stress, anxiety and depression may better reflect individuals' responses to uncertainty and emotional exhaustion, and therefore may be more likely to show group differences(Crudden et al., 2023). At the same time, stress, anxiety, and depression were all strongly positively correlated in both national samples, indicating a high degree of consistency among the three, but anxiety and depression may be more sensitive indicators for distinguishing the psychological states of different groups(Shah et al., 2020).

From a practical perspective, psychological support for university basketball players should pay more attention not only to general stress management, but also to emotional problems such as anxiety and depression(Fogaça, 2019). Overall, this study suggests that the differences in psychological distress between Chinese and Malaysian university basketball players were

mainly concentrated in the dimensions of anxiety and depression rather than in all dimensions.

Relationship Between Power and Psychological Distress

An important finding of this study was that, in the overall sample, power was the only physical fitness indicator that showed significant negative correlations with stress, anxiety, and depression, and this relationship was also found in the China group, but did not reach a significant level in the Malaysia group. This suggests that better power may be associated with lower levels of psychological distress.

This result may indicate that power not only reflects local muscular output ability, but also to some extent reflects the athlete's overall physical preparation and training adaptation level(Deng et al., 2022). Compared with agility and balance ability, power may more directly reflect the athlete's adaptation to sport-specific training load and competition demands, and therefore may be more likely to form a stable relationship with psychological condition(Silva et al., 2018).

In addition, better power performance may be related to higher physical confidence, a greater sense of control, and stronger coping ability, thereby helping to reduce levels of anxiety, depression, and stress(Dagnall et al., 2021). In contrast, when athletes have lower power, they may be more likely to feel physically underprepared during training and competition, which may further increase psychological burden(M. Hamlin et al., 2019).

From a practical perspective, this study suggests that physical fitness training and psychological support should not be viewed separately, and special attention should be paid to athletes with lower power who also show higher psychological distress(Fiedler et al., 2024). Overall, power may be a key indicator linking physical fitness performance and mental health status among university basketball players.

Between-Group Differences in the Relationship Between Power and Psychological Distress

This study found that the significant negative relationship between power and psychological distress mainly appeared in the overall sample and the China group, but did not reach statistical significance in the Malaysia group. This indicates that the relationship between physical fitness and psychological condition may not remain consistent across different cultural and training backgrounds, but may be influenced by the characteristics of the specific sample.

One possible explanation is that the China group had relatively more systematic training arrangements and physical fitness development, so that power could better reflect the athletes' overall physical preparation and sport-specific adaptation level(Thurlow et al., 2023). Under such conditions, athletes with better power may be more likely to show lower levels of anxiety, depression, and stress(Teferi, 2020). In contrast, the absence of significant correlations in the Malaysia group may indicate that the link between physical fitness performance and psychological distress was relatively weaker in this group, or that it was influenced by other factors at the same time(Han, 2021).

In addition, the relatively small sample size may also have affected the stability of the within-group correlation results(Delfin, 2023). Although the two groups had the same number of participants, correlation analysis is more sensitive to sample fluctuation. Therefore, the non-significant result in the Malaysia group does not necessarily mean that the two were completely unrelated, but may reflect that the relationship was less stable or less prominent in that group(Edelsbrunner & Thurn, 2020).

From a practical perspective, this finding suggests that the relationship between physical fitness and mental health among university basketball players may be somewhat context-dependent(Edelsbrunner & Thurn, 2020). For the China group, power may be a more sensitive indicator for identifying the risk of psychological distress; for the Malaysia group, however, a more comprehensive judgement may require the consideration of additional factors related to training, recovery, and psychological support(Cook & Charest, 2023). Overall, this study indicates that the relationship between physical fitness and psychological distress is not completely consistent and should be analysed specifically under different cultural and training backgrounds.

Conclusion

This study found that Chinese university basketball student-athletes showed significantly better performance in agility, balance, and power than Malaysian athletes, while Malaysian athletes reported higher levels of anxiety and depression. No significant group difference was found in stress. Among the physical fitness variables, power was the only indicator significantly and negatively associated with anxiety, depression, and stress in the overall sample, with a similar pattern observed in the China group. These findings suggest that physical fitness, especially power, may be related to stress, anxiety, and depression in university basketball players. The study highlights the importance of integrating physical and psychological factors in basketball training and athlete support.

Limitations

This study has two main limitations. First, this study adopted a cross-sectional design, and therefore causal inferences cannot be made regarding the relationship between physical fitness and the DASS variables. Although some significant correlations were found in the overall sample, this does not indicate that physical fitness directly affects stress, anxiety, or depression. Second, when the sample was further divided into the China group and the Malaysia group, the size of each subsample was relatively small, which may have reduced the statistical power of the subgroup analyses and may also partly explain why some relationships observed in the overall sample did not remain significant in the country-specific analyses. Therefore, the findings of this study should be interpreted with caution, and future studies may use larger samples and longitudinal designs for further verification.

Future Directions

Future studies should include larger and more diverse samples from a wider range of universities in China and Malaysia to improve the stability and generalisability of the findings. At the same time, it is also recommended to adopt longitudinal or follow-up designs to further clarify whether changes in physical fitness are related to changes in stress, anxiety, and depression. In addition, future studies may also include relevant factors such as training load,

recovery status, and academic stress in order to better explain the group difference patterns observed in this study.

References

Abdelkader, S., Alanezi, R., Hujelan, S., Alshowiman, N., Alrushud, A., Alyaemni, A., Shaheen, A., & Algabbani, M. (2024, 2024-10-30). The Correlation Between Dynamic Balance and Jump Performance, Sprints, and Agility in Female Basketball Players: A Preliminary Study. *International Journal of Physical Therapy Research & Practice*. https://doi.org/10.62464/ijoprp.v3i9.55

Arazi, H., & Asadi, A. (2011, 2011-03-31). The effect of aquatic and land plyometric training on strength, sprint, and balance in young basketball players. *Journal of Human Sport and Exercise, 6*, 101-111. https://doi.org/10.4100/jhse.2011.61.12

Cook, J., & Charest, J. (2023, 2023-01-17). Sleep and Performance in Professional Athletes. *Current Sleep Medicine Reports, 9*, 56-81. https://doi.org/10.1007/s40675-022-00243-4

Crudden, G., Margiotta, F., & Doherty, A. (2023, 2023-03-21). Physician burnout and symptom of anxiety and depression: Burnout in Consultant Doctors in Ireland Study (BICDIS). *PLoS One, 18*. https://doi.org/10.1371/journal.pone.0276027

Dagnall, N., Drinkwater, K., Denovan, A., & Walsh, R. (2021, 2021-09-24). The Potential Benefits of Non-skills Training (Mental Toughness) for Elite Athletes: Coping With the Negative Psychological Effects of the COVID-19 Pandemic. *Frontiers in Sports and Active Living, 3*. https://doi.org/10.3389/fspor.2021.581431

Delfin, C. (2023, 2023-09-07). Improving the stability of bivariate correlations using informative Bayesian priors: a Monte Carlo simulation study. *Frontiers in Psychology, 14*. https://doi.org/10.3389/fpsyg.2023.1253452

Deng, N., Soh, K., Zaremohzzabieh, Z., Abdullah, B., Salleh, K. M., & Huang, D. (2022, 2022-09-14). Effects of Combined Upper and Lower Limb Plyometric Training Interventions on Physical Fitness in Athletes: A Systematic Review with Meta-Analysis. *International journal of environmental research and public health, 20*. https://doi.org/10.3390/ijerph20010482

Edelsbrunner, P., & Thurn, C. (2020, 2020-04-22). Improving the Utility of Non-Significant Results for Educational Research. https://doi.org/10.31234/osf.io/j93a2

Fiedler, R., Geber, J., Reichert, M., & Kellmann, M. (2024, 2024-11-07). Young athletes' mental well-being is associated with smartphone social networking application usage and moderated by performance level and app type. *Scientific Reports, 14*. https://doi.org/10.1038/s41598-024-77418-2

Fogaça, J. (2019, 2019-08-14). Combining Mental Health and Performance Interventions: Coping and Social Support for Student-Athletes. *Journal of Applied Sport Psychology, 33*, 4-19. https://doi.org/10.1080/10413200.2019.1648326

Gabbett, T. J. (2016). The training—injury prevention paradox: should athletes be training smarter and harder? *British Journal of Sports Medicine, 50*(5), 273-280.

Ghorbanzadeh, B., Orangi, B. M., & Yaali, R. (2025, 2025-02-26). Experiential knowledge of expert coaches and expert athletes can help identify constraints on the performance of run-up in competitive sport tasks. *Frontiers in Psychology, 16*. https://doi.org/10.3389/fpsyg.2025.1544196

Guszkowska, M. (2025). Mental health symptoms and disorders in elite athletes: A systematic review. *Acta Kinesiologica, 19*(S1), 4-30.

Haj-Sassi, R., Dardouri, W., Gharbi, Z., Chaouachi, A., Mansour, H., Rabhi, A., & Mahfoudhi, M.-E. (2011). Reliability and validity of a new repeated agility test as a measure of anaerobic and explosive power. *The Journal of Strength & Conditioning Research, 25*(2), 472-480.

Hale, G. E., Colquhoun, L., Lancastle, D., Lewis, N., & Tyson, P. J. (2021). Physical activity interventions for the mental health and well-being of adolescents–a systematic review. *Child and adolescent mental health, 26*(4), 357-368.

Hamlin, M., Wilkes, D., Elliot, C., Lizamore, C., & Kathiravel, Y. (2019, 2019-01-29). Monitoring Training Loads and Perceived Stress in Young Elite University Athletes. *Frontiers in Physiology, 10*. https://doi.org/10.3389/fphys.2019.00034

Hamlin, M. J., Wilkes, D., Elliot, C. A., Lizamore, C. A., & Kathiravel, Y. (2019). Monitoring Training Loads and Perceived Stress in Young Elite University Athletes. *Front Physiol, 10*, 34. https://doi.org/10.3389/fphys.2019.00034

Han, F. (2021, 2021-05-13). RESEARCH ON THE RELATIONSHIP BETWEEN SPORTS SCIENTIFIC TRAINING AND ATHLETES' MENTAL HEALTH. *Revista Brasileira de Medicina do Esporte, 27*, 485-489. https://doi.org/10.1590/1517-8692202127042021_0096

Harris, B., & Maher, B. (2022, 2022-08-08). Student-Athlete Mental Health, Help-Seeking, and Service Utilization: Implications for a Multi-Tiered, Public Health Approach on College Campuses. *Journal of College Student Psychotherapy, 37*, 371-390. https://doi.org/10.1080/87568225.2022.2109548

Harris, C., Wattles, A., DeBeliso, M., Sevene-Adams, P., Berning, J., & Adams, K. (2011, 2011-08-01). The Seated Medicine Ball Throw as a Test of Upper Body Power in Older Adults. *Journal of Strength and Conditioning Research, 25*, 2344-2348. https://doi.org/10.1519/jsc.0b013e3181ecd27b

Huynh, P., Guadagnino, S., Zendler, J., & Agresta, C. (2024). Physical demands of collegiate basketball practice: A preliminary report on novel methods and metrics. *Frontiers in Sports and Active Living, 6*, 1324650.

Jabbarzadeh Ganjeh, B., Zeraattalab-Motlagh, S., Jayedi, A., Daneshvar, M., Gohari, Z., Norouziasl, R., Ghaemi, S., Selk-Ghaffari, M., Moghadam, N., Kordi, R., & Shab-Bidar, S. (2024, Feb). Effects of aerobic exercise on blood pressure in patients with hypertension: a systematic review and dose-response meta-analysis of randomized trials. *Hypertens Res, 47*(2), 385-398. https://doi.org/10.1038/s41440-023-01467-9

Kaishian, J. E., & Kaishian, R. M. (2021). The prevalence of mental health conditions among high school and collegiate student-athletes: A systematic review. *Journal of Clinical Sport Psychology, 16*(3), 254-275.

Kegelaers, J., Wylleman, P., Defruyt, S., Praet, L., Stambulova, N., Torregrossa, M., Kenttä, G., & De Brandt, K. (2024). The mental health of student-athletes: A systematic scoping review. *International Review of Sport and Exercise Psychology, 17*(2), 848-881.

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour research and therapy, 33*(3), 335-343.

Makara-Studzińska, M., Tyburski, E., Załuski, M., Adamczyk, K., Mesterhazy, J., & Mesterhazy, A. (2022). Confirmatory factor analysis of three versions of the depression anxiety stress scale (DASS-42, DASS-21, and DASS-12) in Polish adults. *Frontiers in psychiatry, 12*, 770532.

Mao, Z. (2025). Advancements in research on psychological and emotional aspects of student-athletes. *Frontiers in Psychology, 16*, 1645177.

Melam, G. R., Alhusaini, A. A., Perumal, V., Buragadda, S., & Kaur, K. (2016). Comparison of static and dynamic balance between football and basketball players with chronic ankle instability. *Saudi Journal of Sports Medicine, 16*(3), 199-204.

Papadakis, Z. (2025). Impact of a four-week NCAA-compliant pre-season strength and conditioning program on body composition in NCAA Division II Women's Basketball. *Journal of Functional Morphology and Kinesiology, 10*(3), 266.

[Record #2148 is using a reference type undefined in this output style.]

Quinaud, R. T., Capranica, L., Doupona, M., & Guidotti, F. (2022). The holistic development of talented sportspersons through dual-career. *Front Sports Act Living, 4*, 929981. https://doi.org/10.3389/fspor.2022.929981

Reardon, C. L., Hainline, B., Aron, C. M., Baron, D., Baum, A. L., Bindra, A., Budgett, R., Campriani, N., Castaldelli-Maia, J. M., & Currie, A. (2019). Mental health in elite athletes: International Olympic Committee consensus statement (2019). *British Journal of Sports Medicine, 53*(11), 667-699.

Rice, S. M., Purcell, R., De Silva, S., Mawren, D., McGorry, P. D., & Parker, A. G. (2016). The mental health of elite athletes: A narrative systematic review. *Sports medicine, 46*(9), 1333-1353.

Sato, S., Kinoshita, K., Kondo, M., Yabunaka, Y., Yamada, Y., & Tsuchiya, H. (2023). Student athlete well-being framework: an empirical examination of elite college student athletes. *Frontiers in Psychology, 14*, 1171309.

Shah, S. M. A., Mohammad, D., Qureshi, M. F. H., Abbas, M. Z., & Aleem, S. (2020, 2020-10-27). Prevalence, Psychological Responses and Associated Correlates of Depression, Anxiety and Stress in a Global Population, During the Coronavirus Disease (COVID-19) Pandemic. *Community Mental Health Journal, 57*, 101-110. https://doi.org/10.1007/s10597-020-00728-y

Silva, J., Bahamondes-Avila, C., Hernández-Mosqueira, C., & Navarrete, L. (2018, 2018-02-07). Biology of Stress and Physical Performance. https://doi.org/10.5772/intechopen.72425

Singh, B., Olds, T., Curtis, R., Dumuid, D., Virgara, R., Watson, A., Szeto, K., O'Connor, E., Ferguson, T., & Eglitis, E. (2023). Effectiveness of physical activity interventions for improving depression, anxiety and distress: an overview of systematic reviews. *British Journal of Sports Medicine, 57*(18), 1203-1209.

Singh, K., Krishnan, A., Sharma, D., & Guru, C. (2019). Body composition in selective groups of elite Indian sportsmen: A comparative study. *Indian J Physiol Pharmacol, 63*(4), 303-308.

Teferi, G. (2020, 2020-11-05). The Effect of Physical Activity on Academic Performance and Mental Health: Systematic Review. *5*, 131. https://doi.org/10.11648/j.ajset.20200503.12

Thurlow, F., Huynh, M., Townshend, A., McLaren, S., James, L., Taylor, J., Weston, M., & Weakley, J. (2023, 2023-12-02). The Effects of Repeated-Sprint Training on Physical Fitness and Physiological Adaptation in Athletes: A Systematic Review and Meta-Analysis. *Sports Medicine, 54*, 953-974. https://doi.org/10.1007/s40279-023-01959-1

Wang, W. (2025, 2025-03-24). Application of biomechanical analysis based on IoT and deep learning in college basketball education. *Molecular & Cellular Biomechanics*. https://doi.org/10.62617/mcb1201

Wang, Z., Chen, N., Cao, S., Gao, L., Geok, S. K., & Liu, J. (2025). The effects of balance training on physical fitness and skill-related performance in basketball players: a systematic review. *BMC Sports Science, Medicine and Rehabilitation, 17*(1), 108.

Wellm, D., Jäger, J., & Zentgraf, K. (2024). Dismissing the idea that basketball is a “contactless” sport: quantifying contacts during professional gameplay. *Frontiers in Sports and Active Living, 6*, 1419088.

Zhou, J., Wang, X., Hao, L., Ran, X.-W., & Wei, W. (2024, 2024-09-20). Meta-analysis of the effect of plyometric training on the athletic performance of youth basketball players. *Frontiers in Physiology, 15*. https://doi.org/10.3389/fphys.2024.1427291