

# CORRELATION OF PHYSICAL FITNESS AND PSYCHOLOGICAL STRESS AMONG THE VOLLEYBALL PLAYERS

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## Keywords

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## ABSTRACT

### Background

The purpose of this study was to investigate the relationship between physical fitness and psychological stress in volleyball players. Physical Tness Components Key physical fitness components of abdominal muscle endurance and lower body flexibility have been evaluated, as well has the psychological stress by using the Psc--- Perceived Stress Scale.

### Materials & Methods

A cohort of 50 volleyball players from Galgotias University and Noida International University were included in the study. Physical fitness was tested using the Sit-Up Test, which assessed abdominal muscle endurance [41], and V sit-and-reach test to measure lower body flexibility [. Level of psychological stress was assessed with the Perceived Stress Scale filled out by participants.

### Results

The survey results showed that participants generally had good core muscle strength and fair leg flexibility. The participants on average endorsed moderate levels of perceived stress. According to the correlation analysis, abdominal muscle endurance was not significantly correlated with perceived stress. In contrast, the results known a weak negative correlation based on lower body flexibility and perceived stress which signified that players possessing higher rates of different types of relaxation could experience less general anxiety.

### Conclusion

The new findings suggest that to improve the overall health of volleyball players, it is as significant to consider physiological fitness all forms of stress. Although physical fitness is significant for high sporting performance, lower body flexibility also could relate to stress coping. Multifaceted training programs together with stress management strategies might improve psychological and physical health as well as athletic performance. Larger samples and longitudinal designs are required in future research to replicate these results.

## Introduction

The relationship between physical fitness and psychological well-being is critical in determining the overall performance and success of athletes, particularly in high-demand sports like volleyball. Volleyball, characterized by its dynamic and physically demanding nature, requires a multifaceted blend of physical attributes including strength, endurance, agility, and mental resilience. As

athletes engage in rigorous training and competitive play, they encounter various stressors that can affect both their physical and psychological states. Understanding the correlation between physical fitness and psychological stress among volleyball players is essential for optimizing their performance and overall well-being.(1,2)

Physical fitness and psychological fitness are two interconnected pillars that significantly impact the performance and success of volleyball players on the court. Volleyball is a highly dynamic and physically demanding sport, requiring athletes to possess a well-rounded set of physical attributes(3). Endurance and stamina are essential for players to sustain their performance throughout the duration of a match, especially in extended sets or tournaments. A high level of endurance allows players to continuously engage in explosive movements, such as jumping and spiking the ball, without experiencing rapid fatigue. Moreover, players with greater endurance are better equipped to recover quickly between plays, maintaining their effectiveness throughout the game(4).

Explosive power is another critical physical aspect in volleyball. Players need to execute powerful hits, blocks, and jumps to outmaneuver their opponents. The ability to generate explosive force during jumps enhances players' attacking and defensive capabilities, allowing them to gain an advantage over the opposition(5). Agility and quickness are fundamental for players to navigate the court efficiently. Volleyball requires players to change direction rapidly, react to the ball, and adjust their positioning according to the game's flow. Agility and quickness enable players to reach the ball effectively and maintain a strong defensive presence(6).

Strength plays a pivotal role in multiple aspects of volleyball, such as blocking, spiking, and setting. Powerful blocks at the net can disrupt opponents' attacks, while strong spikes can penetrate opposing defenses. Additionally, strength is essential for maintaining stability during various movements, reducing the risk of injury and optimizing performance(7). Flexibility is a key component of physical fitness in volleyball. Players often need to stretch their bodies to reach high balls or perform dives to save points. Flexibility allows athletes to move freely and perform dynamic movements without limitations, contributing to their overall effectiveness on the court.

While physical fitness is integral to volleyball success, psychological fitness is equally vital. Volleyball is a mentally challenging sport, and players need to maintain a high level of focus and concentration throughout the game. The ability to stay mentally engaged allows players to anticipate opponents' moves, make split-second decisions, and execute precise plays(8). Confidence and self-belief are crucial psychological traits that impact players' performance. A confident player is more likely to take risks, attempt challenging shots, and perform optimally under pressure. Believing in one's abilities fosters a positive mindset, contributing to improved performance and resilience during difficult moments.

Coping with pressure is another significant aspect of psychological fitness in volleyball. Competitive matches can be intense and emotionally charged, and players must manage stress

effectively to maintain composure and focus. Players with strong psychological fitness can handle high-pressure situations with resilience, minimizing the negative impact on their performance.

Communication and team cohesion are essential for success in volleyball, as it is a team-oriented sport. Psychological fitness facilitates positive team dynamics, encouraging players to support each other and communicate effectively on the court. A cohesive team with strong communication enhances coordination and synergy, leading to improved performance and teamwork.

Motivation and mental toughness are essential psychological attributes for volleyball players. The sport can be physically and mentally demanding, and players need mental toughness to overcome setbacks, stay motivated during challenging periods, and bounce back from mistakes.

The interplay between physical fitness and psychological stress in athletes has been a topic of interest in sports science and psychology. Previous research has indicated that higher levels of physical fitness are associated with reduced stress and improved mental health across various populations. However, the specific relationship between physical fitness and psychological stress in volleyball players remains underexplored. This study seeks to address this gap by investigating the correlation between physical fitness and psychological stress among volleyball players, with the aim of providing insights that can be used to optimize training programs, enhance performance, and improve overall well-being in this athletic population.

## **Research Gap**

Despite the recognized importance of both physical and psychological fitness in sports performance, there is a paucity of comprehensive studies examining the dynamic relationship between these two factors in volleyball players. Most existing research has focused on the direct correlation between physical fitness and performance outcomes, often overlooking the potential mediating role of psychological stress. A more integrated approach that considers both physical and psychological dimensions could offer valuable insights for improving training and intervention strategies in volleyball. This study aims to fill this gap by exploring how physical fitness and psychological stress interact and influence each other in the context of competitive volleyball.

## **Objective**

The primary objective of this study is to investigate the correlation between physical fitness and psychological stress among volleyball players. By examining the interconnection between these two factors, the study aims to identify potential relationships that could inform the development of targeted training programs and interventions. The ultimate goal is to enhance the physical and mental readiness of athletes, improve their resilience, and support their success in the sport of volleyball.

## Methodology

The present observational study aims to investigate (2) the relationship of physical fitness with psychological stress, among female volleyball players. A total of 50 athletes, all aged between 17 and 24 years comprising both male and female students from Galgotias University as well Noida International University participated in the study. This cross-sectional study will evaluate physical fitness via tests of endurance, flexibility and power and psychological stress using the Perceived Stress Scale (PSS) The inclusion criteria were healthy volleyball players in the proper age group range and exclusion criteria included neurological, cardiovascular or neuromuscular disorders as diagnosis prior to study selection which excluding drug use history, alcohol consumption and smoking.

The method consisted of a sit-and-reach flexibility test, vertical jump for lower body power and sit-ups as performance on muscular endurance. Psychological stress was evaluated with the PSS



questionnaire, which is a measure of perceived (subjective) psychological sense of getting stressed. Participants were confirmed by written consent and ethical approval was obtained from Galgotias University before the test. The analysis of the data will provide an insight into whether physical fitness has correlations with psychological stress, which may be used in training programs and interventions to increase athletes' success as well their sense of wellness.

## Data Analysis

The initial step in the data analysis examined descriptive statistics of all variables by employing summary measures such as mean, median and standard deviation to estimate centrality or dispersion. This was done for the physical fitness variables; endurance, flexibility and power as well as recognition of psychological stress levels in terms of volleyball players. The first step gives a methodical and precise overview of the data distribution and its key features.

The data quality was next assessed to ensure that the data is complete, accurate and consistent. To avoid misrepresenting the results of cognitive measures, we carefully checked our data for missing or inaccurate responses and any outliers likely to distort the findings. We addressed missing data and errors to preserve the reliability and validity of our evaluation.

After the data quality check process, a correlation analysis was carried out to investigate how responses of physical fitness variables (endurance-test, sit and reach powerball) correlated with stress levels of psychological dimension. The strength and direction of these relationships were assessed with a Pearson correlation coefficient, or other appropriate methods to assess correlations. From the analysis, it was intended to verify in volleyball players whether higher levels of physical fitness are associated with lower scores for psychological stress.

Data all data work, including descriptive statistics calculation; the quality checks of data and correlation analysis was processed by SPSS 27 a wide-used statistical software on social science research. This guaranteed a consistent and systematic assessment of the physical fitness-psychological stress relationship in this athletic population.

## Result

The study aimed to explore the correlation between physical fitness and psychological stress among volleyball players. The participants, comprising 50 athletes from Galgotias University and Noida International University, underwent physical fitness tests, including the Sit-Up Test to assess abdominal muscle endurance and the Sit and Reach Test to measure lower body flexibility. They also completed the Perceived Stress Scale to evaluate their perceived stress levels.

The results revealed that the volleyball players displayed a good level of abdominal muscle endurance and satisfactory lower body flexibility. On average, they reported a moderate level of perceived stress. The correlation analysis showed no significant correlation between abdominal muscle endurance and perceived stress levels. However, a weak negative correlation was observed between lower body flexibility and perceived stress, indicating that players with greater flexibility tended to experience lower perceived stress.

The study highlights the importance of addressing both physical and psychological aspects of athletes' well-being. While physical fitness is crucial for optimal performance, lower body flexibility may play a role in stress management among volleyball players. The findings underscore the potential benefits of incorporating flexibility training and stress management



techniques into athletes' routines. However, the study's limitations, including the small sample size and cross-sectional design, necessitate further research with larger samples and longitudinal studies to confirm and extend these findings.

## **LIST OF TABLES:**

### **TABLE NO 1: DEMOGRAPHIC DESCRIPTIVE STATISTICS.**

Table No. 1 presents the demographic descriptive statistics for Group A in the study. The table provides valuable insights into the characteristics of the participants in this group. The average age of the participants in Group A is 20.14 years, with a standard deviation of 2.665. This indicates that the ages of the participants vary by approximately 2.665 years around the mean age. Regarding weight, the average weight of participants in Group A is 80.80 kg, with a standard deviation of 8.182, indicating variability in weights within the group. Additionally, the average height of participants is 6.00 feet, with a standard deviation of 0.298, suggesting slight variability in heights around the mean. These descriptive statistics provide a comprehensive overview of the age, weight, and height distribution within Group A, which serves as a crucial foundation for further analysis and interpretation of the study's results.

### **TABLE NO 2: EXPERIENCE AND SLPEEING DURATIONS**

| VARIABLES                     | MNEA±SD    |
|-------------------------------|------------|
| DURATIONS IN GAME(YEARS)      | 3.42±1.263 |
| DAILY PALYINGS<br>HOURS(HOUR) | 4.06±0.890 |

Table No. 2 presents the descriptive statistics for the variables "Durations in Game (Years)" and "Daily Playing Hours (Hour)" in the study. These variables offer valuable insights into the

| VARIABLES   | GROUP A     |
|-------------|-------------|
| AGE         | 20.14±2.665 |
| WEIGHT (kg) | 80.80±8.182 |
| HEIGHT (ft) | 6.00±0.298  |

participants' experience and daily involvement in the sport of volleyball. The average duration of experience in the game for the participants is 3.42 years, with a standard deviation of 1.263. This

indicates a variation in the number of years players have been engaged in volleyball, showing a diverse level of expertise and skill development within the group. Additionally, the mean daily playing hours for the participants are 4.06 hours, with a standard deviation of 0.890, revealing differences in the amount of time players dedicate to playing volleyball on a daily basis. The data highlights the range of commitment and dedication among the athletes, with some investing more hours in practice and play than others.

**TABLE NO 3: PHYSICAL FITNESS TEST**

| VARIABLES          | MNEA±SD     |
|--------------------|-------------|
| SIT-UP TEST        | 49.58±3.363 |
| SIT AND REACH TEST | 41.38±2.276 |
| VERTICAL JUMP TEST | 25.22±2.12  |

Table No. 3 presents the results of the physical fitness tests conducted in the study, including the "Sit-Up Test" and the "Sit and Reach Test." These tests provide essential information about the participants' muscular endurance and flexibility, respectively, which are crucial components of physical fitness among volleyball players. The mean values and standard deviations for each test are provided, offering insights into the central tendencies and variations in the data.

The results indicate that the participants, on average, performed 49.58 sit-ups in the Sit-Up Test, with a standard deviation of 3.363. This suggests that there is a relatively narrow range of variation in the number of sit-ups performed by the participants around the mean, indicating a consistent level of abdominal and hip-flexor muscle endurance among the group.

Regarding the Sit and Reach Test, the participants achieved an average score of 41.38, with a standard deviation of 2.276. This test assesses the flexibility of the lower back and hamstring muscles, and the small standard deviation suggests a relatively homogeneous level of flexibility among the players. Overall, Table No. 3 provides valuable insights into the physical fitness levels of the volleyball players in terms of muscular endurance and flexibility. These results are crucial for understanding the players' physical capabilities and can be used to evaluate how physical fitness may correlate with other variables, such as psychological stress, in the study. The data contributes to a comprehensive understanding of the players' overall physical well-being and forms an essential basis for further analysis and interpretation of the study's objectives.

**TABLE NO 4: PERCEIVED STRESS SCALE**

| VARIABLES | MNEA±SD |
|-----------|---------|
|           |         |

|                               |             |
|-------------------------------|-------------|
| <b>PERCEIVED STRESS SCALE</b> | 26.54±6.911 |
|-------------------------------|-------------|

Table No. 4 presents the results of the Perceived Stress Scale (PSS) administered in the study. The Perceived Stress Scale is a widely used psychological instrument for measuring the perception of stress in individuals. The table provides information on the mean (M) and standard deviation (SD) of the participants' scores on the Perceived Stress Scale. The average score on the Perceived Stress Scale for the participants is 26.54, with a standard deviation of 6.911. The standard deviation indicates the amount of variation or dispersion in the stress scores of the participants around the mean. In this case, the standard deviation suggests that the participants' stress scores vary by approximately 6.911 points around the mean score of 26.54. The mean score of 26.54 on the Perceived Stress Scale indicates the average level of perceived stress among the participants in the study. A higher score on the scale suggests a higher perception of stress, while a lower score indicates a lower perception of stress. The PSS results provide valuable insights into the psychological well-being of the volleyball players and their subjective experiences of stress.

Overall, Table No. 4 offers a comprehensive summary of the participants' perceived stress levels as assessed by the Perceived Stress Scale. The mean and standard deviation values provide important information about the central tendencies and dispersion of stress scores within the study group. This data is essential for understanding the psychological aspect of the participants and its potential correlation with other variables, such as physical fitness, in the study.

## TABLE NO 5: PEARSON CORRELATION TEST

| Correlations       |                     |             |                    |           |
|--------------------|---------------------|-------------|--------------------|-----------|
|                    |                     | Sit-up test | sit and reach test | PSS SCORE |
| SIT-UP TEST        | Pearson Correlation | 1           | -.235              | .100      |
|                    | Sig. (2-tailed)     |             | .101               | 0.005     |
|                    | N                   | 50          | 50                 | 50        |
| SIT AND REACH TEST | Pearson Correlation | -.235       | 1                  | -.170     |
|                    | Sig. (2-tailed)     | .101        |                    | 0.001     |
|                    | N                   | 50          | 50                 | 50        |
| PSS SCORE          | Pearson Correlation | .100        | -.170              | 1         |
|                    | Sig. (2-tailed)     | .0005       | 0.001              |           |
|                    | N                   | 50          | 50                 | 50        |



Table No. 5 presents the results of the Pearson correlation test conducted to examine the relationships between the variables: "Sit-Up Test," "Sit and Reach Test," and "PSS Score" (Perceived Stress Scale Score). The Pearson correlation coefficient is a statistical measure that quantifies the strength and direction of the linear relationship between two variables. In this table, the correlation coefficients are provided for each pair of variables, along with their corresponding p-values (Sig. 2-tailed) and sample sizes (N).

1. Sit-Up Test and Sit and Reach Test: The correlation coefficient between the Sit-Up Test and the Sit and Reach Test is -0.235. The negative sign indicates an inverse or negative correlation, suggesting that as the number of sit-ups performed increases, the score in the Sit and Reach Test tends to decrease. However, the correlation coefficient is not statistically significant at the 0.05 level ( $p > 0.05$ ), as indicated by the p-value of 0.101. This means that the observed correlation might be due to chance, and there is not enough evidence to conclude a significant relationship between these two physical fitness measures.
2. Sit-Up Test and PSS Score: The correlation coefficient between the Sit-Up Test and the PSS Score is 0.100. The positive sign indicates a positive correlation, suggesting that there might be a weak positive relationship between the number of sit-ups performed and the perceived stress score. However, similar to the previous correlation, this coefficient is not statistically significant at the 0.05 level ( $p > 0.05$ ), with a p-value of 0.005. Thus, there is insufficient evidence to establish a significant correlation between the Sit-Up Test and perceived stress levels.
3. Sit and Reach Test and PSS Score: The correlation coefficient between the Sit and Reach Test and the PSS Score is -0.170. Again, the negative sign indicates an inverse correlation, suggesting that as the flexibility score in the Sit and Reach Test increases, the perceived stress score tends to decrease. However, this correlation is statistically significant at the 0.05 level, with a p-value of 0.001. Therefore, there is evidence to suggest a weak negative correlation between lower body flexibility and perceived stress levels.

Overall, Table No. 5 reveals the correlations between the physical fitness measures (Sit-Up Test and Sit and Reach Test) and the perceived stress score (PSS Score) among the participants. While no significant relationship was observed between the Sit-Up Test and perceived stress, there appears to be a weak negative correlation between flexibility (Sit and Reach Test) and perceived stress. These findings may have implications for understanding how physical fitness components relate to psychological well-being among the volleyball players. However, further research with a larger sample size is necessary to establish more robust conclusions.

## DISCUSSION

The present study aimed to investigate the correlation between physical fitness and psychological stress among volleyball players. The data analysis revealed interesting findings that shed light on the relationship between these two important aspects of athletes' well-being.

The descriptive statistics in Table No. 3 showed that the participants had a mean score of 49.58 in the Sit-Up Test, indicating a good level of abdominal and hip-flexor muscle endurance. Additionally, the Sit and Reach Test yielded a mean score of 41.38, suggesting a satisfactory level of lower body flexibility among the volleyball players. These results highlight the importance of regular physical training and exercise in maintaining good muscular endurance and flexibility, which are essential for optimal performance in volleyball.

Table No. 4 displayed the mean score of 26.54 on the Perceived Stress Scale (PSS). This finding indicates that the participants, on average, perceived a moderate level of stress. While the PSS Score is subjective and dependent on individual perception, the result provides valuable insights into the psychological well-being of the volleyball players. The moderate stress level could be attributed to the demands of competitive sports, academic commitments, and other life stressors that young athletes often encounter.

The correlation analysis in Table No. 5 examined the relationships between physical fitness measures (Sit-Up Test and Sit and Reach Test) and the perceived stress score (PSS Score).

The correlation between the Sit-Up Test and Sit and Reach Test was found to be -0.235, though not statistically significant ( $p > 0.05$ ). This result indicates a weak inverse relationship between abdominal muscle endurance and lower body flexibility. While this correlation is not strong enough to draw definitive conclusions, it suggests that individuals with better abdominal muscle endurance may have slightly reduced lower body flexibility and vice versa. This finding could have implications for training programs to ensure a balance between different aspects of physical fitness.

Surprisingly, the Sit-Up Test and PSS Score exhibited a weak positive correlation of 0.100, which was also statistically insignificant ( $p > 0.05$ ). This result implies that there is no significant association between abdominal muscle endurance and perceived stress levels among the volleyball players. The lack of a strong correlation suggests that other factors might play a more significant role in determining stress levels among these athletes.

On the other hand, the correlation between the Sit and Reach Test and PSS Score was found to be -0.170 and was statistically significant ( $p < 0.05$ ). This finding indicates a weak negative correlation between lower body flexibility and perceived stress levels. Volleyball players with greater lower body flexibility tend to report lower levels of perceived stress. This result suggests that maintaining good flexibility in the lower back and hamstring muscles could have a positive impact on athletes' ability to cope with stress in their daily lives.

The results of this study have important implications for the training and well-being of volleyball players. The findings on physical fitness underscore the significance of targeted exercise programs

that focus on both muscular endurance and flexibility. Coaches and trainers should aim to create balanced training regimens to enhance overall physical fitness levels among athletes.

The discovery of a weak negative correlation between lower body flexibility and perceived stress levels highlights the potential role of flexibility training in stress management for volleyball players. Implementing flexibility exercises as part of the athletes' routine could be beneficial for reducing stress and promoting overall well-being.

However, it is essential to acknowledge the study's limitations, including the relatively small sample size of 50 participants from specific universities. A larger and more diverse sample could strengthen the generalizability of the findings. Moreover, the study's cross-sectional design does not allow for causal conclusions; longitudinal studies could offer valuable insights into the long-term effects of physical fitness on psychological stress among volleyball players.

## Conclusion

In this study, the correlation between physical fitness and psychological stress among volleyball players was explored. The results revealed that the participants exhibited a good level of abdominal muscle endurance and satisfactory lower body flexibility, which are essential components for optimal performance in the sport. Regarding psychological stress, the athletes reported a moderate level of perceived stress, reflecting the various challenges and demands they face as competitive athletes. The correlation analysis unveiled interesting insights. While no significant correlation was found between abdominal muscle endurance and perceived stress levels, a weak negative correlation was observed between lower body flexibility and perceived stress. This implies that volleyball players with greater lower body flexibility tended to experience lower levels of perceived stress. These findings underscore the potential benefits of flexibility training in stress management for athletes. The study emphasizes the significance of addressing both physical and psychological well-being in sports. Incorporating balanced training programs that enhance both muscular endurance and flexibility can contribute to athletes' overall fitness and performance. Moreover, integrating stress management techniques and support mechanisms into training environments can help athletes better cope with stress and improve their overall well-being. However, the study's limitations, such as the small sample size and cross-sectional design, should be acknowledged. Further research with larger and more diverse samples, as well as longitudinal studies, is required to validate and strengthen the observed correlations.

In conclusion, the study provides valuable insights for sports professionals and coaches in fostering the holistic development of volleyball players. By considering both physical and psychological aspects, interventions can be designed to optimize athletes' athletic journey, enhance their performance, and support their overall success in the sport.

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