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Article

Analyzing relationships between years of experience and performance anxiety in teen volleyball players

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SUMMARY

Performance anxiety in athletes exists; when participating in a competitive sport like volleyball, athletes experience stress, and although there is some expected level of nervousness, intense anxiety is not a typical response. This study analyzed variables such as experience and age as crucial factors in the development and persistence of performance anxiety in young volleyball players. We hypothesized that teen volleyball players with more years of training in club volleyball would have less performance anxiety than players in their 1st or 2nd year since the more an athlete trains and plays, the more confident they are of their performance. During the 2023 volleyball season (January to early May), we surveyed 108 athletes from 12 to 18 years of age. We asked 15 questions to assess anxiety symptoms—the Sport Anxiety Scale-2 (SAS-2)—and two extra questions to assess the relationship between performance anxiety and volleyball experience. The results suggested that as experience increases, players have less performance anxiety, but only until they are 17 years old. When athletes had five or more years of competitive experience, however, anxiety scores rose again with disregard to the amount of experience, indicating the presence of new stressors in the life of the now young adult. Performance anxiety can be an annoying feeling for the amateur player and a stressful problem for the experienced one getting closer to college age. Knowing these relationships may help athletes, parents, and coaches understand the main drivers of performance anxiety and potentially decrease its incidence in this population.

INTRODUCTION

According to the National Comorbidity Survey-Adolescent Supplement, the prevalence of general anxiety in adolescents 13 to 18 years old is 31.9% and is the most common mental health disorder in this age group (1). Generally, anxiety in teenagers is temporary but still has a risk of becoming persistent or leading to problems like depression and substance abuse (2). There are different types of anxiety disorders; sport performance anxiety being one of them (2). Athletic performance anxiety refers to the stress caused by participating in competitive activities and performing, by demand, to the best of one's abilities (3). Performance anxiety potentially triggers unwanted cognitive, behavioral, and physiological responses in athletes while playing a sport (3). Players with this type of anxiety struggle with a range of unpleasant reactions. For instance, cognitively, they may have difficulty paying attention or they may have recurrent negative thoughts (4). Behaviorally, reactions like biting fingernails or feeling very tense, and physiologically, a fast heartbeat or an upset stomach can be the most common symptoms (4). Athletes experiencing performance-related anxiety with the unwanted responses mentioned above will most likely have negative consequences on their ability to play (5). Moreover, sports-related anxiety can become persistent and severe depending on age and experience level (5). When team players, coaches, parents, or spectators observe, judge, and evaluate athletic skills, performance anxiety may become evident. The player can either quickly recover or enter a vicious cycle that can block their ability to compete (4).

Research has shown that performance anxiety related to sports is connected to factors such as the intensity of competition, self-belief in success, anxious personality, emotional intelligence, or competitive experience level (6–10). This research focuses on the experience level of youth volleyball players and its role in performance anxiety development. Previous studies agree that players who are more familiar with the sport or activity have more confidence and less performance anxiety when compared to players who do not have as much experience (11, 12).

The present study collected data using the Sport Anxiety Scale-2 (SAS-2), a tool used to analyze symptoms of somatic anxiety, worry, and concentration disruption in athletes (13). The SAS-2 scale was filled out anonymously by young athletes, who were volunteer junior players 12 to 18 years old and played for a volleyball team in the United States (14).

This study contributes to understanding performance anxiety related to sports and enhances the research made thus far in this field. Studies connecting the amount of experience to the development of performance anxiety are insufficient, especially in the United States and amongst young athletes (11, 12). By analyzing the collected data on anxiety levels in each age group and the correlated competitive experience, we hope to understand the relationships between these two factors. We hypothesize that teen volleyball players with more years of training and competitive playing will have less performance anxiety compared to players who are less experienced since the more an athlete has trained and played a sport, the more skilled and confident they are in their competitive performance.

RESULTS

We used an online survey with 17 questions and asked questions regarding anxiety symptoms, age, and years of volleyball experience. We used the Standardized Sport

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Anxiety Scale-2 (SAS-2) to assess the symptoms in three categories somatic anxiety, worrisome feelings, and concentration disruption (13). The survey received 108 completed responses from USA volleyball players from 12 to 18 years of age. Most participants, 44 (40.74%), were players from the volleyball club Eastern Volleyball Academy in Glassboro, New Jersey. Others, 39 (36.11%), were from 8 different tournaments in the USA Northeast region. Finally, 25 (23.15%) volunteered online and represented random areas of the USA. The sample involved 99 girls (91.7%) and only 9 (8.3%) boys.

Performance Anxiety and Competitive Experience

The relationship between the overall anxiety scores and the experience level indicated a moderate negative correlation (Pearson's Correlation, r = -0.6054, *p-value* <0.00001) **(Figure 1)**. When the playing experience was one year or less (n = 24), values ranged from 2.20 to 3.93, with a sample mean ($\bar{x}$) of 2.91. For athletes with two years of experience (n = 29), the SAS-2 score ranged from 1.47 to 3.47 ($\bar{x}$ = 2.35). When teen volleyball players had three years of training (n = 19), the anxiety scores dropped, ranging from 2.73 to 1.27 ($\bar{x}$ = 1.77). For participants with four years in the field (n = 22), performance anxiety levels kept dropping, and values ranged from 2.73 to 1.00 ($\bar{x}$ = 1.62). For five years or more (n = 24), however, the overall scores increased, and the values ranged from 2.87 to 1.0 ($\bar{x}$ = 1.91) **(Figure 1)**.

The SAS-2 scores significantly differed between the five experience levels (E1:E7) (ANOVA, Fstat = 21.60, Fcrit = 3.51, *p-value* < 0.0001. The result is significant at p<0.01). We compared each of the five groups and found that the group with 1 year of experience (E1) was significantly different from all the other groups (Tukey-Kramer Test, all comparisons p<0.001). In a similar way, other group comparisons showed significant differences in their SAS-2 scores (E2:E3, Q = 6.51, *p* = 0.00012; E3:E4, Q = 7.09, *p* = 0.00002; E3:E5, Q = 5.04, *p* = 0.00500). We also found not significant anxiety score differences when comparing other groups (E2:E4, Q = 0.59, *p* = 0.99358; E2:E5, Q = 1.47, *p* = 0.83645; E4:E5, Q = 2.06, *p* = 0.59292) **(Figure 1)**.

We compared the average anxiety scores for each experience level from 1 to 5 years and discovered a predominance of Worry symptoms in all of them; we also found an increase in the same Worry symptoms and overall SAS-2 scores in the most experienced group consistent with the findings in our Analysis of Variance ($\bar{x}$ = 2.17). Worry scores were higher when compared to Somatic and Concentration Disruption values. Somatic symptoms were next in frequency, and Concentration Disruption manifestations were the least frequently seen. Overall, with a clear contradiction in the group with 5 years of volleyball exposure, the anxiety scores diminished as the experience improved.

Performance Anxiety and Age

Even though the association between performance anxiety and age was not the main focus of this study, we analyzed this relationship to make sure that changes in anxiety levels were due to experience and not age. When we correlated age with anxiety, we found a negative correlation in a similar way to years of experience, but the relationship was weak (Pearson's Correlation, r = -0.413, *p-value* <0.00001) **(Figure 2)**.

The SAS-2 scores significantly differed between the seven age groups (A1:A7) (ANOVA, Fstat = 7.33, *p-value* = 0.000001058. The result is significant at p<0.01). Overall, the means of the following pairs are significantly different A1:A5, A1:A6 ,A2:A6, A3:A5, and A3:A6 (Tukey-Kramer Test, A1:A5, Q = 6.56, *p-value* = 0.0001773; A1:A6, Q = 6.67, *p-value* = 0.0001318; A2:A6, Q = 5.03, *p-value* = 0.009403; A3:A5, Q = 5.51, *p-value* = 0.002987; and A3:A6, Q = 5.64, *p-value* = 0.002167) **(Figure 2)**.

DISCUSSION

The main results of this investigation provided evidence to support our hypothesis that there is an inverse relationship between performance anxiety in junior volleyball players and years of experience. Our data supported that less experienced groups experimented more symptoms of anxiety. However, there was an unexpected small increase in anxiety in the most experienced groups, but anxiety scores in players with 5 years of experience were still significantly lower than players with 1 year or less of inexperience.

This unique study examines the relationship between years of experience (training and competing) and performance anxiety in junior volleyball players in the USA. The results of this study suggested that more training and experience are associated with decreased anxiety levels in teenage athletes, but only around the first four years of playing the sport. After the fourth year, anxiety scores increased again, especially in the worry category. A few recent studies have analyzed the influence of experience and performance anxiety in competitive sports (9,11,12,15). Bozkus et al., for instance, found a negative correlation between both variables (9). They concluded that experience plays a crucial role in competitive anxiety development. In another investigation, Mellalieu et al. agreed that players with experience manage stressful situations better because of an improved understanding of their anxiety (11). Likewise, Hanton et al. reported lower levels of somatic anxiety in the highly experienced group compared to its counterpart (12). Even though these three

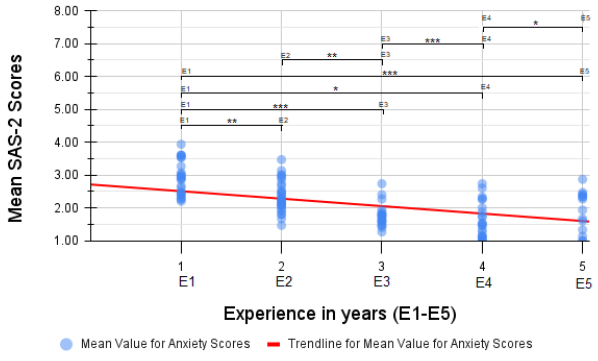

Figure 1: Anxiety declines as time of experience increases. Line graph showing relationship between SAS-2 scores vs. years of experience. Volleyball players were given the SAS-2 survey along with questions about age and experience (n = 108). Error bars represent standard deviation. r = -0.6054, *p-value* <0.00001, result is significant at *p*<0.01. The following groups showed significant differences: E_1:E_2, *p* = 0.00027; E_1:E_3, p = 0.00000; E_1:E_4, *p* = 0.00128; E_1:E_5, *p* = 0.00000; E_2:E_3, *p* = 0.00012; E_3:E_4, *p* = 0.00002; E_3:E_5, *p* = 0.00500. Statistical differences * (*p*<0.01), **(*p*<0.001), ***(*p*<0.0001).

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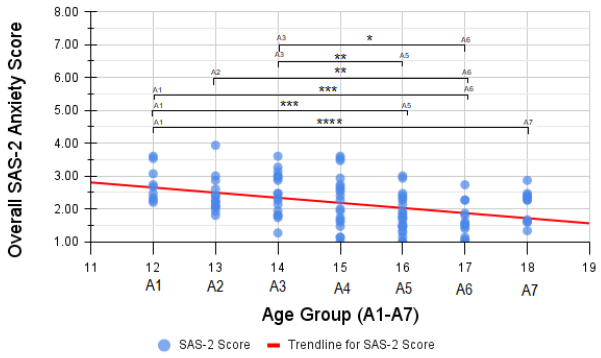

Figure 2: Anxiety declines as age increases. Line graph showing relationship between SAS-2 scores vs. age. Volleyball players were given the SAS-2 survey along with questions about age and experience (n = 108). Error bars represent standard deviation. r = -0.413, *p-value* <0.00001, result is significant at $p<0.01$. The following age groups showed significant differences: A1:A7 *p-value* = 0.000001058; A_1:A_5, *p-value* = 0.0001773; A_1:A_6, *p-value* = 0.0001318; A_2:A_6, *p-value* = 0.009403; A_3:A_5, *p-value* = 0.002987; and A_3:A_6, *p-value* = 0.002167. Statistical differences *($p<0.1$), **($p<0.01$), ***($p<0.001$), ****($p<0.0001$).

studies had similar findings to our research, they were not in the United States, nor did they include junior volleyball athletes, so they are not comparable. Another study based on elite and amateur Italian volleyball players found significantly fewer anxiety levels in experienced players (15). However, the athletes in this study were older individuals ranging from 18 to 36 years of age.

Mintah et al. conducted a study in a very similar population to this research, club volleyball players between ages 12 and 18 in the USA, and they assessed the stress female players are under during the season (16). That research concluded that as athletes age, they experience a new type of stress, which is the pressure to obtain academic scholarships and the amount of work required to be considered as a candidate. These problems added to the pre-existing high expectations from parents and coaches, and caused this group to be at risk for worry, stress, and performance anxiety (16). It's possible that similar circumstances were contributing factors to higher anxiety in the more experienced players that we surveyed.

Our research had one primary limitation, confounding, years of experience and age were confounding factors for each other that we were not able to control. It was important to analyze them separately to avoid confusion and determine a real association between variables. We found that groups with less years of experience (r = -0.6054) had a stronger correlation with the development of anxiety symptoms than the correlation with younger age groups (r = -0.413). Another limitation was the one gender disproportionality presented in the study. We had 108 participants from which only nine were male athletes. It is possible, however, that this under-representation of the male gender was accurate because the overall population of school-aged volleyball players in the US is predominantly represented by females 454,153 vs. males 66.487 (17). A final limitation was that 40.74% of participants belonged to a single club in New Jersey, so these players' training style and response to stressful situations, could potentially have a similar pattern and not being representative of the overall youth volleyball population. A future study could use a larger sample size with female and male participants and inclusion of samples from all areas of the United States.

The present study exposed increased levels of anxiety in volleyball players with 4 and 5 years of experience; therefore, expanding this research to reveal potential causes to this problem would be significant for a better understanding of performance anxiety in this population. A future research could explore other reasons for anxiety, asking participants to name the reason(s) they believe are the cause for their stress or anxiety. In a similar way, including questions about whether or not a pre-existing anxiety disorder exists could also be beneficial to elucidate if any player under stress is at the same risk for performance anxiety despite a history or not of the diagnosis. Another future study could identify levels of stress hormones on saliva before a typical volleyball game to determine if stress hormone levels correlate to player performance and anxiety.

In conclusion, athletes at all levels of competition feel the pressure to work at their best; junior athletes in our study were not the exception. In fact, we can hypothesize based on the findings of Mintah et al. that some of the experienced players in our research were also under a certain degree of athletic, academic, parent, coach, peer, and scholarship pressure, especially if closer to college age (16). Our research may support that, yet at the same time it provides evidence that obtaining experience in volleyball can help young athletes mitigate their performance anxiety and allow themselves to have fun. In the end, enjoying the sport under no stress should be the goal of practicing any sport.

MATERIALS AND METHODS

Participants

The participants were 108 teen volunteers from 12 to 18 years of age who played club volleyball in the USA. The collaborating athletes were contacted online and in person from early January to the end of April. On one side, the online recruitment was a passive process with a survey available to all club parents at Eastern Volleyball Academy and a reminder to collaborate with it sent out every week with the weekly newsletter. In a similar way, the survey was also made available on social media to all volleyball players in the USA who fit the criteria and were willing to help. On the other side, the in person recruitment process was more challenging trying to convince parents and athletes to sign the forms and fill out the questionnaires. At tournaments in Boston, MA; Washington, DC; York, PA; Atlantic City, NJ; Philadelphia, PA; Manheim, PA; Toms River, NJ; and King of Prussia, PA with players from all around the USA, we implemented tables with big signs, colorful print outs with our QR code to the survey, and free souvenirs like Gatorade bottles, headbands, and athletic socks. At the end of the season, 44 participants were recruited through the club, 25 using social media, and 39 in person.

We grouped the players according to the USA Volleyball Junior Player Age Definition chart for use during the 2022-2023 Season (14). The teen athlete fell in the following age groups, 10 (9.3%) in the division 12 and Under (12U) (born on or after July 1, 2010), 13% in 13U (born on or after July 1, 2009), 17 (15.7%) in 14U (born on or after July 1, 2008), 19 (17.6%) in 15U (born on or after July 1, 2007), 21 (19.4%) in 16U (born on or after July 1, 2006), 15 (13.9%) in 17U (born on or after July 1, 2005), and 12 (11.1%) in 18U (born on or after

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July 1, 2004). Regarding years of experience, 20 participants (18.5%) started playing volleyball this year and were considered to have 1 year or less of training and competition, 31 players (28.7%) were in their 2nd year, 21 (19.4%) in their 3rd, 22 athletes (20.4%) in their 4th, 8 (7.4%) in their 5th, and only 6 (5.6%) had played and trained for more than 5-years but also in group 5.

Measures

Anxiety level: Participants were asked to complete a survey with 17 questions after their parents signed/agreed to the informed consent. The first 15 questions were based on the standardized Sport Anxiety Scale-2 (SAS-2) modified by Smith, et al. and assessed somatic anxiety, worrisome feelings, and concentration disruption (13). Volunteers graded each statement or question on a scale from 1 to 4 (not at all, somewhat, moderately, very much). To assess somatic symptoms, we established the following statements: my body feels tense, I feel tense in my stomach, my muscles feel shaky, my stomach feels upset, and my muscles feel tight because I am nervous. To assess feelings of worry: I worry that I will not play well, I worry that I will let others down, I worry that I will not play my best, I worry that I will play badly, and I worry that I will mess up during the game. Finally, to check concentration disruption: it is hard to concentrate on the game, it is hard for me to focus on what I am supposed to do, I lose focus on the game, I cannot think clearly during the game, and I have a hard time focusing on what my coach tells me to do.

Variables: The following 2 questions evaluated age and years of experience: "I play in the following age group," and "I played club volleyball for these amount of years". Multiple choice answers were given in the survey, each one with detailed explanations.

Calculations

Once all the data was available in Google Sheets, we calculated the SAS-2 sub-scores for each of the 5 experience levels and age. We obtained averages for Somatic Anxiety, Worry, and Concentration Disruption, and the values ranged from 1 to 4. These average values constituted the scores for each of the scales. Posteriorly, we obtained an overall average for each SAS-2 sub-group and each studied group.

To compare the different score values for each group of experience level, we conducted a one-way Analysis of Variance (ANOVA) test to accept or reject the null hypothesis H_0: mean values of SAS-2 scores for each of the groups of experience level are equal (H_0:$\bar{X}_1 = \bar{X}_2 = \bar{X}_3 = \bar{X}_4 = \bar{X}_5$). We observed an unbalanced design ($\alpha = 0.01$, $\bar{X}_1 = 2.91$, $\bar{X}_2 = 2.35$, $\bar{X}_3 = 1.77$, $\bar{X}_4 = 2.41$, $\bar{X}_5 = 2.22$, $\bar{X}_{overall} = 2.39$).

To continue with the ANOVA analysis we needed to make several calculations for each of the groups of experience to finally obtain an overall correction factor (CF= 606.01). To calculate this CF, we needed to divide the square of the summation of all the observations $(\Sigma:\bar{X}_1+\Sigma:\bar{X}_2+\Sigma:\bar{X}_3+\Sigma:\bar{X}_4+\Sigma:\bar{X}_5)^2$ by the total sample size $(n_1+n_2+n_3+n_4+n_5)$, (s2-pooled=0.15, s2_$\bar{X}$ =0.17).

We determined the Total Sum Squares, the Sum of Squares between groups, and the Sum of Squares SS within groups (SS_B=14.09, SS_W=16.85). Then, we calculated the Degree of Freedom (df_B) between groups, within groups (df_W), and the total *df* as well as the Mean Square between groups MS_B, and within groups MS_W (MS_B=3.52, MS_W=0.16). The degree of freedom between groups (numerator) and within groups (denominator or *error*) were used to determine the critical value of F using the F-distribution table for a significance level of 0.01.

In order to check the significance difference between groups we needed to run a multiple comparison or post hoc test; we chose the Tukey-Kramer Test because of our unequal size samples. The test uses the Absolute Difference of the Means of SAS-2 scores for each of the two compared groups and the Critical Range value Qu. The Critical Range was found with a modified formula that uses both sample sizes being compared (Qu= 4.52).

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REFERENCES

1. Merikangas, Kathleen R., et al. "Lifetime Prevalence of Mental Disorders in U.S. Adolescents: Results from the National Comorbidity Survey Replication--Adolescent Supplement (NCS-A)." *Journal of the American Academy of Child and Adolescent Psychiatry*, vol. 49, no. 10, Oct. 2010, pp. 980-989. https://doi.org/10.1016/j.jaac.2010.05.017
2. Bhatia, Manjeet S., and Amandeep Goyal. "Anxiety Disorders in Children and Adolescents: Need for Early Detection." *Journal of Postgraduate Medicine*, vol. 64, no. 2, Apr. 2018, pp. 75-76. https://doi.org/doi:10.4103/jpgm.JPGM_65_18
3. Ford, Jessica, et al. "Sport-related Anxiety: Current Insights." *Open Access Journal of Sports Medicine*, vol. 8, 27 Oct. 2017, pp. 205–212, https://doi.org/10.2147/OAJSM.S125845
4. Weinberg, Robert S. and Daniel Gould. "Performance Anxiety." *Foundations of Sport and Exercise Psychology*, edited by Marissa W Uhrina and Mark Sandrock, 8th ed., vol. Human Kinetics, 2023, pp. 83-105
5. Patel, Dilip R., et al. "Sport-related Performance Anxiety in Young Female Athletes." *Journal of Pediatric and Adolescent Gynecology*, vol. 23, no. 6, 28 Sept. 2010. https://doi.org/10.1016/j.jpag.2010.04.004
6. Duncan, Michael J, et al."Effects of Increasing and Decreasing Physiological Arousal on Anticipation Timing Performance during Competition and Practice." *European Journal of Sport Science*, vol. 16, no. 1, 3 Dec. 2014. https://doi.org/10.1080/17461391.2014.979248
7. Walter, Nadja, et al. "Effects of Self-Talk Training on Competitive Anxiety, Self-Efficacy, Volitional Skills, and Performance: An Intervention Study with Junior Sub-

https://doi.org/10.59720/23-136

Elite Athletes." *Sports*, vol. 7, no. 6, 19 Jun. 2019. https://doi.org/10.3390/sports7060148
8. Mercader-Rubio, Isabel, et al. "Emotional Intelligence as a Predictor of Motivation, Anxiety and Leadership in Athletes." *International Journal of Environmental Research and Public Health*, vol. 19, no. 12, 20 Jun. 2022. https://doi.org/10.3390/ijerph19127521
9. Bozkus, Taner, et al. "The Effects of Age, Sports Experience and Physical Self Perception on Competition Anxiety Levels of Female Football Players." *International Journal of Approximate Reasoning*, vol. 5, 21 Aug. 2013, https://doi.org/10.7813/20754124.2013.5-4/B.72
10. Gimenes-Fernandes, Marcos et al. "Fatores Influenciadores da Ansiedade Competitiva em Atletas Brasileiros." *Revista Brasileira de Cineantropometria e Desempenho Humano*, vol. 15, no. 6, Dec. 2013. https://doi.org/10.5007/1980-0037.2013v15n6p705
11. Mellalieu, Stephen D, et al. "Intensity and Direction of Competitive Anxiety as a Function of Sport Type and Experience." *Scandinavian Journal of Medicine & Science in Sports*, vol. 14, no. 5, 26 Apr. 2004. https://doi.org/10.1111/j.1600-0838.2004.00389.x
12. Hanton, Sheldon, et al. "Competitive Experience and Performance Status: an Investigation into Multidimensional Anxiety and Coping." *European Journal of Sport Science*, vol. 8, no. 3, 29 Apr. 2008. https://doi.org/10.1080/17461390801987984
13. Smith, Ronald E., et al. "Measurement of Multidimensional Sport Performance Anxiety in Children and Adults: The Sport Anxiety Scale-2." *Journal of Sport and Exercise Psychology*, vol. 28, no. 4, Apr. 2006. https://doi.org/10.1123/jsep.28.4.479
14. USA Volleyball. "USA Volleyball Junior Player Age Definition." *USA Volleyball Girls Championship Manual*, edited by the USA Volleyball Junior Assembly and the USA Regional Volleyball Association Assembly, USA Volleyball, 2022, pp. 6
15. Vaccaro, Maria G., et al. "Individuals' Depression and Anxiety might be Influenced by the Level of Physical Activity and Expertise: a Pilot Study on Elite Volleyball Players and Amateur Athletes." *Sport Sciences for Health*, vol. 17, 29 Apr. 2021. https://doi.org/10.1007/s11332-021-00767-2
16. Mintah, Joseph K., et al. "The Pressure Female Youth Club Volleyball Players Encounter in the Season." *International Journal of Science and Research*, vol. 7, no. 10, Oct. 2018. https://doi.org/10.21275/ART20192000
17. "High School Athletics Participation Survey: Based on Competition at the High School Level in the 2021-22 School Year." *The National Federation of State High School Associations*. www.nfhs.org/media/5989280/2021-22_participation_survey.pdf. Accessed 8 Dec. 2022.
18. Young, Warren K., et al. "Epidemiology of Common Injuries in the Volleyball Athlete." *Current Reviews in Musculoskeletal Medicine*, vol. 16, no. 6, 4 Apr. 2023. https://doi.org/10.1007/s12178-023-09826-2