SPORTS PARTICIPATION AND MENTAL HEALTH AMONG YOUTH IN KERALA: A CROSS-SECTIONAL STUDY OF PSYCHOLOGICAL DISTRESS AND WELL-BEING

A R. Resmin Bai[1], Dr. P. Kumaravelu[2]
[1] Research Scholar, Department of Physical Education, Tamil Nadu Physical Education and Sports University, Chennai - 127.
resminbai123@gmail.com, https://orcid.org/0009-0004-2578-1154
[2] Research Supervisor, Associate Professor, Department of Physical Education, Tamil Nadu Physical Education and Sports University, Chennai - 127.
drpkv007@gmail.com

ABSTRACT

Background: Mental-health problems are common during young adulthood and can affect academic performance, social functioning, and overall well-being. Participation in regular sport may offer psychological benefits through physical activity, structured routine, social interaction, and opportunities for achievement. This study examined the association between sports participation and depression, anxiety, stress, and psychological well-being among youth in Kerala. **Methods:** A cross-sectional comparative study was conducted among **150 youth aged 18–25 years** recruited from Kerala using a non-probability snowball sampling technique. Participants were classified as sports participants (n = 67) or non-sports participants (n = 83). Psychological distress was assessed using the **Depression Anxiety Stress Scales-21 (DASS-21)**, while positive mental well-being was measured using the **WHO-5 Well-Being Index**. Group differences were examined using the Mann–Whitney U test and chi-square analysis. Demographic-adjusted regression models were used to evaluate the independent association between sports participation and mental-health outcomes. **Results:** Sports participants demonstrated significantly lower median depression (**10.0 vs. 26.0**), anxiety (**12.0 vs. 28.0**), and stress (**10.0 vs. 28.0**) scores than non-sports participants (all **$p < 0.001$**). WHO-5 well-being was substantially higher among sports participants (**84.0 vs. 24.0, $p < 0.001$**). Moderate-or-greater depression, anxiety, and stress were also markedly less prevalent among sports participants. Poor WHO-5 well-being was identified in **1.5% of sports participants compared with 73.5% of non-sports participants**. After adjustment for sociodemographic characteristics, sports participation remained associated with lower depression (**B = −15.88**), anxiety (**B = −16.49**), and stress (**B = −16.61**) and higher WHO-5 well-being (**B = 51.00**), all **$p < 0.001$**. **Conclusion:** Regular sports participation was strongly associated with lower psychological distress and greater positive well-being among the youth studied. Organized sport may represent a useful setting for youth mental-health promotion, although longitudinal and intervention studies are required to determine causal effects.

Keywords: *Sports participation; mental health; depression; anxiety; stress; psychological well-being; DASS-21; WHO-5; youth; Kerala*

INTRODUCTION

Mental health problems commonly emerge during adolescence and early adulthood, a period marked by major educational, social, occupational, and personal transitions. Depression, anxiety, and stress can affect academic performance, social functioning, health behaviours, and overall quality of life. The World Health Organization identifies depression and anxiety among the leading causes of illness and disability in young people and emphasizes regular physical activity and supportive social environments as important components of mental-health promotion (World Health Organization [WHO], 2025).

Mental-health concerns are also evident among young adults in India. A recent multicity study involving students aged 18–29 years reported substantial levels of anxiety, depression, and psychological distress among those pursuing higher education (Suresh & Dar, 2025). Kerala-specific evidence similarly indicates that psychological distress is an important concern. Jaisoorya et al. (2017), in a large study of college students in Kerala, reported psychological distress in approximately one-third of participants, with greater distress associated

with several adverse behavioural and psychosocial factors. These findings highlight the need to identify accessible behaviours and environments that may support psychological well-being during young adulthood.

Sports participation may represent one such factor. Unlike general physical activity, sport combines physical exertion with structured goals, skill development, social interaction, achievement, and, particularly in team settings, opportunities for belonging and social support. A systematic review and meta-analysis by Panza et al. (2020), involving more than 120,000 adolescents, found significantly lower symptoms of anxiety and depression among those participating in organized sport compared with non-participants. More recent evidence has strengthened this association. Wade et al. (2026), in a systematic review of 189 studies, reported that sports participation was consistently associated with lower depressive and anxiety symptoms, higher self-esteem, greater life satisfaction, and improved social outcomes, although the magnitude and direction of benefit varied according to the sporting context.

The mental-health benefits of sport may extend beyond reduced psychological distress. Sustained participation can provide routine, opportunities for social connection, coping resources, and a sense of competence and identity. Longitudinal evidence has shown that young people who maintained team-sport participation from adolescence into young adulthood reported lower stress and better coping than non-participants or those who discontinued participation (Murray et al., 2021). However, sport should not be assumed to be universally beneficial. Competitive pressure, injury, performance expectations, interpersonal conflict, and negative sporting environments may also affect mental health. The psychological value of sport therefore depends not only on participation itself but also on the quality and continuity of the sporting experience.

Despite increasing international evidence, comparatively little research has examined the relationship between sports participation, psychological distress, and positive well-being among youth in Kerala. Much of the existing regional literature has focused on the prevalence and correlates of mental-health problems rather than comparing young people who regularly participate in sport with those who do not. The present study therefore aimed to examine the association between regular sports participation and **depression, anxiety, stress, and psychological well-being among youth in Kerala**. It was hypothesized that sports participants would demonstrate **lower psychological distress and higher well-being** than non-sports participants.

METHODOLOGY

Study Design and Participants

A cross-sectional comparative study was conducted among youth in Kerala, India, to examine the association between regular sports participation and mental-health status. Youth aged 18–29 years who were residing, studying, or working in Kerala were eligible for participation. The final analytical sample comprised **150 participants aged 18–25 years**, with 67 regular sports participants and 83 non-sports participants. Participants represented Thiruvananthapuram, Ernakulam, Kozhikode, and Malappuram districts.

Sports participants were defined as individuals currently engaged in regular or organized sporting activity according to the predefined study criteria. Participants without regular or organized sports involvement were classified as non-sports participants.

Sampling and Recruitment

Participants were recruited using a **non-probability snowball sampling technique**. Initial eligible participants were approached through educational, community, personal, and sporting networks and were subsequently encouraged to refer other eligible young adults from their social networks. Recruitment continued until the required sample size was achieved.

Study Variables

The primary exposure was **current sports participation status**, categorized as sports participant or non-participant. Additional sport-related information included primary sport, sport type, organized-sport involvement, competition level, years of sports participation, days of participation per week, duration of each session, weekly sports minutes, age at initiation of sport, and sports dropout during the preceding 12 months. Weekly sports exposure was calculated as the number of sports days per week multiplied by minutes per session.

Sociodemographic variables included age, sex, district, residence, education, employment status, and family-income category. Typical nightly sleep duration and recreational screen time were also

recorded because of their potential relationship with mental-health outcomes.

The primary mental-health outcomes were **depression, anxiety, and stress**, assessed using the Depression Anxiety Stress Scales-21 (DASS-21), and **positive mental well-being**, assessed using the World Health Organization-Five Well-Being Index (WHO-5).

Depression Anxiety Stress Scales-21

The **DASS-21** is a 21-item self-report instrument comprising three seven-item subscales assessing symptoms of depression, anxiety, and stress (Lovibond & Lovibond, 1995). Each item is scored from 0 to 3. Scores for the seven items within each domain were summed and multiplied by two to obtain scores comparable with the conventional DASS scoring system, as recommended for the DASS-21.

Depression scores were classified as **normal (0–9), mild (10–13), moderate (14–20), severe (21–27), and extremely severe (≥28)**. Anxiety scores were classified as **normal (0–7), mild (8–9), moderate (10–14), severe (15–19), and extremely severe (≥20)**. Stress scores were classified as **normal (0–14), mild (15–18), moderate (19–25), severe (26–33), and extremely severe (≥34)**.

A secondary binary variable was created to identify participants with **at least moderate symptom severity in any DASS-21 domain**. DASS-21 scores were interpreted as measures of current psychological symptom states and not as clinical psychiatric diagnoses.

WHO-5 Well-Being Index

Positive mental well-being was assessed using the **WHO-5 Well-Being Index**, a five-item self-report measure referring to psychological well-being during the preceding two weeks. Each item is scored from 0 to 5, producing a raw score ranging from 0 to 25, with higher scores indicating better well-being (World Health Organization, 2024).

The raw score was multiplied by four to obtain a percentage score ranging from **0 to 100**. A raw score below **13**, equivalent to a percentage score below 50, was classified as **poor well-being** and considered an indication that further assessment may be warranted rather than a clinical diagnosis.

Data Collection Procedure

Data were collected using a structured questionnaire containing sections on sociodemographic characteristics, sports participation, sleep and screen-time behaviours, DASS-21 items, and WHO-5 items. Participants completed the questionnaire after receiving an explanation of the purpose and voluntary nature of the study. Responses were entered using anonymous participant identification codes. No participant names, phone numbers, or exact residential addresses were included in the research dataset. Mental-health scores were used for research-level analysis and were not interpreted as clinical diagnoses.

The final dataset contained **150 complete participant records**, with no duplicate participant identifiers. All DASS-21 responses were within the required 0–3 range and all WHO-5 responses within the 0–5 range.

Statistical Analysis

Data were analysed using **IBM SPSS Statistics**. Descriptive statistics were used to summarize demographic, sports-participation, lifestyle, and mental-health characteristics. Categorical variables were expressed as frequencies and percentages. Continuous variables were summarized using mean and standard deviation or median and interquartile range, depending on distribution.

Distributional characteristics of the DASS-21 depression, anxiety and stress scores, WHO-5 scores, weekly sports minutes, sleep duration, and screen time were examined using descriptive measures, histograms, Q–Q plots, and the Shapiro–Wilk test.

Comparisons of continuous mental-health outcomes between sports participants and non-sports participants were performed using the **Mann–Whitney U test** where normality assumptions were not satisfied. Differences in DASS-21 severity categories, presence of moderate-or-greater psychological distress, and poor WHO-5 well-being were examined using the **Pearson chi-square test**, with Fisher's exact test used when expected cell frequencies were inadequate. Cramer's V was used to quantify the strength of categorical associations.

The relationship between the **dose of sports participation**, particularly weekly sports minutes, and depression, anxiety, stress, and WHO-5 well-being scores was examined using **Spearman's rank correlation coefficient**.

Multivariable analyses were used to examine whether sports participation remained associated with mental-health outcomes after accounting for relevant demographic and behavioural factors, including age, sex, residence, education, employment status, family-income category, sleep duration, and recreational screen time. Effect estimates were reported with **95%**

confidence intervals, and statistical significance was set at **$p < 0.05$**.

Ethical Considerations

The study did not undergo review by a formal institutional ethics committee. Participation was voluntary, and all participants were adults aged 18 years or above. Participants were informed about the purpose of the study before data collection and provided consent to participate. They were free to decline or discontinue participation without consequence.

Confidentiality and anonymity were maintained throughout data collection and analysis. Personally identifying information was not included in the analytical dataset. DASS-21 and WHO-5 scores were used solely for research purposes and were not treated as clinical diagnoses.

Results

Participant Characteristics

A total of **150 participants aged 18–25 years** were included in the analysis, with a mean age of **21.58 ± 2.37 years**. Of these, 80 (53.3%) were male and 70 (46.7%) were female. Most participants were undergraduates (72.7%) and students (74.7%), while 57.3% resided in urban areas.

Regular or organized sports participation was reported by **67 participants (44.7%)**, while 83 (55.3%) were non-sports participants. Among sports participants, 48 (71.6%) were involved in team sports and 19 (28.4%) in individual sports. Sports participants reported a mean of **4.84 ± 2.48 years** of sports involvement and **4.64 ± 1.16 days of participation per week**. Mean weekly sports exposure was **278.51 ± 69.83 minutes**.

The two groups were comparable with respect to age, sex, residence, education, employment status, family-income category, and district distribution, with no statistically significant differences in these characteristics.

Table 1. General characteristics of the study participants

Characteristic	Total sample
Participants	150
Age, years	21.58 ± 2.37
Male	80 (53.3%)
Female	70 (46.7%)
Urban	86 (57.3%)
Rural	64 (42.7%)
Undergraduate	109 (72.7%)
Students	112 (74.7%)
Sports participants	67 (44.7%)
Non-sports participants	83 (55.3%)

Values are presented as mean ± SD or n (%), as appropriate.

Reliability of Mental-Health Measures

Internal consistency was high for all mental-health measures. Cronbach's alpha was **0.890 for DASS-21 Depression, 0.895 for Anxiety, 0.899 for Stress, and 0.962 for the WHO-5**, indicating good to excellent internal reliability within the present sample.

Depression, Anxiety, Stress, and Well-Being According to Sports Participation

The distributions of the principal mental-health variables deviated significantly from normality; therefore, sports participants and non-sports participants were compared using the Mann–Whitney U test.

Sports participants demonstrated substantially lower depression scores than non-sports participants. The median depression score was **10.0 (IQR 6.0–14.0)** among sports participants compared with **26.0 (IQR 18.0–36.0)** among non-sports participants. The difference was statistically significant, **$U = 499.50$, $p < 0.001$**, with a rank-biserial correlation of **−0.820**, indicating a large group difference.

A similar pattern was observed for anxiety. Sports participants had a median anxiety score of **12.0 (IQR 4.0–14.0)** compared with **28.0 (IQR 16.0–34.0)** among non-sports participants, **$U = 599.00$, $p < 0.001$, rrb = −0.785**.

Stress scores were also markedly lower among sports participants. Median stress was **10.0 (IQR 6.0–14.0)** in the sports group and **28.0 (IQR 18.0–36.0)** in the non-sports group, **U = 486.50, p < 0.001, rrb = −0.825**.
In contrast, psychological well-being was substantially higher among sports participants. The median WHO-5 score was **84.0 (IQR 76.0–92.0)** compared with **24.0 (IQR 6.0–52.0)** among non-sports participants. The difference was statistically significant, **U = 5377.50, p < 0.001**, with a rank-biserial correlation of **0.934**, representing a very large difference.

Table 2. Mental-health outcomes according to sports participation

Outcome	Non-sports participants	Sports participants	U	p	Rank-biserial r
Depression	26.0 (18.0–36.0)	10.0 (6.0–14.0)	499.50	<0.001	−0.820
Anxiety	28.0 (16.0–34.0)	12.0 (4.0–14.0)	599.00	<0.001	−0.785
Stress	28.0 (18.0–36.0)	10.0 (6.0–14.0)	486.50	<0.001	−0.825
WHO-5 well-being	24.0 (6.0–52.0)	84.0 (76.0–92.0)	5377.50	<0.001	0.934

Values are median (interquartile range). Higher DASS-21 scores indicate greater psychological distress, whereas higher WHO-5 scores indicate better well-being.

Figure 1. Distribution of DASS-21 depression, anxiety, and stress scores according to sports participation

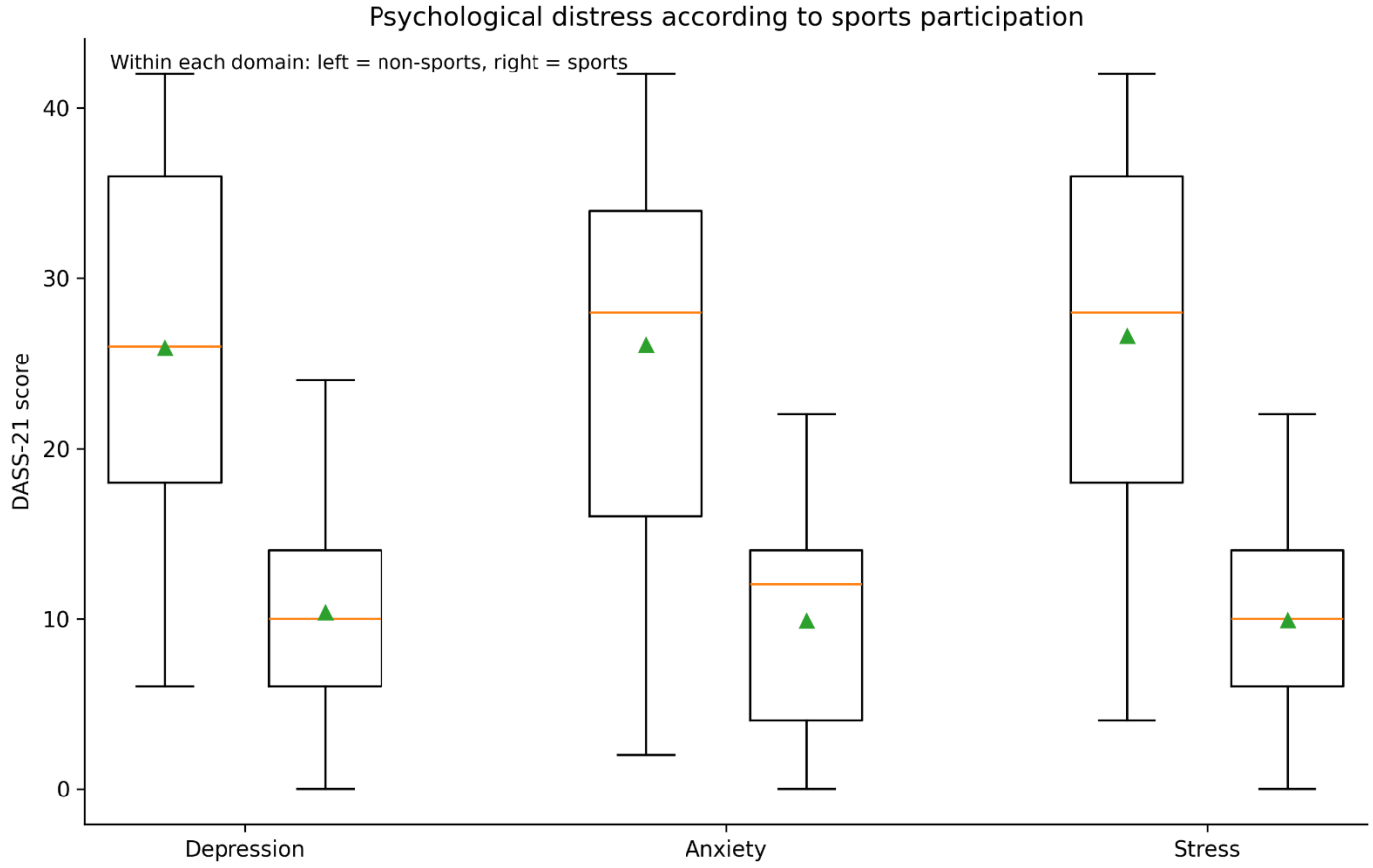


Figure 2. WHO-5 mental well-being according to sports participation



Clinically Relevant Levels of Psychological Distress

Differences between the groups were also evident when DASS-21 scores were categorized according to conventional severity thresholds.

Moderate-or-greater depressive symptoms were present in **76 of 83 non-sports participants (91.6%)**, compared with **21 of 67 sports participants (31.3%)**. The association was statistically significant, **$\chi^2(1) = 58.85$, $p < 0.001$, Phi = 0.626**.

Moderate-or-greater anxiety was observed in **79 non-sports participants (95.2%)** compared with **38 sports participants (56.7%)**, **$\chi^2(1) = 31.96$, $p < 0.001$, Phi = 0.462**.

For stress, moderate-or-greater symptoms were identified in **60 non-sports participants (72.3%)** compared with only **4 sports participants (6.0%)**, representing a particularly large association, **$\chi^2(1) = 66.66$, $p < 0.001$, Phi = 0.667**.

When the three DASS-21 domains were considered together, **all 83 non-sports participants (100%)** had at least moderate symptoms in one or more domains, compared with **38 of 67 sports participants (56.7%)**, **$\chi^2(1) = 44.54$, $p < 0.001$, Phi = 0.545**.

Table 3. Moderate-or-greater psychological distress according to sports participation

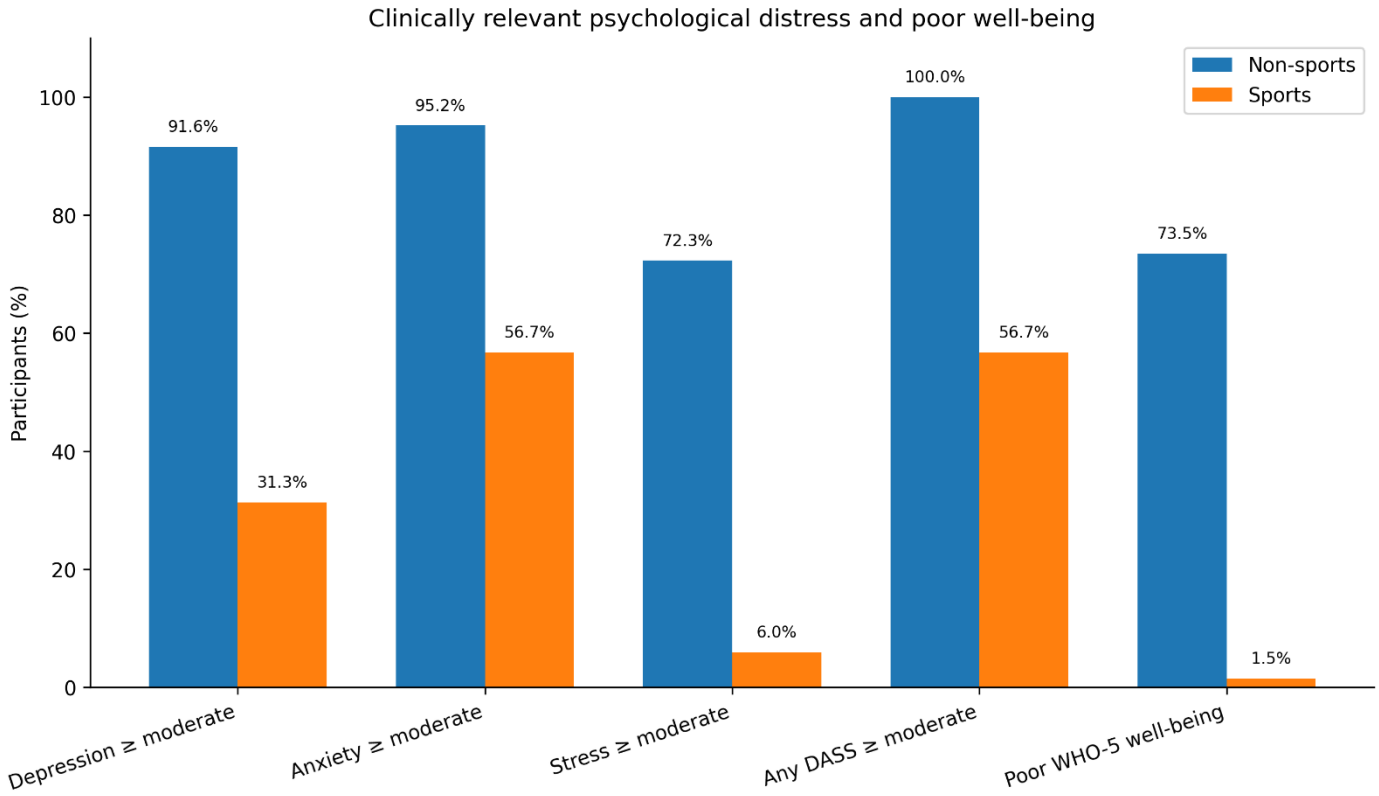
Mental-health indicator	Non-sports n (%)	Sports n (%)	χ^2	p	Phi
Depression ≥ moderate	76 (91.6)	21 (31.3)	58.85	<0.001	0.626
Anxiety ≥ moderate	79 (95.2)	38 (56.7)	31.96	<0.001	0.462
Stress ≥ moderate	60 (72.3)	4 (6.0)	66.66	<0.001	0.667
Any DASS domain ≥ moderate	83 (100.0)	38 (56.7)	44.54	<0.001	0.545

Poor Mental Well-Being

Poor well-being, defined as a WHO-5 raw score below 13, was identified in **61 of 83 non-sports participants (73.5%)** compared with only **1 of 67 sports participants (1.5%)**.

The association between sports participation and poor mental well-being was statistically significant, **$\chi^2(1) = 79.26$, $p < 0.001$**, with a **Phi coefficient of 0.727**, indicating a very large association.

Figure 3. Prevalence of moderate-or-greater psychological distress and poor well-being according to sports participation



DASS-21 Severity Distribution

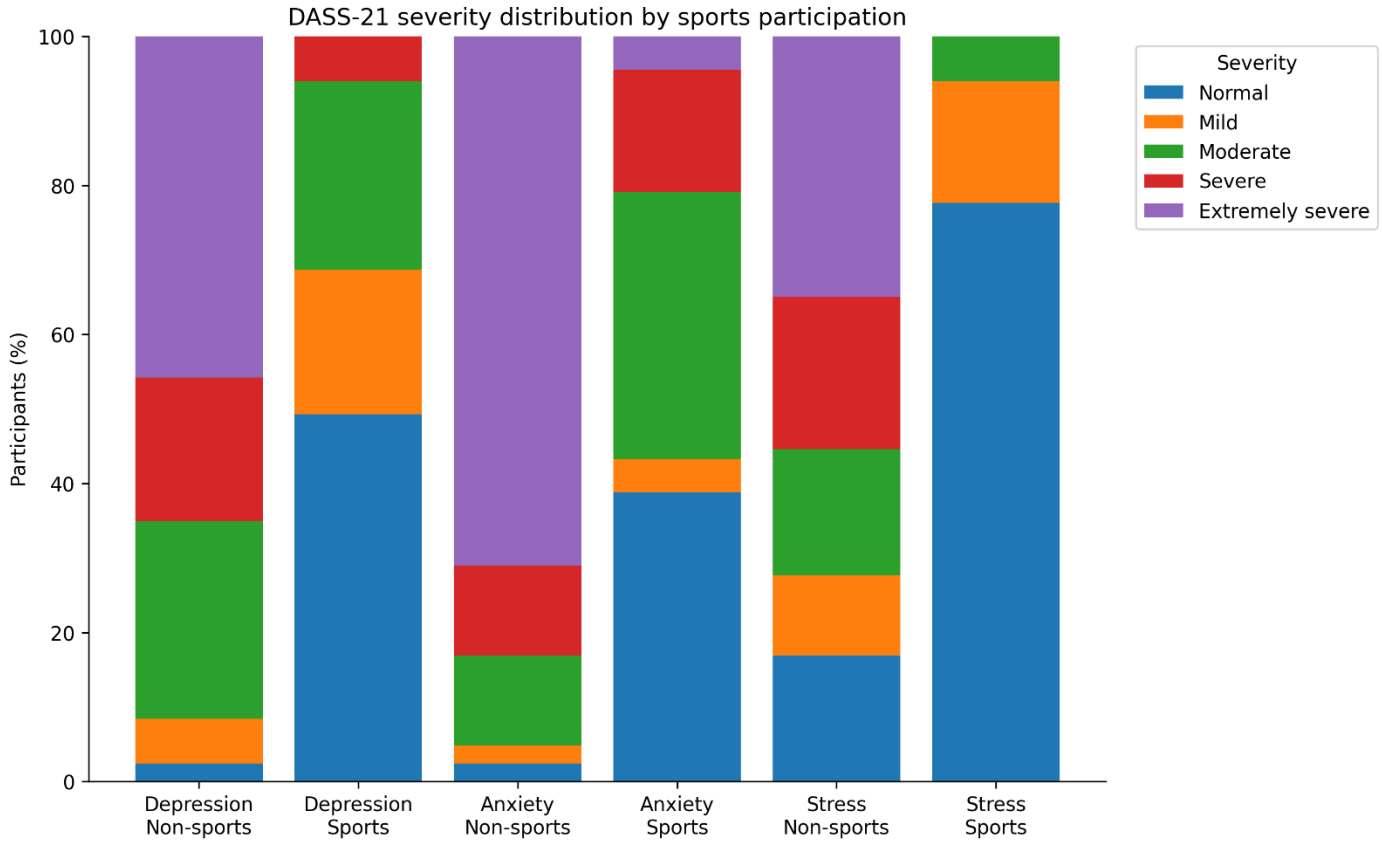
The full DASS-21 severity profiles showed a clear shift toward lower psychological distress among sports participants.

For depression, **33 of 67 sports participants (49.3%)** were classified within the normal range, and none were classified as extremely severe. In contrast, only **2 of 83 non-sports participants (2.4%)** were within the normal range, while **38 (45.8%)** were classified as extremely severe.

For anxiety, 26 sports participants (38.8%) were within the normal range compared with only 2 non-sports participants (2.4%). Extremely severe anxiety was observed in **59 non-sports participants (71.1%)**, compared with **3 sports participants (4.5%)**.

For stress, **52 sports participants (77.6%)** were within the normal range, and no sports participant was classified as severe or extremely severe. Among non-sports participants, only 14 (16.9%) were classified as normal, while 17 (20.5%) had severe and 29 (34.9%) had extremely severe stress.

Figure 4. DASS-21 severity distribution according to sports participation



Sleep and Screen-Time Characteristics

Sports participants reported significantly longer sleep duration than non-sports participants. Mean sleep duration was **7.51 ± 0.50 hours/night** among sports participants compared with **5.52 ± 0.50 hours/night** among non-sports participants (**$p < 0.001$**).

Recreational screen time showed the opposite pattern. Sports participants reported **2.04 ± 0.81 hours/day**, compared with **6.02 ± 1.41 hours/day** among non-sports participants (**$p < 0.001$**).

However, the distributions showed **complete non-overlap between the groups**: sports participants reported 7–8 hours of sleep and 1–3 hours of screen time, whereas non-sports participants reported 5–6 hours of sleep and 4–8 hours of screen time. Because of this lack of overlap, sleep and screen time could not be reliably entered simultaneously with sports participation in the adjusted regression models without introducing severe collinearity and positivity concerns.

Sports Participation Dose and Mental Health

Among the 67 sports participants, greater weekly sports duration was **not significantly correlated** with depression, anxiety, stress, or WHO-5 well-being.

Weekly sports minutes were not significantly correlated with depression (**$\rho = 0.073$, $p = 0.559$**), anxiety (**$\rho = 0.017$, $p = 0.889$**), stress (**$\rho = -0.088$, $p = 0.480$**), or WHO-5 well-being (**$\rho = -0.057$, $p = 0.644$**).

Similarly, years of sports participation showed no significant association with depression (**$\rho = 0.044$, $p = 0.723$**), anxiety (**$\rho = -0.128$, $p = 0.303$**), stress (**$\rho = -0.064$, $p = 0.606$**), or WHO-5 well-being (**$\rho = -0.013$, $p = 0.918$**).

Mental-health outcomes also did not differ significantly between team-sport and individual-sport participants, and no significant differences were observed across competition levels. These findings suggest that, within the sports-participating group, **participation status rather than the measured dose or type of sport accounted for the dominant group-level pattern**.

Adjusted Analysis

Because the continuous mental-health outcomes were non-normally distributed, demographic-adjusted linear regression models were estimated using **heteroskedasticity-robust standard errors (HC3)**. Models adjusted for age, sex, residence, education, employment status, and family-income category.

Sports participation remained strongly associated with each mental-health outcome after adjustment.

For depression, sports participation was associated with an adjusted **15.88-point lower DASS-21 depression score** (**B = −15.88, 95% CI −18.40 to −13.37, p < 0.001**). The model explained approximately 52.4% of the observed variance (**R^2 = 0.524; adjusted R^2 = 0.490**).

For anxiety, sports participation was associated with a **16.49-point lower score** (**B = −16.49, 95% CI −19.22 to −13.76, p < 0.001; R^2 = 0.514**).

For stress, sports participation was associated with a **16.61-point lower score** (**B = −16.61, 95% CI −19.42 to −13.80, p < 0.001; R^2 = 0.538**).

For positive mental well-being, sports participation was associated with a **51.00-point higher WHO-5 percentage score** after demographic adjustment (**B = 51.00, 95% CI 44.82–57.17, p < 0.001**). This model explained approximately 70.1% of the variation in WHO-5 scores (**R^2 = 0.701; adjusted R^2 = 0.680**).

Table 4. Adjusted association between sports participation and mental-health outcomes

Outcome	Adjusted B for sports participation	95% CI	p	R^2	Adjusted R^2
Depression	−15.88	−18.40 to −13.37	<0.001	0.524	0.490
Anxiety	−16.49	−19.22 to −13.76	<0.001	0.514	0.480
Stress	−16.61	−19.42 to −13.80	<0.001	0.538	0.505
WHO-5 well-being	+51.00	44.82 to 57.17	<0.001	0.701	0.680

Models were adjusted for age, sex, residence, educational status, employment status, and family-income category. Positive coefficients for WHO-5 indicate better well-being; negative coefficients for DASS-21 outcomes indicate lower psychological distress.

Principal Finding

Across all primary analyses, sports participants demonstrated **substantially lower depression, anxiety, and stress and considerably higher positive mental well-being** than non-sports participants. These differences were large in magnitude and remained significant after adjustment for major sociodemographic characteristics. However, because the study is cross-sectional, the findings indicate a strong association and should not be interpreted as evidence that sports participation directly caused the observed mental-health differences.

Discussion

The present study identified a strong association between regular sports participation and better mental-health status among youth in Kerala. Sports participants reported substantially lower depression, anxiety, and stress scores and markedly higher WHO-5 well-being than non-sports participants. The differences were large across all primary outcomes and remained statistically significant after adjustment for major sociodemographic characteristics. These findings support the hypothesis that participation in regular or organized sport is associated with a more favourable psychological profile among young adults.

The direction of these findings is consistent with the wider literature. Panza et al. (2020), in a systematic review and meta-analysis involving more than 122,000 adolescents, found significantly lower symptoms of depression and anxiety among young people participating in organized sport compared with non-participants. Similarly, Zuckerman et al. (2021) reported lower odds of depression and anxiety among young people engaged in team sports. More recently, Wade et al. (2026), synthesizing 189 studies, concluded that sport participation was consistently associated with lower depressive and anxiety symptoms, higher self-esteem, greater life satisfaction, and improved social outcomes.

However, the magnitude of the differences observed in the present study was considerably larger than the generally small-to-moderate effects reported in systematic reviews. For example, Panza et al. (2020) described the overall association between sport involvement and depression/anxiety as statistically significant but small in magnitude. In the present sample, rank-biserial effect sizes ranged from approximately 0.79 to 0.93 across the principal outcomes, indicating very large separation between the sports and non-sports groups. These results should therefore be interpreted as evidence of a strong association within this sample rather than as an estimate of the effect that would necessarily be expected in the broader Kerala youth population.

Several mechanisms may contribute to better mental health among young people who participate in sport. Sport provides regular physical activity, structured

use of time, goal-directed behaviour, opportunities for mastery, social interaction, and a sense of belonging. Contemporary models increasingly suggest that the mental-health value of sport extends beyond exercise itself. Wade et al. (2026) identified self-perception, peer belonging, social support, emotional regulation, and resilience as central pathways through which sport may support psychological health. Qualitative evidence has similarly identified purpose, structure, distraction from stress, personal development, and belonging as mechanisms through which sporting environments can influence mental health.

The substantially higher WHO-5 scores among sports participants are particularly relevant because they indicate that the observed pattern was not restricted to fewer negative symptoms. Sports participants also demonstrated considerably better **positive psychological well-being**. This distinction is important because absence of psychological distress does not necessarily imply positive mental health. The findings therefore suggest that sports participation was associated with both lower negative emotional states and greater subjective well-being. This pattern is consistent with longitudinal and systematic evidence linking organized sport with greater life satisfaction, self-esteem, psychosocial functioning, and quality of life.

The findings are also relevant within the Kerala context. Jaisoorya et al. (2017), in a study of 5,784 college students from 58 colleges in Kerala, reported psychological distress in **34.8%** of participants and showed that distress was associated with academic failure, substance use, suicidality, and other adverse psychosocial factors. The present study similarly demonstrates that psychological distress is an important issue among young people, but direct prevalence comparisons should be avoided because the studies used different instruments, sampling methods, and definitions of distress. Notably, the very high prevalence of at least moderate DASS-21 symptoms among the non-sports group in the present sample is substantially greater than that reported in population-based or broader college samples and should therefore be interpreted cautiously.

Longitudinal evidence provides additional support for a relationship between sustained sports participation and psychological health. Murray et al. (2021) found that individuals who continued team-sport participation from adolescence into young adulthood reported lower stress and better coping than those who did not participate or who discontinued sport. Prospective research has also shown that greater team-sport participation can predict fewer subsequent depressive and anxiety symptoms during adolescence. These longitudinal findings strengthen the plausibility of a protective relationship, although they do not establish that all observed differences between athletes and non-athletes are caused by sport itself.

In the present study, neither weekly sports minutes nor years of sports participation showed significant correlations with depression, anxiety, stress, or well-being among sports participants. This suggests that the major distinction in this sample was between **participation and non-participation**, rather than a simple dose-response relationship within those already active in sport. Previous literature has also shown that the relationship between sport exposure and mental health is not necessarily linear. The psychosocial quality of the sporting environment, enjoyment, social support, coaching climate, and continuity of participation may be more important than the number of minutes accumulated alone.

No significant differences were observed between team-sport and individual-sport participants in the present study. This differs somewhat from recent literature suggesting that team sports may provide stronger mental-health benefits because of additional opportunities for social connection and belonging. Wade et al. (2026) reported more consistent psychological and social benefits for team sports, while a 2024 review suggested that individual-sport athletes may experience relatively greater depression and anxiety in some contexts. The absence of a difference in the present study may reflect the relatively small number of individual-sport participants, the young-adult age range, or characteristics of the local sporting environment.

An additional finding was the marked difference in sleep duration and recreational screen time between sports participants and non-participants. Sports participants consistently reported longer sleep and substantially lower screen exposure. These behaviours may represent part of a broader healthy-lifestyle pattern associated with sport participation rather than independent effects of sport itself. Importantly, the sleep and screen-time values showed complete separation between the two groups in this dataset. For this reason, they were not entered simultaneously with sports participation in the adjusted models, as doing so would have produced severe collinearity and limited meaningful statistical

adjustment. This pattern also reinforces the possibility that sports participation may be acting partly as a marker of broader behavioural differences between the groups.

The adjusted analyses nevertheless showed that sports participation remained strongly associated with lower depression, anxiety, and stress and higher WHO-5 well-being after controlling for age, sex, residence, education, employment status, and family-income category. The consistency of the association across four separate psychological outcomes strengthens the internal pattern of the findings. However, residual confounding remains possible. Variables such as pre-existing mental-health status, personality, social support, academic pressure, family functioning, socioeconomic resources, physical-health status, and motivation to participate in sport were not comprehensively measured.

Practical Interpretation

The findings support the potential value of organized sport as one component of youth mental-health promotion. Colleges, universities, community organizations, and sports bodies may provide accessible opportunities for regular participation that combine physical activity with social interaction, routine, achievement, and peer support. Evidence from intervention research also suggests that structured team-sport programmes can improve selected psychological outcomes, although effects vary across outcomes and settings. Sport should therefore be viewed as a potentially supportive environment rather than as a substitute for professional mental-health assessment or treatment.

Strengths and Limitations

The study has several strengths. Mental health was assessed from both negative and positive perspectives using the DASS-21 and WHO-5, allowing depression, anxiety, stress, and well-being to be examined simultaneously. Internal consistency was high for all four scales. The analysis also included effect sizes, severity classifications, sport-exposure variables, and demographic-adjusted models rather than relying solely on unadjusted mean comparisons.

Several limitations require careful consideration. First, the **cross-sectional design prevents determination of temporal sequence or causality**. Better mental health may encourage continued sports participation just as sports participation may contribute to better mental health. Second, the **snowball sampling method** may have introduced selection and network-related bias and limits generalizability. Third, all measures were self-reported and therefore susceptible to recall and social-desirability bias. Fourth, the unusually large separation between the groups—including the very high prevalence of moderate-or-greater DASS symptoms among non-sports participants and the complete separation in sleep and screen-time values—suggests that the sample may contain substantial behavioural clustering. The magnitude of the observed associations may therefore overestimate what would be found in a representative population sample. Fifth, potential confounders such as prior mental-health diagnoses, counselling or medication use, social support, academic stress, family relationships, and other forms of physical activity were not included.

Finally, the absence of significant dose-response relationships and team-versus-individual differences should not be interpreted as proof that sport characteristics are irrelevant. The sports subgroup was relatively modest in size, reducing statistical power for within-sport comparisons.

Overall, the present findings show a consistent and substantial association between regular sports participation and better psychological health among the youth studied. Sports participants demonstrated lower depression, anxiety, and stress together with substantially greater positive well-being. These findings support further investigation of sport as a potentially useful setting for youth mental-health promotion in Kerala. **Longitudinal, probability-based, and intervention studies are required to determine whether sports participation itself produces these benefits and to identify which forms and contexts of sport are most effective.**

Conclusion

Regular sports participation was strongly associated with a more favourable mental-health profile among youth in Kerala. Sports participants reported substantially lower levels of depression, anxiety, and stress and markedly higher psychological well-being than non-sports participants. These differences remained significant after adjustment for major sociodemographic characteristics.

The findings suggest that organized sport may provide a useful setting for promoting psychological well-being among young adults through structured activity, social interaction, routine, and opportunities for achievement. However, the cross-sectional

design, snowball sampling method, and pronounced behavioural differences between the groups prevent causal conclusions.

Sports participation should therefore be viewed as a potentially supportive component of youth mental-health promotion rather than a stand-alone intervention. Longitudinal and intervention-based studies with representative samples are needed to determine whether sustained sports participation directly contributes to improved mental health and to identify the sporting environments that provide the greatest psychological benefit.

Acknowledgement

The authors sincerely acknowledge all individuals who assisted with participant identification, coordination, and data collection for this study. Their support was valuable in facilitating the successful completion of the research.

The authors also thank all participants for their time, cooperation, and willingness to share the information required for the study.

References

1. Boelens, M., Smit, M. S., Raat, H., Bramer, W. M., & Jansen, W. (2022). Impact of organized activities on mental health in children and adolescents: An umbrella review. *Preventive Medicine Reports, 25*, 101687. https://doi.org/10.1016/j.pmedr.2021.101687
2. Jaisoorya, T. S., Rani, A., Menon, P. G., Jeevan, C. R., Revamma, M., Jose, V., Radhakrishnan, K. S., Kishore, A., Thennarasu, K., & Nair, B. S. (2017). Psychological distress among college students in Kerala, India—Prevalence and correlates. *Asian Journal of Psychiatry, 28*, 28–31. https://doi.org/10.1016/j.ajp.2017.03.026
3. Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Psychology Foundation.
4. Murray, R. M., Sabiston, C. M., Doré, I., Bélanger, M., & O'Loughlin, J. L. (2021). Association between pattern of team sport participation from adolescence to young adulthood and mental health. *Scandinavian Journal of Medicine & Science in Sports, 31*(7), 1481–1488. https://doi.org/10.1111/sms.13957
5. Ooms, L., van Stam, W., Sevdalis, V., Overbye, M., Algurén, B., Heck, S., & Van Hoye, A. (2025). How do sports participation and sports settings influence the mental health of children and adolescents? A systematic review of qualitative studies. *BMC Public Health, 26*(1), 272. https://doi.org/10.1186/s12889-025-25916-x
6. Panza, M. J., Graupensperger, S., Agans, J. P., Doré, I., Vella, S. A., & Evans, M. B. (2020). Adolescent sport participation and symptoms of anxiety and depression: A systematic review and meta-analysis. *Journal of Sport & Exercise Psychology, 42*(3), 201–218. https://doi.org/10.1123/jsep.2019-0235
7. Reardon, C. L., & Hitchcock, M. (2024). Mental health in individual versus team sports. *International Review of Psychiatry, 36*(3), 284–295. https://doi.org/10.1080/09540261.2024.2349079
8. Sullivan, N., Breslin, G., McLaughlin, M., Shannon, S., Leavey, G., & Dempster, M. (2025). A systematic review of sport-based adolescent mental health awareness programmes. *PLOS ONE, 20*(3), e0315315. https://doi.org/10.1371/journal.pone.0315315
9. Suresh, K., & Dar, A. A. (2025). Mental health of young adults pursuing higher education in Tier-1 cities of India: A cross-sectional study. *Asian Journal of Psychiatry, 106*, 104447. https://doi.org/10.1016/j.ajp.2025.104447
10. Wade, L., Eime, R., Pankowiak, A., Vella, S., Robinson, K., Kennedy, S., Parkes, R., & Eather, N. (2026). The impact of sports participation on psychological health and social outcomes in children and adolescents: A systematic review and update to the "Mental Health through Sport" conceptual model. *Systematic Reviews, 15*(1), 121. https://doi.org/10.1186/s13643-026-03104-1
11. World Health Organization. (2024). *The World Health Organization-Five Well-Being Index (WHO-5).* https://www.who.int/publications/m/item/WHO-UCN-MSD-MHE-2024.01
12. World Health Organization. (2025, September 1). *Mental health of adolescents.* https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health