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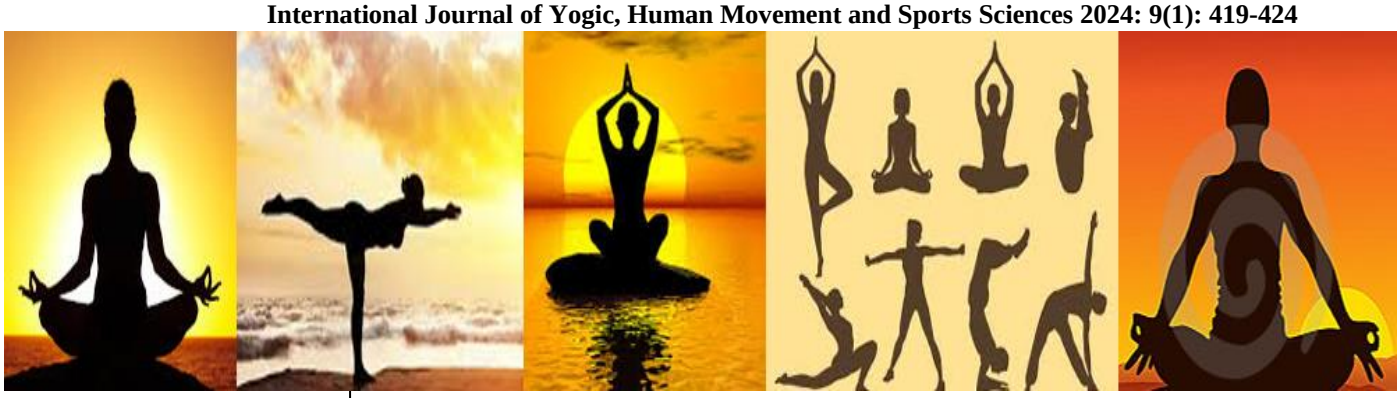

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The impact of psychological skills training on performance in adolescent cricket players

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Abstract
This study investigated the effectiveness of psychological skills training (PST) in improving performance among adolescent male cricket players (n=24). A 12-week PST package consisted of a five-step intervention using relaxation, self-talk, goal setting, focusing and visualisation was implemented. Compared to a control group, players receiving PST significantly improved batting (F-12.918, $p<.05$ and bowling performance (F= 7.415, $p<.05$). These findings suggest that PST can be a valuable tool for young cricketers, potentially enhancing both batting and bowling abilities. Future research can delve deeper into how PST works (e.g., by examining if focus or anxiety plays a role) and its influence on other mental aspects like motivation and self-confidence. Additionally, studies investigating the effects of PST on female cricket players would broaden our understanding of its generalizability.

Keywords: Adolescent players, psychological skills training (PST)

1. Introduction
"Psychological Skills Training (PST) refers to the systematic and consistent practice of mental or psychological skills for the purpose of enhancing performance, increasing enjoyment, or achieving greater sport and physical activity self-satisfaction" (Weinberg & Gould, 2023) [14]. Therefore, PST should be systematic, goal-oriented, planned, controlled and evaluated (Seiler & Stock, 1994) [10]. Psychological Skills Training (PST) is crucial to athletic and exercise performance. It involves teaching athletes and exercisers various psychological skills to help them regulate their mental state and enhance their overall performance. PST is of interest to Sport and Exercise Psychology (SEP) because psychological states impact athletes' performance; by learning psychological skills to control their psychological states, athletes may improve their results. However, the field has since broadened its scope to encompass various aspects beyond performance enhancement. Today, sports psychologists work with athletes at all levels, coaches, parents, and teams, to address multiple issues such as motivation, teamwork, communication, leadership, stress management, injury rehabilitation, and career transitions. Moreover, they also focus on promoting positive youth development through sports, fostering a healthy and enjoyable sporting environment, and tackling issues like bullying, burnout, and substance abuse. "Mental training focuses on the positive aspects of an athlete's mental performance, physical abilities, and preparation skills. The mental training program is based on the idea that the pictures in the person's mind have real power; the person can create his reality with his images of how he "sees" himself and his abilities, whether positively or negatively (Porter, 2003) [9]." Blumenstein (1997) [1] stated that coaches and athlete all know that physical skills need to be regularly practised and refined through literally thousands and thousands of repetitions". The PST package consisted of a five-step intervention using "relaxation, self-talk, goal setting, focusing and visualisation. The results also reported that imagery and relaxation were the most effective methods (Gould *et al*., 2007) [5]. "Mental preparation provides an athlete with techniques to overcome mental and emotional barriers" (Blumenstein, Bar, & Tenenbaum, 1997) [1]. Also, the focus of PST can vary greatly depending on the athlete's needs; the program can be comprehensive or focused on one or two skills.

The most frequently sought-after result from PST by athletes is performance enhancement. To reach this aim, "many athletes use goal setting, imagery, relaxation, concentration, and self-talk. Since thoughts influence behaviour, using psychological skills and learning to control one's thoughts is a straightforward manner to further excel in competitions" (Kornspan, 2009) [7]. "Therefore, since mental components can play such a crucial role in sports, the advantages of improving these qualities are clear; furthermore, PST helps athletes with motivation, releasing the tension choking problems, and helps them get "in the zone'." Also, following PST, many athletes can cope with pressure (in athletics and daily life), tend to rebound better following failure, and are more persistent. Yet another advantage of PST is that it helps build and develop mental toughness, which is perceived to be the most critical determinant of success in sports" (Weinberg & Gould, 2023) [14]. The psychological demands on athletes vary between teams, age, gender, level of competition, and sport type (Elbe AM, Wenhold F., 2009) [3]. Young athletes, particularly those in the intermediate competition stage, often require motivation to stay committed to sports practice, including matches and training) and need proper mental preparation to handle the stress of competing. Athletes aiming to excel in high-intensity sports must manage rigorous training loads and intensities while ensuring regular development. Hence, fostering psychological growth in young athletes enhances their success and equips them with crucial psychological abilities like efficacy, arousal management, motivational and recovery skills. These skills aid in achieving goals and experiencing satisfaction in sports (Navarrón *et al*., 2017; Brière *et al*., 2018) [8, 2]. In the bat-and-ball game of Cricket, two teams of eleven players compete against one another. It is among the oldest sports in the world, having started in England in the sixteenth century. Cricket was a colonial pastime until the British Empire expanded. Now, it is a popular sport worldwide, especially in Commonwealth countries, where it is an integral part of the national identity. Cricket is a team sport governed by rules and regulations. Teams compete by batting and bowling, and the team that scores the most runs wins. It is a well-known fact that playing cricket involves mental and physical challenges. Surprisingly, many players and teams still emphasise perfecting their technical abilities more than building the mental toughness required to perform at their highest level and keep it there. As a result of paying too little attention to the mental side of their game, many players cannot reach their full potential. Sports psychology has significantly impacted understanding, training, and utilising mental skills for optimal performance in cricket. According to former English cricketer Smith R in 1994, cricket is a game that relies heavily on mental abilities more than any other sport. Concentration is vital in cricket, as players must make quick decisions while batting or bowling. Batsmen need to execute their shots effectively and anticipate the bowler's delivery. Similarly, bowlers must plan their deliveries while anticipating the batsman's response. Additionally, fast bowlers, spin bowlers, batters, and wicketkeepers must mentally prepare for each ball they face or deliver. Various psychological factors can affect performance in cricket, emphasising the crucial role of mental preparation and resilience in this sport. Psychological Skill Training (PST) has garnered significant interest from athletes, coaches, and specialists to enhance performance in sports. Various research has been undertaken across different sports to explore this topic. Nevertheless, research on cricket performance has been scarce despite the existing interest. Adolescent male cricket players may perform subpar due to insufficiently developed psychological abilities. The objective of this study was to ascertain whether implementing psychological skills training can enhance the participants' cricket performance and self-efficacy.

2. Methodology

For this study, twenty-four male adolescent cricket players (N=24) were selected from the sports hostels run by the Kerala State Sports Council in India. To ensure equity, the players were randomly allocated into two groups of similar magnitude (n=12 per group). The experimental group (EG) engaged in a 12-week programme focused on psychological skills training. The control group (CG) did not undergo the training programme. The age range of all participants was limited to individuals aged between 15 and 1 Players' cricket playing performances were assessed on actual achievement in each match. For batters, runs scored were recorded, while for bowlers, the number of wickets taken in an inning was deemed the most appropriate performance measure. Such statistics are readily available following the completion of a competitive match and are the most used measures of performance in cricket (Wright, 2001). Two qualified cricket coaches (Who work for the Kerala State Sports Council) and one qualified club coach were requested to assess each player's performance for every match. For this investigation, a subjective performance assessment system was created. The experimenter created the standards for the intra-individual assessment of the players with the help of cricket coaches. As indicated in Table 1, the general performance levels of batters and bowlers were scored from 1 (poor) to 10 (outstanding), with a score of 5 denoting an average performance in relation to that player's abilities. During a series of competitive training sessions, where competitive environments were simulated, and pre-season friendly matches were played before the testing period, the coaches who were evaluating performance within the study became familiar with the performance criteria until inter-rater reliability was consistently greater than r = 0.8. The data was collected and analysed using descriptive statistics, including frequency counts, percentages, and standard deviation (SD). In addition, ANCOVA was employed to assess the statistical significance of the intervention at a significance level of 0.05. The analyses were conducted using the SPSS software, specifically version 25.

Table 1: Subjective criteria for the performance assessment of cricketers

Rating		Cricketer Description
9/10	Batters	Scored heavily. Never looked like getting out. In control (Characteristics in 5/6 and 7/8)
	Bowler	Bowled perfect line and length throughout the spell. Made batters work hard for their runs. It took and always looked like taking wickets. (Plus, characteristics in 5/6 and 7/8).
7/8	Batters	Looked to dominate the bowling. They timed the ball well into gaps. Played ball along the ground. Ran well between the wickets. Good communication, i.e., calling, etc. (Plus characteristics in 5/6).
	Bowlers	Had batters in trouble on numerous occasions. Bowled aggressively. It looked like taking wickets regularly. (Plus, characteristics in 5/6).

5/6	Batters	That's a good shot selection. They timed the ball well. Looked comfortable at the crease.
	Bowlers	Bowled good line and length. They bowled tidily, but usually one bad ball an over. The timing is not as good as normal. Hit the ball in the air more than normal. The shot selection is not too good. Gave chances to the fielders.
3/4	Batters	Timing not as good as normal. Hit the ball in the air more than normal. Shot selection not too good. Gave chances to the fielders.
	Bowlers	Consistently bowled bad balls. Only real chances of taking wickets through bad batting. Failed to see batters weaknesses.
1/ 2	Batters	Poor shot selection. Played and missed on numerous occasions.
	Bowlers	Failed to bowl line or length. Failed to cause problems for the batters. Bowled plenty of boundary balls.

3. Selection of Subjects and Research Design

This study used a randomised controlled trial (RCT) to examine the effects of a mental skills training package on adolescent male cricket players. The players were randomly selected from Kerala State Sports Council's sports hostels in India. The study involved a 12-week intervention with a subjective performance assessment method developed by Thelwell, R. C., & Maynard, I. W. (2003) [12]. The players underwent psychological skills training three times a week for 12 weeks. The difference between initial and final scores was analysed to determine the training program's impact on the players' performance.

3.1 Administration of Test

The study aimed to provide psychological skills training to cricket players for 12 weeks, focusing on goal setting, imagery, self-talk and relaxation. The program began with a two-week pre-testing phase and ten days of preparation. The results from the pre-tests were used to tailor a 12-week program. The players were then informed about the study's aims, testing procedure, and intervention procedure. The study collected consent forms, demographic information, and general participant information.

3.1.1 Preparation of Mental Training Programme

The study involved a 12-week program focusing on cricket-related psychological skills, developed in collaboration with sports psychologists and cricket coaches. Participants were randomly assigned to either an experimental or control group and were asked not to undergo additional mental skills training or consultations with sports psychologists. The experimental group received three sessions per week for 12 weeks, covering four fundamental psychological techniques: goal setting, imagery, self-talk and relaxation. Each participant received a logbook with daily activity worksheets to guide their practice throughout the program. The progression of the psychological skills training was done in a sequence: goal setting, imagery, self-talk and relaxation. Goal setting was done in group sessions, while relaxation and mental imagery were done individually. The program progressed strategically throughout the 12 weeks, with the initial focus on familiarising participants with the program and establishing a solid foundation in relaxation techniques. The program was designed to be efficient and adaptable to individual needs, with sessions typically lasting up to 30 minutes. The program ran for 12 weeks, with sessions offered thrice weekly for the experimental group. Professional sports psychologists were consulted to ensure the effectiveness of these individualised sessions. The commitment from the participants was high, with an impressive attendance rate of nearly 90% for the psychological training sessions.

Table 2: Intervention Protocol/ Psychological Skill Training Programme for three weeks

Sl. No.	Skill	Week- 1, 2 & 3 Description
1	Goal Setting	-Initially, the participants were asked to set S.M.A.R.T goals (Specific, Measurable, Action-oriented, Realistic, Timely and Self-determined Goals) Then, they were asked to write down their goals in a manual under various sub-headings or categories. ▪ **Ultimate Goals:** Play for team India, get a job in sports quota, etc. ▪ **Outcome Goals:** e.g., I will score 'n' number of runs or take 'n' number of wickets in the Ranji trophy or a vital tournament, I will become a man of the series, etc., a step closer to reaching the ultimate goal. ▪ **Performance Goals:** Based on previous performance and weaknesses, one should aim to improve those, learn to execute, and perfect new skills to reach close to the outcome goal. ▪ **Process Goals:** A performer must take actions to carry out or perform properly. E.g. improve the basics of critical cricketing skills
2	Imagery	The participants were asked to imagine things or events that will ultimately give them self-confidence, increase self-awareness or just uplift their mood to tackle anxiety and stress, e.g.-Visualization of proper execution of a cricketing or physical skill, some good moments from their experience, or a winning situation etc.
3	Self-Talk	The participants were asked to observe their thoughts and identify the negative ones affecting their mood and eventually affecting performance and quality of life. They were asked to replace them with positive and self-assuring talks.
4	Relaxation	**Simple Mindful Breathing:** Although the first exercise is relatively essential, it can potentiate complete relaxation for beginners. The only task at hand is to recognise the inhale and exhale as an exhalation. You recognise that this is your in-breath when you take a breath. You are aware that this is your out-breath as you exhale.

4. Analysis of Data and Results

A post-test compared the batting average of two groups: experimental and control. Both groups had 12 participants. The experimental group scored slightly higher (8.00) than the control group (7.08). There was some variability in the scores, with a standard deviation of around 0.8 for both groups. Levene's Equality of Error Variances Test aims to verify the accuracy of subsequent statistical tests that depend on the assumption of equal variances among different groups. Given the p-value (0.989) above the significance level (usually 0.05), we cannot reject the null hypothesis. Levene's test indicates no statistically significant disparity in the variability of scores between the experimental and control groups. This is further corroborated by the F statistic approaching zero. This outcome enables you to proceed with additional analysis with greater confidence under the assumption that there is homogeneity of variance (equal variances) among the groups.

Table 3: ANCOVA on pre and post-test performance in Batting

Tests of Between-Subjects Effects							
Dependent Variable: Batting							
Source	**Type III Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**	**Observed Power [b]**
Corrected Model	10.723[a]	2	5.361	12.191	0.000	0.537	0.989
Intercept	4.128	1	4.128	9.386	0.006	0.309	0.832
Pre test	5.681	1	5.681	12.918	0.002	0.381	0.929
Group	5.042	1	5.042	11.464	0.003	0.353	0.898
Error	9.236	21	0.440				
Total	1385.000	24					
Corrected Total	19.958	23					

a. R Squared =.537 (Adjusted R Squared =.493)
b. Computed using alpha =.05

An ANCOVA analysis examined the factors affecting batting performance (Table 3). The study considered the initial batting ability (pre-test score) and group membership (potentially representing an intervention or training program). There was a statistically significant overall effect on batting performance ($F(2, 21) = 12.191$, $p = 0.000$), indicating that at least one of the factors (pretest or group) has a significant influence. The initial batting ability (pre-test score) had a moderate effect size (partial eta squared = 0.309) and a significant impact ($p = 0.002$), suggesting that participants with higher initial ability tended to score higher on the post test. Additionally, the group had a significant effect ($p = 0.003$) with a moderate effect size (partial eta squared = 0.353). This indicates that after accounting for initial ability, there's a statistically significant difference in how much batting performance improved between the groups. These findings warrant further investigation to determine the direction of the group differences (which group improved more) and the specific way initial ability influences improvement.

Table 4: Pairwise comparison of adjusted post-test means on batting performance of Experimental and Control Groups

Dependent Variable: Batting						
(I) Group		**Mean Difference (I-J)**	**Std. Error**	**Sig.[b]**	**95% Confidence Interval for Difference [b]**	
					Lower Bound	**Upper Bound**
Experimental (M=8.000)	Control	.917*	0.271	0.003	0.354	1.480
Control (M=7.083)	Experimental	-.917*	0.271	0.003	-1.480	-0.354

Based on estimated marginal means
*. The mean difference is significant at the.05 level.
b. Adjustment for multiple comparisons: Bonferroni.

Following up on the significant group effect from the ANCOVA (Table 3), Table 4 dives deeper into the difference between the Experimental and Control groups' batting performance. A statistically significant difference was found ($p = 0.003$) using a Bonferroni correction to account for multiple comparisons. This means that after considering initial ability, the Experimental group, on average, scored 0.917 points higher than the Control group on the post-test. The confidence interval around this difference also does not include zero, further supporting the conclusion that the Experimental group performed better. While an effect size is not explicitly shown, the significant difference suggests a potentially meaningful impact of the factor associated with the Experimental group. Overall, these results indicate that the Experimental group benefitted from the psychological skill training program, which led to a statistically significant improvement in batting performance compared to the Control group.

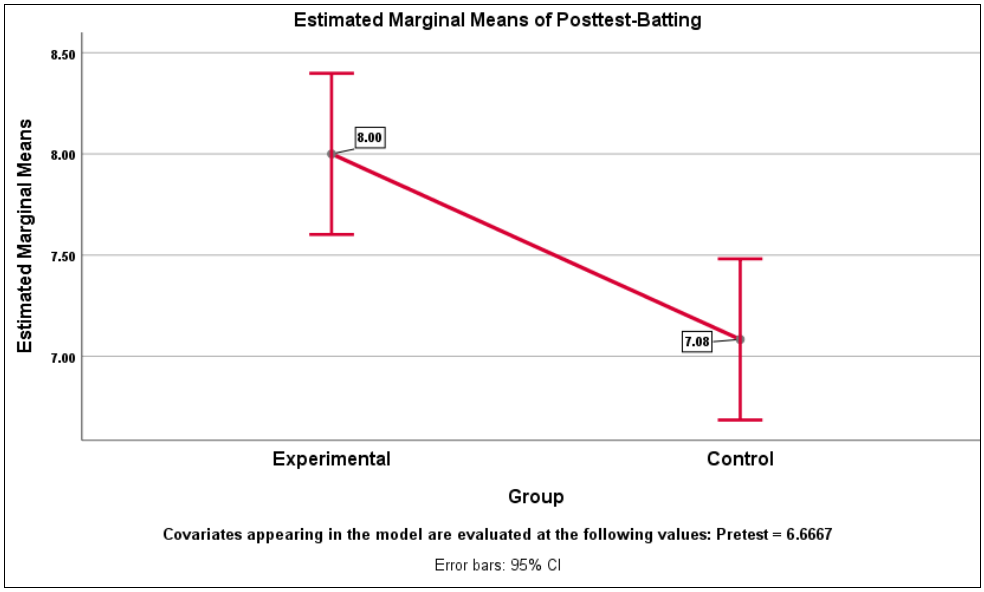

Fig 1: Estimated marginal means of pre and post-test on batting performance

An ANCOVA was conducted to examine the factors affecting bowling performance. The analysis considered the initial bowling ability (Pre-test score) and group membership (Potentially representing a training program or intervention). The study revealed a statistically significant difference in adjusted post-test scores between the experimental and control groups (p<.05). While both groups showed some variability in scores (Standard deviation around 0.8), the experimental group achieved a slightly lower adjusted mean score (indicating better bowling performance) compared to the control group. This suggests that after accounting for initial bowling ability, the intervention or training program associated with the experimental group may have improved bowling performance. However, further analysis is recommended to determine the magnitude of this effect size and explore the specific nature of the improvement. Levene's test checked a vital assumption for further analysis in an ANCOVA examining bowling performance. This assumption is homogeneity of variance, meaning the spread of scores (Variability) is similar across groups. The test considered the initial bowling ability (Pre-test scores) and group membership (Experimental or control). The results (F = 1.244, p = 0.277) suggest that after accounting for initial ability, there's no statistically significant difference in how spread out the bowling performance scores are between the experimental and control groups. This allows researchers to proceed with more confidence in subsequent analyses.

Table 5: ANCOVA on pre and post-test performance in Bowling

Tests of Between-Subjects Effects							
Dependent Variable: Bowling							
Source	**Type III Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**	**Partial Eta Squared**	**Observed Power [b]**
Corrected Model	10.239[a]	2	5.120	7.304	0.004	0.410	0.899
Intercept	1.358	1	1.358	1.937	0.179	0.084	0.264
Pre test	5.198	1	5.198	7.415	0.013	0.261	0.738
Group	4.402	1	4.402	6.281	0.021	0.230	0.667
Error	14.719	21	0.701				
Total	1301.000	24					
Corrected Total	24.958	23					

a. R Squared =.410 (Adjusted R Squared =.354)
b. Computed using alpha =.05

An ANCOVA analysis was conducted to examine the factors affecting bowling performance, considering both initial ability (pre-test score) and group membership (intervention or training program) (Table 5). The analysis revealed a statistically significant overall effect on bowling performance (p = 0.004), indicating that at least one of these factors has a significant influence. The initial bowling ability (pre-test score) had a moderate effect size (partial eta squared = 0.261) and a significant impact (p = 0.013). This suggests that participants with higher initial ability tended to score lower (better performance) on the post test, even after accounting for the group they were assigned to. The group had a significant effect (p = 0.021) with a moderate effect size (partial eta squared = 0.230). This indicates that after accounting for initial ability, there's a statistically significant difference in how much bowling performance improved between the groups. These findings warrant further investigation to determine the direction of the group differences (which group improved more) and the specific way initial ability influences improvement in bowling performance.

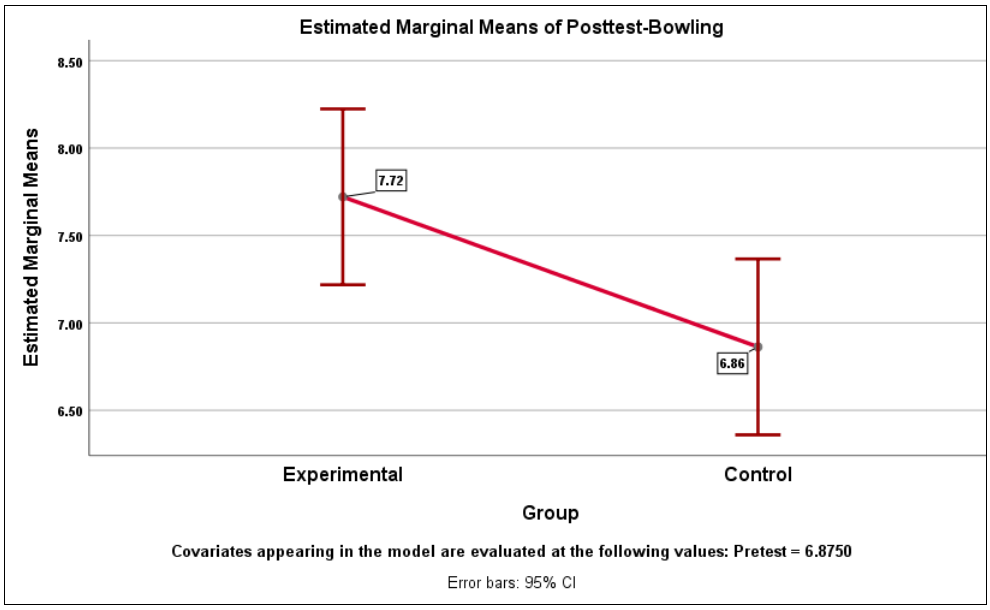

Fig 2: Estimated marginal means of pre and post-test on bowling performance

This study examined the effects of a 12-week psychological skill training program on adolescent male cricketers' batting and bowling performance. The results strongly suggest the program benefitted both aspects of their game. For batting,

the group receiving the training (Experimental) showed a statistically significant improvement compared to the control group who did not receive the training (p = 0.003). This improvement held even after accounting for the participants' initial batting ability. Bowling performance analysis didn't show the exact significance level. Still, it revealed a statistically significant difference in adjusted scores between the groups ($p<.05$). The experimental group achieved a slightly lower adjusted score, indicating better bowling. Both analyses confirmed similar variability in scores within each group (Homogeneity of variance). Further investigation is recommended to determine the magnitude of the effect on bowling performance and explore how the program specifically improved bowling skills. In conclusion, this study suggests the psychological skill training program positively impacted batting and bowling performance in adolescent male cricketers. This training program could be valuable for enhancing young cricketers' overall performance.

Table 6: Pairwise comparison of adjusted post-test means on bowling performance of Experimental and Control Groups

Pairwise Comparisons						
Dependent Variable: Bowling						
		Mean Difference (I-J)	**Std. Error**	**Sig. [b]**	**95% Confidence Interval for Difference [b]**	
					Lower Bound	**Upper Bound**
(I) Group						
Experimental (M = 7.721)	Control	.858*	0.342	0.021	0.146	1.570
Control (M = 6.863)	Experimental	-.858*	0.342	0.021	-1.570	-0.146
Based on estimated marginal means						
*. The mean difference is significant at the.05 level.						
b. Adjustment for multiple comparisons: Bonferroni.						

Following up on the significant group effect in the ANCOVA analysis (Table 5), Table 6 dives deeper into the difference between the Experimental and Control groups' bowling performance. A statistically significant difference was found (p = 0.021) using a Bonferroni correction to account for multiple comparisons. This means that after considering initial ability, the Experimental group scored an average of 0.858 points lower (Better performance) than the Control group on the post-test. The confidence interval around this difference also doesn't include zero, further supporting the conclusion that the Experimental group improved more in bowling performance. Therefore, the factors associated with the experimental group (Intervention, training program, etc.) appear to have positively impacted bowling performance compared to the control group.

5. Conclusion

A study examined the impact of psychological skills training (PST) on adolescent male cricket players. Players who underwent a 12-week PST program focusing on goal setting, relaxation techniques, and self-talk showed significant improvement in batting performance compared to those without training. While bowling performance also seemed to benefit, further research is needed to confirm the extent of this effect. These findings suggest that mental skills training can be a valuable tool for young cricketers, potentially enhancing both batting and bowling abilities. Future studies could explore the mechanisms behind this improvement and investigate the impact on psychological aspects like motivation. Additionally, research with female players would broaden the understanding of PST's effectiveness.

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