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Effects of Mental Imagery Training on Self-Efficacy and Decision-Making among State-Level Female Rugby Players in Jammu and Kashmir

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ABSTRACT

Background: Mental imagery is a psychological skill whereby athletes can rehearse actions, situations, and performance experiences in their mind and is believed to aid in psychological preparation and performance-related outcomes. Evidence on mental imagery among female rugby players competing at the state level nonetheless remains limited.

Objective: This study examined changes in self-efficacy and decision-making following a mental imagery training program among state-level female rugby players in Jammu and Kashmir, India.

Methods: A one-group pretest-posttest design was used. Twenty female state-level rugby players aged 18-23 years participated. Self-efficacy was assessed with the Athlete Self-Efficacy Scale (ASES), and decision-making was assessed with the Decision-Making Questionnaire (DMQ). Pretest and posttest scores were compared using paired-samples t-tests, and mean differences, 95% confidence intervals, and Cohen's dz were calculated.

Results: Self-efficacy rose from 30.20 (SD = 3.89) at pretest to 34.70 (SD = 4.12) at posttest, a mean gain of 4.50 points (95% CI [3.57, 5.43]), $t(19) = 10.13$, $p < .001$, Cohen's dz = 2.27, a 14.9% increase. Decision-making rose from 23.95 (SD = 2.87) to 28.35 (SD = 3.17), a mean gain of 4.40 points (95% CI [3.50, 5.30]), $t(19) = 10.19$, $p < .001$, Cohen's dz = 2.28, an 18.4% increase.

Conclusion: Both self-efficacy and decision-making improved significantly following the mental imagery program, suggesting that imagery training may be a useful psychological strategy for female rugby players. As no control group was included, these results are best read as pretest-to-posttest change rather than confirmed evidence of a causal treatment effect.

Keywords: mental imagery, self-efficacy, decision-making, female rugby players, sport psychology, physical education

INTRODUCTION

Mental imagery involves mentally recreating or rehearsing actions, experiences, and competitive situations without physically performing them. It is widely incorporated into athletic preparation and has been associated with confidence, self-efficacy, anxiety regulation, mental toughness, and performance outcomes (Budnik-Przybylska et al., 2022; Yalcin et al., 2022). Broader reviews of psychological-skills

interventions in sport report measurable performance benefits across several distinct techniques, of which imagery is among the most studied (Reinebo et al., 2023).

Self-efficacy refers to an individual's belief in their capacity to carry out a given task successfully. In sports, it influences the way that athletes try, perseverance, motivation, and their reactions in challenging situations. In general, athlete self-efficacy is considered to be a multidimensional construct related to beliefs concerning the various aspects of athletic functioning instead of a global sense of self-efficacy.

For this reason, Koçak (2020) created the Athlete Self-Efficacy Scale to measure this construct specifically. The final instrument contains 16 items, split into four dimensions: Sport Discipline Efficacy, Psychological Efficacy, Professional Thought Efficacy, and Personality Efficacy, with an overall Cronbach's alpha reported in the original validation study of .88. A more detailed reliability analysis yielded an overall alpha of .898, and subscale alphas ranging from .752 to .841.

Imagery-based interventions have produced favorable psychological outcomes across a range of individual and team sports, including tennis, badminton, futsal, archery, karate, and football (Fekih et al., 2021; Hidayat et al., 2023; Indrayogi et al., 2025; Isar et al., 2022; Widyastuti et al., 2024). Related work in football, golf, and alpine skiing has linked imagery use specifically to gains in confidence and self-efficacy (Blanco-Ariza et al., 2024; Hamidi et al., 2025; Volgemute et al., 2024), and a similar self-efficacy pathway has been proposed to explain how imagery buffers competitive stress in martial arts athletes (Di Corrado et al., 2025). Imagery use has also been linked to psychological resilience through its association with sport confidence in student athletes (D'Agostino & Munroe-Chandler, 2025), and earlier work reported comparable confidence gains following imagery training (Kristina et al., 2022). At a broader level, meta-analytic and systematic-review evidence indicates that imagery practice contributes positively to athletic performance, although questions remain about the amount, or 'dose', of imagery training needed to produce reliable effects (Liu et al., 2025; Volgemute et al., 2025; Yang, 2026; Zhang et al., 2025).

Decision-making is a further important component of sport performance. Athletes must repeatedly choose among possible actions under time pressure, uncertainty, and rapidly changing conditions. In team sports in particular, decision-making involves responding to teammates, opponents, and tactical situations as they unfold.

The Decision-Making Questionnaire (DMQ) has been used to examine decision-making behavior among athletes. As described in the Indian study drawn on here, the DMQ is a 21-item questionnaire assessing decision-making across seven factors: Thoroughness, Control, Hesitancy, Social Resistance, Optimizing, Principled, and Instinctiveness, using six response categories ranging from very infrequently or never to very frequently or always.

Decision-making and anticipation have received growing research attention in team sports more broadly. A recent systematic review and meta-analysis of perceptual-cognitive training in team-sport athletes revealed that perceptual-cognitive training was effective for improving anticipation and decision-making, but to a lesser extent in actual games than in laboratory settings (Zhu et al., 2024). This indicates that decision-making is trainable, although the form and situation of the training might affect the degree to which the improvements transfer to the competition.

Particularly in the case of rugby, the sport is a highly dynamic environment where players are always required to adapt to a competitive setting and are constantly learning to apply technical and tactical skills. In addition to physical and technical demands, confidence and correct decision-making under pressure play a crucial role in performance; therefore, mental imagery seems a reasonable psychological preparation tool in this sport. A small body of research in rugby does indeed support this, as a short mental-

rehearsals intervention has been shown to improve passing accuracy and stress resilience in professional male rugby players (Beaven et al., 2023), while a tailored imagery intervention has been shown to decrease maladaptive anger expression and boost resilience in adolescent male rugby players (Beaven et al., 2020; Di Corrado et al., 2026).

Even so, this rugby-specific evidence has so far involved male players and has focused on motor performance, stress, or emotional regulation rather than self-efficacy or decision-making. Imagery research involving female rugby players competing at the state level in India remains scarce, and studies examining self-efficacy and decision-making together within this population are rarer still. Structured, manualized formats for delivering psychological-skills training, including app-supported programs, have begun to be tested in other sport settings (Bordo et al., 2025), but comparable rugby-specific applications among Indian female athletes have not, to our knowledge, been reported.

The present study therefore examined changes in self-efficacy and decision-making following a mental imagery training program among state-level female rugby players aged 18-23 years from Jammu and Kashmir, India.

Purpose of the Study

The purpose of the study was to examine changes in self-efficacy and decision-making following mental imagery training among state-level female rugby players in Jammu and Kashmir.

Objectives

1. To examine changes in self-efficacy from pretest to posttest following mental imagery training.
2. To examine changes in decision-making from pretest to posttest following mental imagery training.

Hypotheses

H1: There will be a statistically significant difference in self-efficacy scores between pretest and posttest following mental imagery training.

H2: There will be a statistically significant difference in decision-making scores between pretest and posttest following mental imagery training.

METHODS

Research Design

A one-group pretest-posttest intervention design was used, with participants assessed before and after the mental imagery training program.

Participants

The study sample comprised 20 female state-level rugby players, aged 18-23 years, from Jammu and Kashmir, India.

Sampling and Recruitment

A purposive sampling approach was used. Participants were deliberately selected from the population of female rugby players in Jammu and Kashmir on the basis that they met the study's inclusion criteria, namely competing at the state level and falling within the specified age range.

Inclusion Criteria

Participants were required to be:

- female rugby players;

- aged 18-23 years; and
- competing at the state level in Jammu and Kashmir.

Mental Imagery Training

Participants completed a four-week mental imagery training program comprising three sessions per week of approximately 20 minutes each, for a total of 12 sessions. The program was provided as an additional part of the normal rugby training program, and involved guided, multisensory imagery in first-person perspective. Imagery practice was directed towards rugby-specific performance situations and mental rehearsal of appropriate performance responses.

Instruments

Athlete Self-Efficacy Scale

The Athlete Self-Efficacy Scale (ASES; Koçak, 2020) was used for the measurement of self-efficacy. There are four dimensions of the scale: Sport Discipline Efficacy, Psychological Efficacy, Professional Thought Efficacy, and Personality Efficacy, with 16 items. Each item is rated on a five-point Likert scale (1-5), yielding a total score range of 16-80, with higher scores indicating greater athlete self-efficacy. The original validation study reported good internal consistency for the total scale (Cronbach's $\alpha = .898$).

Decision-Making Questionnaire

Decision-making was assessed using the Decision-Making Questionnaire (DMQ), a 21-item measure of decision-making behavior. Participants responded on a six-point scale ranging from very infrequently or never to very frequently or always, with higher scores reflecting greater frequency of the respective decision-making behaviors.

Procedure

Participants completed the pretest assessment before the start of the mental imagery training program. The same questionnaires were administered as the posttest immediately after the intervention concluded. Assessments were conducted under standardized conditions, with participants given instructions on completing the questionnaires before responding to the items.

Ethical Considerations

The study was conducted in accordance with the ethical principles for research involving human participants set out in the Declaration of Helsinki. The purpose and procedures of the study were explained fully to all participants before data collection, and written informed consent was obtained from each participant. Participants were informed that their involvement was entirely voluntary, that their responses would be kept confidential and used only for research purposes, and that they were free to withdraw from the study at any time without penalty.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS). Means and standard deviations were computed for all variables and normality (of difference scores) was examined using the Shapiro-Wilk test. As the difference scores met the normality assumption, paired-samples t-tests were used to compare pretest and posttest scores for self-efficacy and decision-making. Mean differences, 95% confidence intervals, p values, and Cohen's dz effect sizes were calculated for each outcome. Percentage change was computed as (Posttest - Pretest) / Pretest × 100. Statistical significance was set at $p < .05$.

RESULTS

Descriptive Statistics

Table 1

Descriptive Statistics of Self-Efficacy and Decision-Making at Pretest and Posttest

Variable	N	Pretest M (SD)	Posttest M (SD)
Self-Efficacy	20	30.20 (3.89)	34.70 (4.12)
Decision-Making	20	23.95 (2.87)	28.35 (3.17)

Both self-efficacy and decision-making scores were higher at posttest than at pretest.

Paired-Samples t-Test

Table 2

Paired-Samples t-Test Results

Variable	Mean Diff.	95% CI	t	df	p	Cohen's dz	% Change
Self-Efficacy	4.50	3.57–5.43	10.13	19	< .001	2.27	14.9%
Decision-Making	4.40	3.50–5.30	10.19	19	< .001	2.28	18.4%

Note. Mean difference = posttest - pretest.

Self-Efficacy

Self-efficacy increased from 30.20 (SD = 3.89) at pretest to 34.70 (SD = 4.12) at posttest, a mean increase of 4.50 points (95% CI [3.57, 5.43]). The paired-samples t-test confirmed a statistically significant difference, $t(19) = 10.13$, $p < .001$, with Cohen's dz = 2.27, indicating a large effect. This corresponded to a 14.9% increase relative to the pretest value.

Decision-Making

Decision-making increased from 23.95 (SD = 2.87) at pretest to 28.35 (SD = 3.17) at posttest, a mean increase of 4.40 points (95% CI [3.50, 5.30]). The paired-samples t-test confirmed a statistically significant difference, $t(19) = 10.19$, $p < .001$, with Cohen's dz = 2.28, indicating a large effect. This corresponded to an 18.4% increase relative to the pretest value.

DISCUSSION

This study examined changes in self-efficacy and decision-making following a mental imagery training program among state-level female rugby players from Jammu and Kashmir. Both outcomes increased significantly from pretest to posttest, with effect sizes that were large by conventional standards.

The improvement in self-efficacy is consistent with reports that imagery-based training raises confidence-related outcomes across a range of sports and playing levels. Comparable pretest-to-posttest gains in imagery-linked self-efficacy or confidence have been documented among alpine skiers (Volgemute et al., 2024), footballers (Blanco-Ariza et al., 2024), and golfers of both sexes (Hamidi et al., 2025), and a similar mechanism, in which imagery operates through enhanced self-efficacy, has been proposed to explain reduced competitive stress among martial arts athletes (Di Corrado et al., 2025). Self-efficacy gains of a comparable order have also followed other structured psychological-skills interventions, such as self-talk training in junior sub-elite athletes (Walter et al., 2019), suggesting that deliberate mental-skills practice more generally, and not imagery alone, can shift how athletes appraise their own capability.

A plausible explanation for the increase observed here is that repeated mental rehearsal strengthened participants' sense of preparedness by allowing them to mentally represent rugby-specific performance situations many times over, in a way that may have complemented their ongoing physical training. This interpretation is consistent with the broader imagery literature but cannot be confirmed directly from the present data.

The large effect size in the case of self-efficacy (Cohen's dz = 2.27) indicates a large pretest-to-posttest difference, which, however, has to be interpreted taking into account the design of the study. Because there was no control group, other factors occurring over the same four-week period ongoing rugby training, growing familiarity with the questionnaires, motivation, or simple maturation cannot be ruled out as contributors to the change, and the effect cannot be attributed to mental imagery alone.

Decision-making also increased significantly, from 23.95 to 28.35, an 18.4% change. This outcome is notable given that decision-making in rugby requires athletes to respond to rapidly evolving situations and to make appropriate choices under time and competitive pressure. The finding is broadly consistent with evidence that perceptual-cognitive training can improve decision-making and anticipation in team-sport athletes, although that same evidence indicates that gains made under training or testing conditions do not always transfer fully to competitive performance (Zhu et al., 2024). This is a useful caution for the present study: an improvement on a questionnaire measure of decision-making does not by itself confirm that on-field decision-making has improved to the same extent.

One way imagery could support decision-making is by allowing athletes to mentally rehearse sport-specific scenarios and possible responses to them, effectively practicing choice under simulated conditions. Because the present programme involved a relatively short and clearly defined dose three 20-minute sessions per week over four weeks it is worth noting that the amount and consistency of imagery practice have themselves been linked to the size of psychological benefits in a recent Bayesian meta-analysis (Zhang et al., 2025), and the gains observed here sit within a schedule broadly comparable to interventions found effective in prior meta-analytic work on imagery and performance (Liu et al., 2025).

These findings add to a still-limited literature on imagery training in women's rugby. The rugby-specific imagery evidence available to date has largely involved male players and outcomes other than self-efficacy or decision-making, including passing accuracy and stress resilience among professional players (Beaven et al., 2023) and anger regulation and resilience among adolescent players (Di Corrado et al., 2026). Broader imagery research has more often involved sports such as football, tennis, badminton, futsal, archery, and karate (Fekih et al., 2021; Hidayat et al., 2023; Isar et al., 2022; Widyastuti et al., 2024), or has examined confidence outcomes without a specific focus on female team-sport athletes (Hamidi et al., 2025; Yang, 2026). The current findings add to this research by being specific to self-efficacy and decision-making in the context of female rugby players in J&K.

The results should, however, be treated with care. Even though it is not working very hard to strip all the credit from mental imagery, the design cannot conclude that this was the only, or even the dominant, cause of the improvements reported. The study also had a limited sample size and was conducted in a homogeneous area. Findings from studies with randomized controlled designs and larger samples are warranted before stronger conclusions could be made regarding the benefits of using mental imagery for female rugby players.

Practical Implications

Given these findings, mental imagery could be a good psychological skill to consider as an adjunct to the overall training program for rugby players. Imagery could be integrated into physical, technical, and

tactical training sessions and be used by coaches and sport psychology practitioners in this regard to enable athletes to prepare for situations where they need to be confident and make quick decisions. There is perhaps one practical pathway to delivering imagery training consistently as structured, app-supported sessions (Bordo et al., 2025) which would have to be tested in rugby environments. In all cases, imagery should complement rather than replace physical and tactical practice.

Limitations

The study has several limitations. First, the one-group pretest-posttest design did not include a control group, which limits causal interpretation of the findings. Second, the sample consisted of only 20 female state-level rugby players from Jammu and Kashmir, which limits the generalisability of the results. Third, the study relied on questionnaire-based measures of self-efficacy and decision-making, and self-report data can be influenced by participants' perceptions and response tendencies. Finally, the ASES was originally developed with athletes from Turkey; its authors recommended further validity and reliability testing across different sports, age groups, languages, and cultures, and the present findings should be considered in that context.

Future Research

Future studies should use randomized controlled or quasi-experimental designs with appropriate comparison groups, and should recruit larger samples from a range of regions and competitive levels. It would also be valuable to examine whether improvements in questionnaire-based decision-making correspond to improvements in actual on-field decision-making and performance. Rugby-specific imagery programs that incorporate technical, tactical, and pressure-related scenarios could be developed and tested, and longitudinal designs could establish whether gains in self-efficacy and decision-making are maintained over time.

CONCLUSION

This study found significant improvements in self-efficacy and decision-making following a mental imagery training program among 20 state-level female rugby players from Jammu and Kashmir. Self-efficacy increased from 30.20 to 34.70, and decision-making increased from 23.95 to 28.35, with both changes statistically significant and associated with large effect sizes. These results suggest that mental imagery may be a useful psychological training strategy for female rugby players. However, because no control group was included, the findings should be interpreted as pretest-to-posttest change rather than definitive evidence of a causal intervention effect.

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