



Preliminary Effects of Reflective Card-Based Mental Training on Mental Toughness among Student-Athletes

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ABSTRACT

Mental toughness is a crucial psychological resource for student-athletes. However, structured and engaging mental training interventions in university sports remain limited. This study aimed to examine the preliminary effects of reflective card-based mental training intervention, Points of You (Athlete Edition), on mental toughness among student-athletes. A pre-experimental one-group pretest-posttest design was employed involving 15 university sepak takraw student-athletes. The intervention was conducted over eight guided reflective sessions using structured visual cards grounded in positive sport psychology principles. Mental toughness was measured using the Sport-Specific Psychological Strengths Questionnaire (SSPSQ). Data were analysed using descriptive statistics and paired-sample t-tests. Mental toughness scores increased significantly from pre-test ($M = 68.40$, $SD = 6.85$) to post-test ($M = 75.60$, $SD = 6.21$), $t(14) = 4.27$, $p < .05$. The largest improvements were observed in emotional regulation (+2.7), achievement motivation (+2.7), and self-confidence (+2.3). The calculated effect size (Cohen's $d = 0.82$) indicated large practical effect. Most participants reported high engagement and perceived usefulness of the reflective media (88.9%). The findings provide preliminary empirical evidence that reflective card-based mental training can enhance psychological readiness among university athletes. This intervention offers a practical and innovative approach for integrating mental training into sport education programs.

ARTICLE INFO

Article History:

Submitted/Received January 2026

First Revised March 2026

Accepted September 2026

Publication Date September 2026

Keyword:

mental toughness, mental training, point of you, reflective cards, sepak takraw

INTRODUCTION

Mental toughness is widely recognized as a multidimensional psychological construct that enables athletes to maintain performance consistency, regulate emotions, sustain motivation, and remain resilient under competitive pressure. It encompasses emotional regulation, achievement motivation, self-confidence, commitment, and responsibility psychological attributes that are strongly associated with performance stability and adaptive coping in sport settings. For university student-athletes, mental toughness plays an even more critical role due to the dual demands of academic responsibilities and competitive sport participation (Pujianto et al., 2022). Consequently, mental toughness has become a central focus in applied sport psychology research and practice.

In university sport contexts, student-athletes frequently encounter overlapping stressors, including academic deadlines, intensive training schedules, and competitive expectations (Martin et al., 2023). Empirical studies report that university athletes often experience performance anxiety, emotional instability, and fluctuations in confidence during important competitions. Without structured psychological preparation, these pressures may negatively affect both academic and athletic performance (Broa & Abellanos, 2023). Therefore, systematic mental training interventions are essential within higher education sport programs.

Traditional psychological interventions in sport have primarily focused on techniques such as imagery training, goal setting, self-talk regulation, and relaxation strategies (Huang & Zane, 2019). These approaches have demonstrated effectiveness in enhancing performance and psychological skills. However, most interventions rely heavily on instructor centred delivery and repetitive cognitive exercises. While effective, such methods may not always optimally engage young adult athletes who benefit from experiential and participatory learning formats (Callary et al., 2024).

Recent developments in sport psychology emphasize reflective learning as a powerful mechanism for psychological development. Rooted in experiential learning theory, reflective practice encourages individuals to reinterpret experiences, develop metacognitive awareness, and construct personal meaning from performance situations. Through guided reflection, athletes can better understand emotional responses, identify personal strengths and weaknesses, and enhance self-regulation skills core components of mental toughness (Jannah et al., 2025).

Visual and reflective tools, such as card-based interventions, have gained attention in coaching and counselling contexts as structured media for facilitating reflection (Roy et al., 2021). These tools integrate images, keywords, and open ended prompts to stimulate internal dialogue and deeper cognitive processing. Research outside competitive sport settings indicates that reflective card methods enhance emotional awareness, engagement, and intrinsic motivation (Hughes et al., 2009). However, empirical evidence examining their structured implementation within university sport training programs remains limited.

Recent developments in applied sport psychology emphasize the importance of experiential and reflective learning approaches in mental skills development (Rose & Burton, 2024). Rather than relying solely on directive instruction, reflective approaches encourage athletes to actively explore their thoughts, emotions, and experiences (Marheni et al., 2019).

Importantly, most reflective tools currently available are designed for general coaching or counselling contexts rather than tailored to the specific psychological demands of athletic performance (Rahayuni et al., 2021). Meanwhile, competitive sport environments require targeted psychological preparation aligned with performance pressure, teamwork dynamics,

and goal-oriented achievement (Safitri et al., 2023). Thus, a clear research gap exists regarding the empirical evaluation of sport-specific reflective training media integrated into routine university athletic programs.

To address this gap, this study investigated the preliminary effects of a reflective card-based mental training intervention, Points of You (Athlete Edition), specifically adapted for athletic performance contexts. Unlike traditional lecture-based mental training, this intervention integrated structured visual stimuli and guided reflective discussion into regular training sessions. Accordingly, this study aimed to examine whether the reflective card-based intervention could significantly improve overall mental toughness among university student-athletes, analyse changes across specific mental toughness dimensions, evaluate participant perceptions regarding the feasibility and engagement of the intervention, and provide empirical evidence supporting the integration of reflective tools into sport education practice (Ramirez & Delariarte, 2023).

Although reflective and experiential approaches have been conceptually supported in sport psychology literature, empirical evidence regarding their effectiveness in structured mental training interventions remains limited, particularly in university sport settings (Astutik & Dewi, 2022). Most existing studies focus on established mental skills training techniques, such as imagery, goal setting, and self-talk, while fewer studies examine innovative media-based interventions (Koh et al., 2017). As such, there is a need for empirical research that explores the potential benefits of reflective card-based mental training tools for student-athletes. By clarifying the theoretical foundation, identifying the research gap, and explicitly stating research objectives, this study sought to contribute both theoretically and practically to applied sport psychology and university sport education.

METHODS

This study employed a quantitative pre-experimental one-group pretest–posttest design to examine the preliminary effects of a reflective card-based mental training intervention on the student-athlete mental toughness. This design was selected to explore short-term intervention effectiveness and feasibility prior to conducting randomized controlled trials (Sari, 2021). Although causal inference is limited without a control group, the design is appropriate for pilot-level evaluation of innovative training media.

Participants

The participants were 15 male university student-athletes from the sepak takraw student activity unit at Universitas PGRI Adi Buana Surabaya. The mean age of participants was 20.3 years ($SD = 1.2$), with an average competitive experience of 2–4 years at the inter-university level. All participants were actively enrolled undergraduate students, participated in regular training sessions (minimum 3 times per week), had competition experience at regional or inter-university level, and volunteered to participate and signed informed consent.

Sampling Procedures

Purposive sampling was used to select participants who met inclusion criteria relevant to the study objectives. Coordination with the team coach ensured that participation did not interfere with routine physical and technical training. Data collection was conducted during scheduled training periods at the university sport facility.

Materials and Apparatus

The primary intervention material used in this study was the Points of You (Athlete Edition) reflective card set. The cards consist of visual images, keywords, and reflective questions designed to facilitate self-awareness, emotional regulation, and psychological reflection grounded in positive sport psychology principles.

Mental toughness was measured using the Sport-Specific Psychological Strengths Questionnaire (SSPSQ). The instrument consists of 25 items rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The SSPSQ measures five dimensions, namely emotional regulation, achievement motivation, self-confidence, commitment, and responsibility (Beaumont, 2021). Previous validation research reported acceptable internal consistency coefficients ranging from $\alpha = .78$ to $.87$ and satisfactory construct validity. In the present study, reliability analysis produced a Cronbach's alpha coefficient of $\alpha = .84$, indicating good internal consistency.

Procedures

The reflective card-based intervention (Points of You – Athlete Edition) was conducted over four weeks, consisting of eight sessions (two sessions per week). Each session lasted approximately 45 minutes and was integrated into regular training schedules. Each session followed a structured format, including card selection phase (visual stimulus exposure), individual reflection on keywords and guiding questions, small group discussion and guided sharing, and facilitated consolidation linking reflection to training experiences. The intervention focused on enhancing emotional awareness, motivation regulation, self-confidence, and psychological resilience grounded in positive sport psychology principles.

Data were collected in three stages, namely pre-test (administration of SSPSQ before intervention), intervention phase (eight reflective training sessions), and post-test (re-administration of SSPSQ after completion). Additionally, participant feedback regarding engagement and usability was collected descriptively through structured response items.

Data Analysis

Data were analysed using descriptive statistics to summarize mental toughness scores before and after the intervention by using SPSS. Descriptive statistics (mean and standard deviation) were calculated for pre-test and post-test scores. Normality of data distribution was assessed using the Shapiro–Wilk test. Paired-sample t-tests were conducted to examine differences between pre-test and post-test scores. Statistical significance was set at $p < .05$. Effect size (Cohen's d) was calculated to determine practical significance (Rachman et al., 2024).

RESULTS

This section presents the results of the reflective card-based mental training intervention conducted with sepak takraw student-athletes. The results include descriptive statistics, inferential analysis of mental toughness scores, and participant responses to the intervention. All data were analysed according to the procedures outlined in the Methods section.

Prior to hypothesis testing, normality of the data distribution was assessed using the Shapiro–Wilk test. Results indicated that both pre-test ($p = .231$) and post-test scores ($p = .187$) were normally distributed ($p > .05$), supporting the use of parametric analysis. Descriptive statistics indicated an increase in mental toughness following the intervention. The mean of pre-test score was 68.40 ($SD = 6.85$), while the mean of post-test score increased to 75.60 ($SD = 6.21$). This reflects a mean difference of 7.20 points, representing a 10.5% increase in overall mental toughness.

A paired-sample t-test revealed a statistically significant difference between pre-test and post-test scores $t(14) = 4.27$, $p = .001$. This finding indicates that the improvement was statistically significant and unlikely to occur by chance. To determine practical significance, effect size was calculated using Cohen's d , which yielded a value of $d = 0.82$. According to conventional interpretation, this represents a large effect size, suggesting that the intervention produced a meaningful psychological improvement.

Descriptive statistics of mental toughness scores before and after the intervention are presented in Table 1. The results show that the mean of post-test score was higher than the mean of pre-test score, indicating an overall increase in the student-athlete mental toughness following participation in the reflective card-based mental training sessions. Specifically, the mean of pre-test score was 68.40 with a standard deviation of 6.85, while the mean of post-test score increased to 75.60 with a standard deviation of 6.21. The reduction in standard deviation from pre-test to post-test suggests a more consistent level of mental toughness among participants after the intervention.

Table 1. Descriptive Statistics of Mental Toughness

Measurement	Mean	Standard Deviation
Pre-test	68.40	6.85
Post-test	75.60	6.21

To determine whether the observed difference between pre-test and post-test scores was statistically significant, a paired sample t-test was conducted. The analysis revealed a significant difference between pre-test and post-test mental toughness scores ($t = 4.27$, $p < 0.05$). This result indicates that the increase in mental toughness scores following the intervention was unlikely to have occurred by chance. The statistical findings provide initial empirical support for the effectiveness of the reflective card-based mental training intervention in enhancing the student-athlete psychological readiness.

In addition to overall mental toughness scores, descriptive analysis of the SSPSQ subcomponents revealed improvements across multiple psychological dimensions. Although detailed inferential analysis at the subscale level was not the primary focus of this pilot study, mean score increases were observed in emotional regulation, achievement motivation, and self-confidence. These dimensions represent key elements of mental toughness in sport and are particularly relevant for sepak takraw athletes, who must perform under time pressure, coordinate team dynamics, and respond quickly to competitive situations.

The visual comparison of pre-test and post-test mental toughness scores is illustrated in Figure 1. The bar chart demonstrates a clear increase in the mean score following the intervention, providing a visual representation that supports the numerical data presented in Table 1. The graphical depiction highlights the positive trend in mental toughness development among participants after engaging in reflective mental training activities.

Beyond quantitative outcomes, participant responses to the intervention were analysed descriptively to assess perceived usability and relevance of the training media. The results indicated that the majority of participants responded positively to the reflective card-based approach. Specifically, 86.7% of participants reported that the cards were easy to use during training sessions, suggesting that the intervention did not impose excessive cognitive or procedural demands. Furthermore, 90.0% of participants rated the visual design and presentation of the cards as attractive, indicating that the visual elements contributed to engagement and interest during the reflective activities.

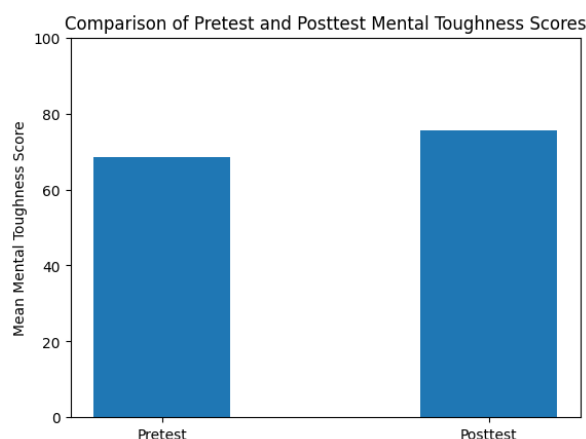


Figure 1. Comparison between Pre-Test and Pos-Test

In terms of perceived benefits, 88.9% of participants stated that the intervention was useful in helping them reflect on their mental state during training and competition. Participants reported that the reflective questions encouraged them to think more deeply about their emotional responses, motivation, and confidence as sepak takraw athletes. Although these responses were collected descriptively and not subjected to inferential testing, they provided valuable contextual information regarding participant engagement and acceptance of the intervention.

Table 2. Mean Scores of Mental Toughness Subscales Before and After the Intervention

Dimension	Pre-Test Mean	Post-Test Mean	Mean Difference
Emotional Regulation	13.5	16.2	+2.7
Achievement	14.1	16.8	+2.7
Motivation			
Self-Confidence	13.8	16.1	+2.3
Commitment	13.2	14.7	+1.5
Responsibility	13.8	15.8	+2.0

Descriptive analysis of the mental toughness subscales, as presented in Table 2, indicates consistent improvements across all measured psychological dimensions following the reflective card-based mental training intervention. The largest improvements were observed in emotional regulation, achievement motivation, and self-confidence. Improvements were also evident in commitment and responsibility, although the magnitude of change in these dimensions was relatively smaller. These findings suggest that reflective mental training may have a broader impact on multiple aspects of mental toughness, while certain psychological components may require longer or more intensive interventions to achieve greater improvement (Eime et al., 2025).

Descriptive analysis of participant feedback indicated strong engagement, with 90% of participants rated the visual design as attractive, 86.7% reported ease of use, and 88.9% perceived the intervention as useful for reflecting on mental states. Participants reported that reflective questions helped them to recognize emotional triggers during competition, reframe

negative thoughts, and clarify personal performance goals. These findings suggest that the intervention was not only statistically effective but also practically acceptable and engaging. As a pilot study, these findings provide an empirical basis for further investigation using more rigorous experimental designs and larger samples.

DISCUSSION

The present study examined the preliminary effects of a reflective card-based mental training intervention on the mental toughness of university sepak takraw student-athletes. The findings demonstrated a statistically significant improvement in overall mental toughness, accompanied by a large practical effect size (Cohen's $d = 0.82$). These results suggest that structured reflective engagement may meaningfully enhance psychological readiness in university sport settings (Putra et al., 2024).

Mental toughness is widely recognized as a multidimensional construct that includes emotional regulation, motivation, confidence, and persistence (Tangkudung, 2019). For student-athletes, particularly those at the university level, the ability to manage psychological demands is essential due to the dual pressures of academic and athletic responsibilities. The improvement observed in this study suggests that reflective mental training can support student-athletes in navigating these demands more effectively (Wu et al., 2023). By providing structured opportunities for self-reflection, the intervention may have enhanced the athlete awareness of their psychological states and coping strategies.

The observed increase in mental toughness aligns with previous research demonstrating that the structured mental skill training could enhance the athlete psychological functioning (Gandrapu & Rakesh, 2024). Traditional interventions such as imagery, goal setting, and self-talk have consistently shown positive outcomes in performance-related variables. However, the present findings extend this literature by demonstrating that reflective and visually mediated tools can also produce measurable psychological gains (Nascimento & Dos Santos, 2025). Unlike directive cognitive approaches, the reflective card method encourages athletes to actively construct meaning from their experiences, potentially strengthening internal self-regulatory processes.

One of the most notable findings was the substantial improvement in emotional regulation. Emotional regulation is central to mental toughness, particularly in high-pressure sports such as sepak takraw, where rapid decision-making and team coordination are essential (Basso et al., 2019). Reflective engagement may facilitate emotional labelling and cognitive reframing, thereby enhancing the athlete capacity to manage stress responses during competitions (Callary et al., 2024). This supports theoretical perspectives suggesting that metacognitive awareness plays a critical role in psychological resilience.

Similarly, Elzas (2022) declares that improvements in achievement motivation and self-confidence suggest that reflective questioning may reinforce intrinsic goal orientation and self-belief. According to self-determination theory, internalized motivation is strengthened when individuals gain clarity regarding personal values and competencies (Ryan & Deci, 2000). The structured reflection process appears to provide opportunities for athletes to articulate strengths, redefine challenges, and develop a more adaptive performance mindset (Candra et al., 2023).

The improvement across multiple sub-dimensions also highlights the multidimensional nature of mental toughness. Rather than influencing a single psychological factor, the intervention appears to support a broader constellation of psychological skills (Kasyfillah & Utami, 2023). However, the relatively smaller increase in commitment suggests that more

stable behavioural traits may require longer intervention duration or repeated reinforcement over time.

From a theoretical perspective, the findings contribute to sport psychology by integrating reflective learning theory into mental toughness development frameworks (Prasetyo et al., 2022). While most mental toughness interventions focus on skill acquisition, the present study emphasizes experiential meaning-making as a complementary pathway. This suggests that mental toughness may not only be trained through repetition of techniques but also through structured reflective processing of lived athletic experiences (Naliza et al., 2024).

From a practical standpoint, the intervention offers several implications for coaches and sport educators. First, the reflective card format provides a structured yet flexible tool that can be integrated into regular training sessions without disrupting physical preparation. Second, the visual and interactive nature of the cards appears to enhance athlete engagement, which is often a challenge in psychological training programs. Third, the relatively short session duration (45 minutes) suggests feasibility within university sport schedules.

Importantly, participant feedback indicated high levels of perceived usefulness and engagement. Athlete acceptance is a critical determinant of intervention effectiveness. Mental training programs that are perceived as overly theoretical or monotonous often face resistance (Putra et al., 2025). The positive reception observed in this study suggests that reflective visual media may represent an accessible entry point for psychological development among young adult athletes (Eime et al., 2013).

Despite these promising findings, several limitations warrant consideration. The absence of a control group limits causal inference, as improvements may have been influenced by external factors such as ongoing physical training or competitive exposure. The small sample size restricts statistical power and generalizability. Additionally, the relatively short intervention period may not fully capture long-term psychological adaptation (Huang & Zane, 2019). Future research should employ randomized controlled designs, larger multi-sport samples, and longitudinal follow-up assessments to strengthen empirical evidence. Overall, the present study provides preliminary support for the integration of reflective card-based mental training within university sport education programs. By combining structured reflection with visual stimuli, the intervention may represent an innovative complement to conventional psychological skill training approaches.

CONCLUSION

This study investigated the preliminary effects of a reflective card-based mental training intervention (Points of You – Athlete Edition) on the mental toughness of university sepak takraw student-athletes. The findings demonstrated a statistically significant improvement in overall mental toughness, accompanied by a large practical effect size. Notable enhancements were observed in emotional regulation, achievement motivation, and self-confidence, indicating that structured reflective engagement can positively influence multiple psychological dimensions relevant to athletic performance.

The primary contribution of this study lies in introducing and empirically evaluating a sport-specific reflective training tool integrated within a university athletic program. Unlike traditional instructor-centred mental skill training, the intervention emphasizes experiential learning and structured meaning-making through visual stimuli and guided reflection. This approach expands current mental toughness development models by incorporating reflective learning principles into applied sport psychology practice.

From a sport education perspective, the intervention provides a practical and feasible framework for integrating psychological training into routine university sport programs. The structured yet flexible format allows coaches and sport educators to incorporate reflective mental development sessions without disrupting physical and technical training schedules. The high levels of participant engagement further support its applicability in higher education settings.

However, several limitations must be acknowledged. The pre-experimental one-group design without a control group limits causal interpretation of the findings. The relatively small sample size and focus on a single sport restrict generalizability. Additionally, the short intervention duration does not allow conclusions regarding long-term psychological adaptation. Future research should employ randomized controlled trials, larger and more diverse athletic samples, and longitudinal designs to evaluate sustained effects and strengthen causal inference. In conclusion, reflective card-based mental training represents a promising and innovative approach to enhancing mental toughness in university athletes. With further empirical validation, this method has the potential to complement conventional psychological skill training and contribute meaningfully to holistic athlete development in sport education contexts.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to Universitas PGRI Adi Buana Surabaya for supporting this research. Special appreciation is extended to the coaches and sepak takraw student-athletes who willingly participated in this study and contributed valuable time and commitment throughout the research process. The authors also acknowledge all parties who provided assistance and support during data collection and implementation of the mental training intervention.

AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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