

ORIGINAL RESEARCH ARTICLE

A Moderated Mediation Model Examining the Influence of Mindfulness on Self-Confidence and Mental Toughness of Thai National Athletes

Chatkamon Singnoy¹; Junggil Park²; Tanida Julvanichpong¹

¹Faculty of Sport Science, Burapha University, Thailand; ²Research Analytics Lab, Korea

Abstract

Numerous studies have shown that athletes' dispositional mindfulness is positively associated with sports performance, psychological skills, and mental toughness. This study tested whether self-confidence mediates the association between mindfulness and mental toughness among Thai national athletes and investigated whether sport type moderates this mediation model. Participants included 408 Thai national athletes ($M_{age} = 22.52$, $SD = 5.92$) representing individual ($n = 219$) and team sports ($n = 189$). Data were collected using the Mindfulness in Sport Questionnaire (Thai version), the Revised Competitive State Anxiety Inventory-2 (CSAI-2R) for self-confidence, and the Thai Mental Toughness Questionnaire. Internal consistency for all scales ranged from 0.76 to 0.97. The results demonstrated that mindfulness significantly predicted both self-confidence and mental toughness, with self-confidence acting as a partial mediator. The moderated mediation analysis (Model 59) was significant (Index of Moderated Mediation = 0.105, 95% CI [0.021, 0.208]). Specifically, the mindfulness-confidence linkage (Path a) was stronger in team sports, whereas the confidence-mental toughness relationship (Path b) was more pronounced in individual sports. This study contributes to the literature by clarifying the mindfulness-self-confidence-mental toughness pathway. Within the Thai context, mindfulness is positioned as a 'naturalised grounding' derived from Buddhist heritage, offering a unique baseline for elite athletes. Finally, the findings suggest that coaches should implement sport-specific mental training—focusing on filtering social noise for team sports and bolstering internal belief for individual sports.

Introduction

In the realm of high-performance sport, psychological factors are recognised as critical determinants distinguishing victory from defeat. In particular, self-confidence and mental toughness are fundamental psychological constructs that enable athletes to realise their maximum potential (Hays et al., 2009; Holland et al., 2010). Across various high-pressure sporting disciplines, psychological resilience and self-belief are critical for performance. Previous research in high-stakes environments—such as football penalty shoot-outs—has demonstrated that confidence plays a pivotal role in execution and maintaining composure during critical moments (Wood & Wilson, 2010; Wood et al., 2015). However, this

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ORCID ID

Chatkamon Singnoy
0009-0003-4958-3318
Junggil Park
0009-0008-1993-0268
Tanida Julvanichpong
0000-0002-8324-4056

during critical moments (Wood & Wilson, 2010; Wood et al., 2015). However, this psychological necessity extends beyond team sports to a wide range of individual and collective disciplines, where competitive state anxiety frequently challenges an athlete's perceived performance levels (Chun et al., 2022).

Over the past decade, mindfulness training has gained widespread attention as a "third-wave" cognitive-behavioural intervention to enhance athletic performance. Rather than focusing on controlling thoughts, mindfulness emphasises non-judgmental awareness of the present moment. Current literature suggests that mindfulness interventions effectively reduce rumination and improve emotion regulation (Mao et al., 2023; Meland et al., 2015), which directly bolsters mental toughness and emotional intelligence in team sports like basketball and soccer (Ajilchi et al., 2019; Oguntuase & Sun, 2022). Furthermore, mindfulness serves as a foundational mechanism for achieving the "flow state," allowing athletes to maintain peak focus during competition (Aherne et al., 2011; Kaufman et al., 2009).

Global mindfulness protocols, such as Mindfulness-Acceptance-Commitment (MAC) and Mindful Sport Performance Enhancement (MSPE), have demonstrated efficacy in increasing sport-specific mindfulness and fostering acceptance of competitive emotions (Josefsson et al., 2019; Glass et al., 2019). Studies across diverse disciplines, including track and field and karate, confirm that these programmes significantly reduce anxiety while enhancing psychological grit (Hut et al., 2021; Harita et al., 2022; Mohebi et al., 2022). However, the effectiveness of these interventions may vary across cultural landscapes. While Western and Chinese contexts often require the "adaptation" of programmes to fit local lifestyles (Su et al., 2019; Myall et al., 2023), other regions may offer different entry points for these practices. In Thailand, while the importance of mental toughness and stress management has long been recognised (Julvanichpong et al., 2010), the study of mindfulness offers a unique perspective. Unlike in North America or Europe, where mindfulness may be perceived as a novel psychological technique, Thai culture possesses a naturalised cultural grounding in mindfulness rooted in Buddhist philosophy and *Dharma* principles (Singnoy et al., 2022). While localised studies have demonstrated the benefits of mindfulness and breathing techniques (Anapanasati) on the accuracy of junior golfers (Khaunphet, 2023), petanque players (Siriwatthanasin et al., 2010), and air rifle shooters, as well as its role in traditional rituals like Wai Khru in Muay Thai (Paphauthananan & Chobpradit, 2022) and specialised awareness training for fencers (Mokkrit et al., 2024), there remains a lack of empirical evidence concerning the complex mediated relationship between mindfulness, self-confidence, and mental toughness among elite Thai national athletes. While preliminary research has validated Thai versions of mindfulness instruments (Singnoy et al., 2020), empirical evidence regarding the impact of mindfulness on self-confidence and mental toughness among Thai footballers remains scarce.

A clearer understanding of the relationship between mindfulness and confidence—specifically how mindfulness mitigates negative self-appraisal (Walker, 2019)—will enable coaches and sport psychologists to design interventions that align with Thai cultural foundations. Consequently, this study aims to examine the influence of mindfulness on mental toughness and self-confidence. It is hypothesised that mindfulness acts as a primary mechanism for psychological adaptation, facilitating performance through a culturally resonant framework (Vella-Fondacaro & Romano-Smith, 2023; Birrer et al., 2012). While previous research has established a general link between mindfulness and performance, this study transcends simple replication by identifying a sport-specific 'divergent mechanism' within a non-Western elite population. Beyond merely applying an established model, this research challenges the 'one-size-fits-all' assumption in mindfulness protocols. It demonstrates that the mediation pathway of self-confidence functions in opposing intensities depending on the social structure of the sport (individual vs. team)—a nuance that remains underdeveloped in Western-centric

literature. Furthermore, by integrating the 'naturalised grounding' framework, this study offers a new theoretical lens for understanding how indigenous cultural predispositions can act as a catalyst for psychological skill acquisition, providing a blueprint for culturally-responsive sport psychology globally.

Research Purpose

By investigating these dynamics among Thai national athletes, this study aims to contribute a unique perspective to the international body of sports psychology. We seek to provide practical guidance for Thai coaches and organisations to optimise mental training protocols that are both scientifically robust and culturally resonant.

The distinction between individual and team sports may fundamentally alter the psychological pathways of mindfulness and confidence. From a social psychology perspective, team sport athletes operate within a collective dynamic where self-confidence is often susceptible to 'social noise'—such as teammate evaluations and group momentum (Hill & Shaw, 2013). In this context, mindfulness may serve as a critical attentional filter, protecting an athlete's self-belief from external social pressures. Conversely, in individual sports, athletes face a unique state of psychological isolation. Without the social buffer of teammates, reliance on self-confidence becomes the primary driver of resilience and grit (Mental Toughness). Grounded in the Thai cultural context, where collective harmony (team) and solitary meditation (individual) represent different applications of Buddhist mindfulness, we hypothesise that the social structure of the sport will moderate these psychological mechanisms. A critical distinction in this study lies in the 'Naturalised Grounding' of mindfulness within Thai athletic populations. Unlike Western frameworks where mindfulness is often treated as a novel, acquired cognitive intervention, Thai athletes are predisposed to these concepts through a cultural and educational upbringing deeply rooted in Buddhist philosophy. Local evidence supports the efficacy of traditional Anapanasati (Mindful Breathing) across diverse disciplines, from improving accuracy in golf (Khaunphet et al., 2024; Manowong, 2025) and archery (Chantarasarasom, 2009) to enhancing emotional control (Khamtorn, 2019).

This cultural familiarity suggests that mindfulness in Thai athletes functions as a naturalised foundational trait rather than a secondary skill. In Figure 1, we argue that this grounding sharpens the Path a (Mindfulness to Self-Confidence) because the athlete is leveraging an existing cultural 'cognitive baseline.' This is evident in studies where mindfulness combined with concentration significantly improved skill execution in sports like petanque (Siriwatthanasin et al., 2010) and volleyball (Pengmode et al., 2022). Consequently, the conceptual bridge of our model is built on the premise that this culturally reinforced mindfulness provides the psychological stability necessary to foster robust self-belief and, ultimately, mental toughness.

Hypothesis 1 (Mediation): Self-confidence partially mediates the relationship between mindfulness and mental toughness.

Hypothesis 2 (Moderation of Mindfulness to Self-Confidence): Sport type moderates the relationship between mindfulness and self-confidence.

Hypothesis 3 (Moderation of Self-Confidence to Mental Toughness): Sport type moderates the relationship between self-confidence and mental toughness.

Hypothesis 4 (Moderation of Direct Path): The study also tested whether sport type moderates the direct relationship between mindfulness and mental toughness.

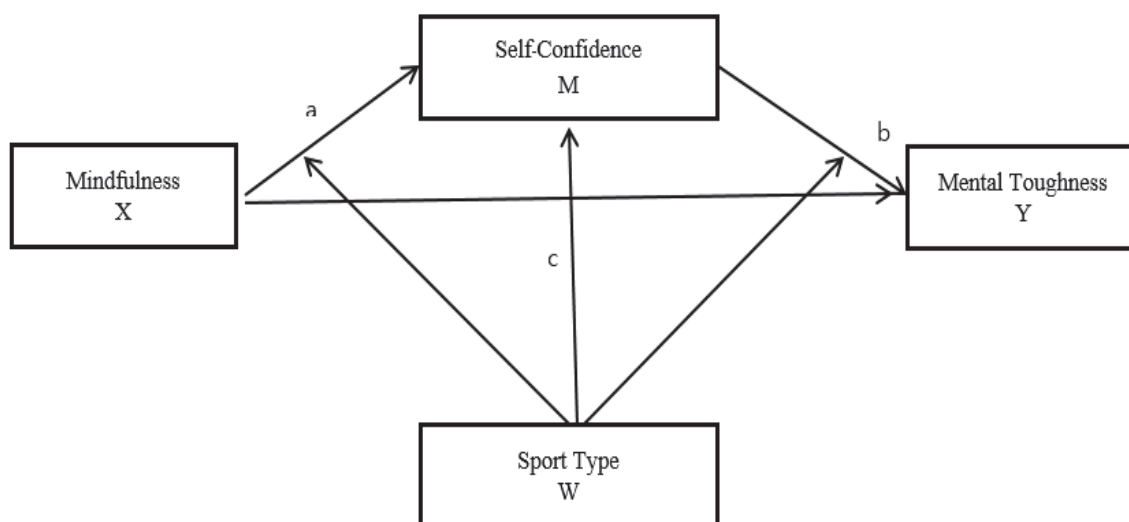


Figure 1. The proposed diagram of the moderated mediation model in the study

Methods and Materials

Participants

The target population for this study consisted of 1,228 elite athletes from 40 sporting disciplines currently in training for the 19th Asian Games. The sample size was determined using the formula of Krejcie and Morgan (1970) with a 3% margin of error, yielding a required sample of 571. To account for potential incomplete responses or data loss, the researchers increased the target sample by 10%, totalling 628 survey distributions. A stratified random sampling method was employed to ensure representation across different sports. The disciplines were first stratified into indoor (24 types) and outdoor (19 types) categories. A lottery method was then used to select 20 indoor sports and 15 outdoor sports. Out of the 628 questionnaires distributed, 408 athletes (217 males, 191 females; $M_{age} = 22.52$, $SD = 5.92$) provided complete and valid responses (response rate = 65%), which constituted the final sample for analysis.

Statistical Analysis and Moderation

Framework data were analysed using SPSS (Version 26.0). To address the reviewer's concerns regarding the categorical nature of the moderator (Sport Type), the following analytical framework was implemented below:

- Categorical variable specification: Sport type was treated as a binary/dichotomous variable (0 = Individual Sports, 1 = Team Sports). This approach ensures that the interaction terms in the moderated mediation model are mathematically appropriate for categorical data.
- Moderated Mediation (Model 59). This model was specifically used to test the moderated mediation hypotheses; Hayes' (2018) PROCESS macro (Model 59) was employed. This model simultaneously examined the following paths: (1) the effect of Mindfulness on Self-confidence (Path a), (2) the effect of Self-confidence on Mental Toughness (Path b), and (3) the direct effect of Mindfulness on Mental Toughness (Path c). Additionally, Sport Type was entered as a moderator to test if it influenced all three aforementioned paths.

- Conditional indirect effects: In accordance with best practices for categorical moderators, we do not report effects at ± 1 Standard Deviation. Instead, we report the Conditional Indirect Effects specifically for each category (Individual vs. Team). This allows for a clear comparison of how the mindfulness mechanism functions differently across these two athletic contexts.
- Inference via Bootstrapping: The significance of the moderated mediation was determined using the Index of Moderated Mediation. A bootstrapping procedure with 5,000 resamples was used to calculate 95% confidence intervals (CI). An effect is considered statistically significant if the 95% CI does not straddle zero.

Participant Recruitment and Procedures

Participants were selected through stratified random sampling of athletes representative of Thai national sports associations. The recruitment process followed these steps:

1. Institutional Contact: Official letters were sent to the directors and head coaches of various national sport organisations in Thailand to request permission for data collection.
2. Coach Coordination: Once permission was granted, researchers coordinated with team coaches to identify training sessions where athletes could be briefed on the study.
3. Briefing Sessions: During these sessions, the research team explained the study's objectives, the voluntary nature of participation, and the anonymity of the results.
4. Informed Consent: Athletes who expressed interest were provided with an Informed Consent Form. For athletes under 18, an additional parental consent form was required and collected before survey administration.

Inclusion and Exclusion Criteria

To ensure the sample accurately represented elite-level competitors, the following criteria were applied:

- Inclusion Criteria: (1) Currently active as a Thai national team athlete; (2) minimum of 2 years of international or national competitive experience; (3) aged between 18 and 35 years; and (4) regularly participating in national training sessions (at least 3 times per week).
- Exclusion Criteria: (1) Athletes sidelined by significant physical injuries for more than one month; (2) incomplete survey responses ($>10\%$ missing items); and (3) participation in formal mindfulness interventions within the last 6 months.

Survey Administration

The survey was administered using a paper-and-pencil format to ensure a high response rate and allow participants to ask clarifying questions in real time. Data collection took place in controlled environments, typically in team meeting rooms or quiet areas of training facilities, immediately before or after a scheduled training session. To minimise social desirability bias, coaches and administrative staff were asked to leave the room while athletes completed the survey. Researchers provided standardised instructions: "There are no right or wrong answers; please respond based on your honest experience in your sport." The survey took approximately 20–25 minutes to complete. Participants were not provided with financial compensation but were offered a summary of the general findings (aggregate data) upon completion of the study to help inform their future mental training.

Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki. The protocol was reviewed and approved by the Review Board (IRB) of Burapha University (IRB1-007/2566). All participants were informed that participation was voluntary and that they could withdraw at any time without penalty. Data were anonymised to ensure participant confidentiality. In addition to individual consent, supplementary parental consent was obtained for all participating athletes under 18, ensuring full compliance with ethical standards for minors.

Measurements

1. Demographic variables: Gender is a dichotomous variable within two types of sports: individual sports and team sports.
2. Mindfulness in Sports Questionnaire in Thai Version, developed by Singnoy et al. (2020), is designed to assess mindfulness in sports. It has demonstrated a reliability of 0.76. The scale comprises 15 questions, divided into three components: Awareness, Non-judgment, and Refocusing. These are evaluated on a 6-point scale ranging from 1 (never) to 6 (very often). The statistical fit of the model is as follows: $\chi^2 = 306.82$, $df = 87$, $p = 0.001$, $CMIN/DF = 3.52$, $CFI = 0.942$, $TLI = 0.930$, $RMR = .093$, and $RMSEA = .079$, with a 90% confidence interval of .069 to .088. Additional metrics include $AIC = 372.82$ and $ECVI = 0.916$.
3. Self-Confidence Questionnaire: The Revised Competitive State Anxiety Inventory-2 (Thai version; CSAI-2R) was used to measure situational self-confidence. The 5-item scale demonstrated good internal consistency with a Cronbach's alpha of 0.90. Confirmatory factor analysis (CFA) was conducted to verify the structural validity, yielding the following fit indices: $\chi^2 = 22.33$, $df = 5$, $p = .001$, $CMIN/DF = 4.46$. The incremental fit indices showed excellent model-data fit, with $CFI = .985$ and $TLI = .971$, both exceeding the recommended threshold of .95. While the $RMSEA$ was .092 (90% CI: 0.056, 0.133), slightly above the conventional .08 cutoff, this is often observed in models with small degrees of freedom ($df = 5$), where $RMSEA$ can be artificially inflated. Given the superior CFI and TLI values, along with an RMR of .012, the scale demonstrates robust structural validity within this elite Thai national athlete sample. These results confirm that the instrument is a psychometrically sound measure for the subsequent mediation analysis.
4. Mental toughness: The mental toughness questionnaire in Thai by Julvanichphong et al. (2010). This questionnaire comprises 36 items and 12 sub-scales, including Self-Efficacy, Mental Self-Concept, Potential, Perseverance, Task Focus, Task Familiarity, Personal Bests, Task Value, Goal Commitment, Positive comparisons, and Stress Minimisation. After analysis, it was observed that the revised short version of the section consists of 12 items across a single dimension, designed to predict mental toughness in Thai athletes. The questionnaire demonstrated high internal consistency ($\alpha = .97$) and uses an 8-point rating scale. The statistical fit of the model was as follows: $\chi^2 = 1929.32$, $df = 528$, $p = .001$, $CMIN/DF = 3.65$, $CFI = .870$, $TLI = 0.845$, $RMR = 0.073$, and $RMSEA = .081$ with a 90% confidence interval of 0.077 to 0.085. Additional metrics include $AIC = 2205.32$ and $ECVI = 5.41$.

Data analysis and Assumption Testing

Data were analysed using SPSS (Version 26.0), beginning with a rigorous assessment of the assumptions for multivariate regression. Normality for all continuous variables—mindfulness,

self-confidence, and mental toughness—was confirmed through Skewness values for all primary variables, which ranged from -1.23 to 0.10, and Kurtosis values, which ranged from -0.90 to 1.68 (Table 1). These values fall well within the acceptable thresholds of ± 2 and ± 7 , respectively, indicating that the data meet the assumptions of normal distribution for multivariate analysis. Linearity was verified by inspecting scatterplots, which exhibited consistent linear trends, while the Durbin-Watson statistic was utilised to confirm the independence of observations, with values near 2.0. To address potential multicollinearity, a correlation matrix and Variance Inflation Factors (VIF) were examined; the highest correlation was observed between self-confidence and mental toughness ($r = 0.57$), well below the 0.80 threshold, and all VIF values were below 2.5. To test the proposed statistical relationships, we utilised the SPSS PROCESS macro (Model 59) developed by Hayes (2018), which allows for the simultaneous testing of mediation and moderated mediation. Given the cross-sectional design of this study, the model evaluates statistical associations rather than temporal causality. We employed a bootstrapping method (5,000 resamples) to generate 95% confidence intervals (CI) for the indirect effects, where an effect is considered significant if the CI does not include zero. For the moderated mediation analysis, the moderator (Sport Type) was treated as a categorical/binary variable, and conditional effects were calculated separately for individual and team sports to provide a culturally and contextually resonant framework for the Thai athletic context.

Table 1. Descriptive Statistics and Normality Testing (N = 408)

Variables	Sub-scales	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Mindfulness	Awareness	4.55	0.98	-0.48	-0.17
	Non-Judgment	3.19	1.29	0.1	-0.9
	Refocusing	4.55	0.98	-0.6	0.02
Self-Confidence	Confidence	3.24	0.64	-0.83	0.53
	Self-Efficacy	6.68	1.15	-1.06	1.36
	Mental Self-Concept	6.52	1.3	-1.19	1.68
Mental Toughness	Potential	6.79	1.04	-0.92	0.53
	Task Focus	6.93	1.06	-0.77	0.76
	Task Familiarity	6.94	0.98	-1.05	0.98
	Personal Bests	7	0.99	-1.23	1.25
	Task Values	6.91	1	-1.03	1.07
	Goal Commitment	6.93	1.01	-0.98	0.46
	Positivity	6.67	1.03	-1.07	1.64
	Stress Minimization	6.3	1.26	-0.69	0.46
	Positive comparisons	6.78	1.39	-0.96	1.10
	Persistence	6.94	1.18	-0.99	1.02

Results

Descriptive and Correlation Analyses

Table 2 presents the Pearson correlation matrix for the primary variables—mindfulness, self-confidence, and mental toughness. As hypothesised, mindfulness exhibited significant positive correlations with both self-confidence and mental toughness. Furthermore, self-confidence was strongly and positively associated with mental toughness. Notably, sport type (individual vs. team) did not show a significant correlation with any of the psychological constructs, suggesting that these traits were distributed consistently across different sport formats in this elite sample.

Table 2. Descriptive statistics and correlations for study variables

Variables	<i>M</i>	<i>SD</i>	1	2	3	4
1. Mindfulness	4.10	0.54	-			
2. Self-confidence	3.24	0.64	0.42**	-		
3. Mental toughness	6.77	0.89	0.49**	0.57**	-	
4. Type of sport	0.46	0.49	-0.07	0.03	0.01	-

Note. *N* = 408. *M* and *SD* represent mean and standard deviation, respectively. ** $p < .01$.

Test of Mediation Effect

The mediation analysis (Table 2) confirmed that self-confidence partially mediates the relationship between mindfulness and mental toughness. The model was statistically significant, $F(2, 405) = 132.08$, $p < .001$, explaining 39.2% of the variance in mental toughness ($R^2 = 0.392$). Both the direct effect of mindfulness on mental toughness and the indirect effect through self-confidence were significant, as indicated by 95% bias-corrected confidence intervals that did not contain zero. This suggests that mindfulness not only directly supports mental toughness but also enhances it indirectly by increasing an athlete's self-confidence.

Test of Moderated Mediation Effects

The moderated mediation analysis (Model 59) examined whether the social structure of the sport (individual vs. team) moderated the mediation pathways. As shown in Table 3, sport type significantly moderated the path from mindfulness to self-confidence and the path from self-confidence to mental toughness. However, the direct interaction between mindfulness and sport type on mental toughness was not significant, suggesting the direct benefits of mindfulness on toughness are consistent across sport types.

To interpret the interactions, conditional effects were analysed separately for individual and team sports. For the path from mindfulness to self-confidence, the effect was significantly stronger for team sport athletes ($B = 0.70$, $p < .001$) compared to individual sport athletes ($B = 0.36$, $p < .001$). This interaction is visualised in Figure 2, where the slope representing team sports is noticeably steeper, indicating that increments in mindfulness yield higher gains in self-confidence in team environments.

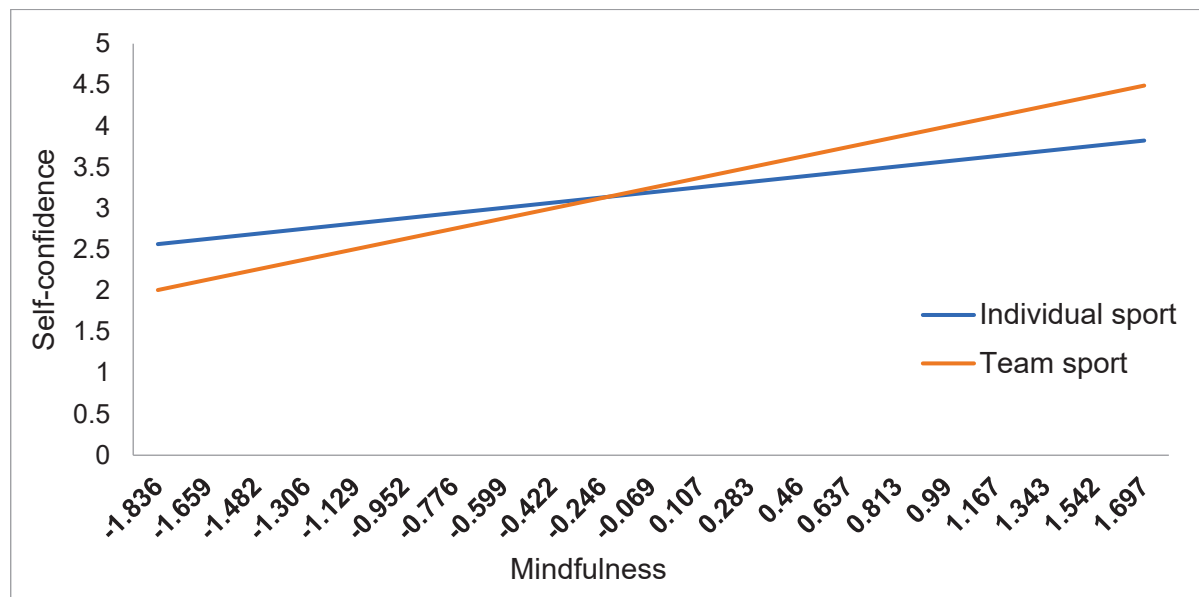


Figure 2. Moderation of the effect of mindfulness on self-confidence by sport type

Conversely, the effect of self-confidence on mental toughness was stronger for individual sport athletes ($B = 0.96$, $p < .001$) than for team sport athletes ($B = 0.64$, $p < .001$). As shown in Figure 3, the interaction plot illustrates that while both groups benefit from increased self-confidence, athletes in individual sports demonstrate a higher sensitivity to these changes, suggesting that self-confidence is a more critical driver of mental toughness when social support from teammates is absent. These findings indicate that while the mediation mechanism exists in both groups, team sport athletes derive more confidence from mindfulness. In contrast, individual sport athletes rely more heavily on that confidence to maintain mental toughness.

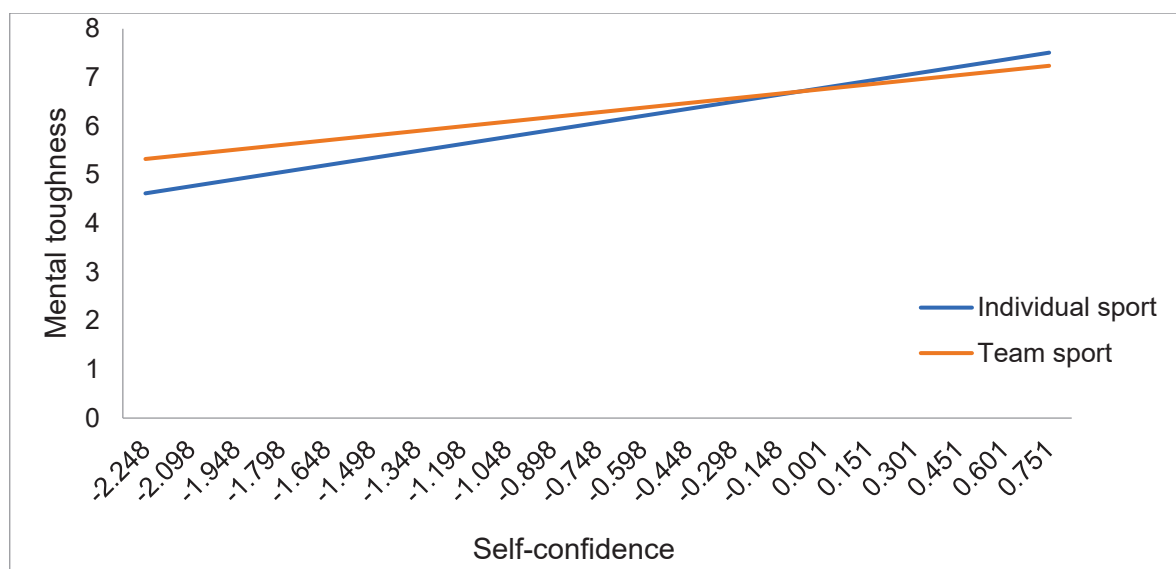


Figure 3. Moderation of the effect of self-confidence on mental toughness by sport type

Finally, the formal test of moderated mediation was conducted. The Index of Moderated Mediation was 0.105 (95% CI [0.021, 0.208]), confirming that the indirect effect of mindfulness on mental toughness through self-confidence was significantly different between individual and team sports. Specifically, the indirect pathway was stronger for team sport athletes compared to individual sport athletes.

Table 3. Mediation analysis of mindfulness on mental toughness

Model	Path	B	SE	t	p
Model 1	c (total effect)	0.794	0.070	11.232	0.001
Model 2	a	0.495	0.052	9.427	0.001
Model 3	b	0.611	0.095	10.272	0.001
	c' (direct effect)	0.491	0.069	7.055	0.001
Bootstrap estimate	Indirect effect	Effect	SE	95% CI	
		0.303	0.049	0.211 - 0.405	

Abbreviations: SE = standard error, CI = confidence interval, Bootstrap n = 5,000, Bootstrap CI method = Bias-corrected

To interpret the interaction effects as shown in Table 3, conditional effects were analysed (Table 4). For Path a (Mindfulness to Self-Confidence), the interaction was statistically significant ($B = 0.347$, $p = .001$, 95% CI [0.139, 0.554]). As visualised in Figure 2, the relationship was significantly stronger for team sport athletes ($B = 0.70$) compared to individual sport athletes ($B = 0.36$).

Conversely, for Path b (Self-Confidence to Mental Toughness), the interaction was also significant but in the opposite direction ($B = -0.325$, $p = .004$, 95% CI [-0.547, -0.103]). As illustrated in Figure 3, the association was more pronounced for individual sport athletes ($B = 0.96$) than for team sport athletes ($B = 0.64$). This suggests that while mindfulness boosts confidence more effectively in team environments, self-confidence remains the more critical driver of resilience for athletes in solitary individual sports.

Table 4. Conditional effects for sport type

Predictor Variables	B	SE	t	p	95% CI [LL, UL]
Outcome: Self-Confidence (Mediator)					
Constant	1.758	0.285	6.164	0.001	[1.197, 2.319]
Mindfulness (MF)	0.356	0.068	5.216	0.001	[0.222, 0.490]
Sport Type (ST)	-1.345	0.435	-3.085	0.002	[-2.202, -0.488]
MF × ST (Interaction)	0.347	0.105	3.286	0.001	[0.139, 0.554]
$R^2 = 0.204$, $F(3,404) = 34.57$, $p < 0.001$					
Outcome: Mental Toughness (DV)					
Constant	2.173	0.372	5.831	0.001	[1.440, 2.905]
Self-Confidence (SC)	0.963	0.083	11.616	0.001	[0.801, 1.127]
Mindfulness (MF)	0.478	0.087	5.481	0.001	[0.306, 0.649]
Sport Type (ST)	0.992	0.545	1.819	0.069	[-0.079, 2.063]
SC × ST (Interaction)	-0.325	0.113	-2.876	0.004	[-0.547, -0.103]
$R^2 = 0.412$, $F(4,403) = 70.42$, $p < 0.001$					

Discussion

The analysis supports the hypothesis that mindfulness contributes to mental toughness, with self-confidence as a mediating variable. Mindfulness was associated with higher self-confidence, and this confidence further contributes to mental toughness. The primary objective of this study was to examine the mediating role of self-confidence in the relationship between mindfulness and mental toughness among elite Thai athletes, while exploring how these pathways vary between individual and team sport contexts. Our findings confirm that mindfulness significantly predicts mental toughness, a relationship partially explained by the boost in situational self-confidence. Furthermore, the moderated mediation analysis reveals that the competitive structure of the sport—whether team-based or individual—determines the relative strength of these psychological pathways.

The Mindfulness–Self-confidence–Mental Toughness Pathway

The significant mediation effect observed in this study aligns with established theoretical frameworks identifying mindfulness as a foundational mechanism for performance enhancement and the development of elite mental qualities (Kaufman et al., 2009; Josefsson et al., 2019; Birrer et al., 2012). By fostering a non-judgmental awareness of the present moment, mindfulness helps athletes mitigate "negative self-appraisal," which is a primary psychological barrier to self-belief (Walker, 2019; Röthlin et al., 2016). When athletes are mindful, they develop the ability to observe intrusive thoughts—such as doubt during a high-stakes moment—as transitory mental events rather than absolute truths. This cognitive distancing prevents the erosion of confidence that typically follows a mistake or a period of high pressure.

Beyond mere focus, mindfulness meditation has been shown to counteract self-control depletion (Frieze et al., 2012), effectively preserving the cognitive and emotional resources needed to maintain situational confidence under the high-stakes pressure of elite competition (Compte & Postlewaite, 2004). This mental stability is critical, as confidence acts as a vital buffer against competitive state anxiety and ruminative thinking (Chun et al., 2022; Mao et al., 2023). Our results confirm that mindfulness provides the cognitive clarity required to sustain self-belief, which subsequently serves as the primary driver for mental toughness. In elite sports, mental toughness is defined by the ability to remain resilient, focused, and persistent in the face of adversity (Harita et al., 2022). By stabilising confidence, mindfulness ensures that an athlete's "internal engine" remains functional even when external conditions are unfavourable, allowing the consistent effort and focus required for world-class performance (Hays et al., 2009).

The significant moderated mediation observed in this study reflects a unique cultural synergy. The Path b (Self-Confidence to Mental Toughness) is reinforced by the Thai emphasis on 'Awareness' (Sati), which serves as a shield against psychological depletion. This aligns with recent Thai research on Breath and Movement Awareness Programmes (BMAP) in fencing (Mokrid et al., 2024) and imagery training in dragon boat racing (Raktavee, 2023), where heightened self-awareness directly translated into sustained competitive grit.

Furthermore, the interaction effects suggest that 'Naturalised Grounding' allows team athletes to filter social pressure, while providing individual athletes with the solitary persistence required in combat or precision sports. This cultural interpretation is supported by localised findings that combine mindfulness with physical strength training to enhance performance in basketball (Paso et al., 2022) and Muay Thai (Paphaathananan & Chobpradit, 2022). Thus, the pathways in our model are not merely statistical artefacts but are deeply embedded in the Thai cultural ethos of mental training.

Cultural Contextualisation: Naturalised Grounding vs. Western Samples

A critical contribution of this research is exploring these psychological pathways within a Thai population, highlighting what we define as "naturalised cultural grounding." In most Western sport psychology research, mindfulness is often introduced as a secularised clinical intervention or a novel cognitive skill that requires significant conceptual shifts for athletes to adopt. In contrast, Thai athletes are predisposed to these concepts from a young age through a cultural and educational upbringing deeply rooted in Buddhist philosophy and Dharma (Kaewpornasawan et al., 2012; Purananon, 2017).

Specifically, the Thai approach to mindfulness remains centred on a distinct three-step cognitive cycle: Awareness (Sati), Letting Go, and Returning to the Task (Samadhi). Unlike models that focus solely on relaxation, the Thai protocol emphasises the active redirection of focus. Thai athletes are taught from their earliest years in the national education system to recognise a wandering or distressed mind, consciously "let go" of the attachment to that distraction, and immediately return to the present duty. This cultural familiarity implies that Thai athletes do not face conceptual barriers. The core tenets are already integrated into the Thai cognitive lexicon and social fabric, allowing for an intuitive transition from psychological awareness to athletic confidence.

This "home-field advantage" is supported by local research across diverse Thai sporting disciplines. For instance, the Mindfulness of Thailand (MOT) protocol's emphasis on Anapanasati (mindful breathing and movement) has been shown to improve accuracy in petanque (Siriwatthanasin et al., 2010), junior golf (Khaunphet, 2023), and air rifle shooting (Wongsomboon, 2020). Even in traditional combat arts like Muay Thai, rituals like Wai Khru serve as structured mindfulness exercises that help practitioners transition from daily life to a "warrior" mindset (Paphauthananan & Chobpradit, 2022). A breath-and-movement awareness programme was shown to be effective in developing mindfulness among fencing athletes (Mokkritt et al., 2024).

Consequently, the robust mediation pathways observed in this study are bolstered by this lifelong immersion, making mindfulness a more potent and accessible resource for Thai athletes preparing for international events like the 19th Asian Games (Singnoy et al., 2022). While this study positions Thai athletes within a framework of 'naturalised grounding' due to the cultural prevalence of Buddhist philosophy, it is important to acknowledge that this claim remains theoretical and inferential. The present study did not empirically measure participants' religious practices or spiritual depth; therefore, the cultural grounding is offered as a conceptual interpretation rather than a direct empirical finding.

The Moderating Role of Sport Type

Our results confirm a 'divergent mechanism' based on the social structure of the sport. In team settings, the mindfulness-to-confidence pathway (Path a) was more pronounced, indicating that mindfulness functions as an attentional filter against social evaluation and group pressure. In contrast, individual sport athletes showed a stronger reliance on the confidence-to-mental toughness pathway (Path b), as they lack the social buffer provided by teammates and must rely almost exclusively on their internal self-belief to maintain grit. This research identifies distinct psychological dynamics based on the social structure of the sport. In team settings, the mindfulness-to-confidence pathway was found to be significantly more pronounced. This finding suggests that mindfulness is particularly vital for managing the external social distractions and interpersonal pressures inherent in collective environments (Hill & Shaw, 2013). In sports like football, volleyball, or basketball, an athlete's confidence can be vulnerable to team fluctuations, social friction, coach critiques, or the looming fear of letting down the group. Mindfulness allows team athletes to improve attentional control (Baltar & Filgueiras, 2018) and remain centred, maintaining individual self-confidence regardless of the group's

performance or external noise (Ajilchi et al., 2019). By practising mindfulness, team athletes can "filter" social pressure, ensuring their self-belief remains stable even when the team's collective momentum is low.

Conversely, the individual sport context demonstrated a significantly stronger path from self-confidence to mental toughness. Without teammates to share the psychological burden or provide immediate social support, individual athletes experience a unique state of "psychological isolation." In these disciplines, the relationship between self-belief and toughness is nearly one-to-one; if confidence wavers, the athlete has no social buffer to prevent a collapse in toughness. For these athletes, self-confidence serves as the primary "shield" that translates mindfulness-induced awareness into the grit and perseverance required for elite competition (Mohebi et al., 2022). In high-pressure individual disciplines like karate (Harita et al., 2022), tennis (Terzioğlu & Çakır-Çelebi, 2024), or track and field (Hut et al., 2021), mindfulness acts as a "resource-conserving strategy" (Li et al., 2023). Our results suggest that for the isolated athlete, self-belief is the central engine for mental toughness, allowing them to remain "tough yet compassionate" toward themselves during solitary struggles (Stamatis et al., 2020). This underscores that while mindfulness is universally beneficial, its application must be context-specific: it protects the team athlete from the group, while it empowers the individual athlete to be their own source of strength.

Limitations and Future Research

Despite the high-level sample of national athletes, several limitations must be acknowledged. First, the cross-sectional design prevents the establishment of temporal or definitive causal relationships; while the model is statistically robust, it reflects associations rather than developmental processes. Second, the reliance on self-report measures may introduce social desirability bias, as elite athletes may feel pressured to report higher levels of toughness or confidence to align with the "warrior" archetype of national representation. Third, while the Thai context provides unique insights into "naturalised grounding," the results may not be directly generalisable to non-Buddhist or highly secularised athletic populations where mindfulness lacks a similar cultural scaffold. Future research should employ longitudinal or experimental methods and incorporate objective metrics, such as heart rate variability or other physiological stress markers (Meland et al., 2015), to validate these self-reported trends over time.

Conclusion

In conclusion, this study offers a comprehensive understanding of the psychological mechanisms underpinning elite athletic performance in the Thai context. The research provides three primary contributions as follows.

First, regarding the theoretical contribution, our findings clarify the mindfulness-self-confidence-mental toughness pathway. The results demonstrate that self-confidence serves as a crucial partial mediator, suggesting that mindfulness does not merely bolster resilience directly but does so by stabilising an athlete's self-belief. This clarifies the cognitive "chain of command" required to maintain mental toughness under high-stakes competitive pressure.

Second, the cultural-contextual contribution resides in the introduction of the "naturalised grounding" framework. By situating the study within Thai Buddhist society, we highlight how a cultural predisposition toward mindfulness can facilitate the adoption of sport psychology interventions. This framework differentiates Thai athletes from Western samples, suggesting that mindfulness is not an alien cognitive skill but a culturally resonant practice already integrated into their social and educational fabric.

Third, the applied implications offer a clear roadmap for sport-specific mental training. Coaches and sport psychologists are encouraged to move beyond a "one-size-fits-all" approach. For team sports, mindfulness training should focus on protecting athletes from external social distractions. In contrast, for individual sports, interventions should prioritise leveraging mindfulness to build the robust self-belief necessary for solitary persistence. Ultimately, these insights provide Thai sports organisations with a culturally tailored strategy to optimise the mental health and performance of their national athletes.

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Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this manuscript, the authors used Gemini AI to assist with improving language clarity, grammar, and phrasing. The authors carefully reviewed and revised the output to ensure its accuracy and take full responsibility for the content of the final manuscript.

Notes on Contributors

Chatkamon Singnoy, PhD, is an Associate Professor at Burapha University, Thailand, specialising in mindfulness and mental toughness. An experienced Olympic sport psychologist, he designs structured training programmes and serves on editorial boards. Email: Chatkamon@gmail.com

Jung-Gil Park, PhD, is a Research Professor at Kangwon National University, South Korea. Holding doctorates and degrees from Korea and New York universities, his distinguished research profile focuses on securing major National Research Foundation of Korea grants for predictive athletic modelling. Email: drpjg15@gmail.com

Tanida Julvanichpong, PhD, is an Associate Professor at Burapha University, Thailand. A pioneer in Thai exercise psychology and elite national team consultant, her prominent professional achievements include developing and validating the original Thai Mental Toughness Questionnaire. Email: Tanida@bua.ac.th

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