

**MINDFULNESS, ATTENTION CONTROL AND EMOTIONAL REGULATION IN
MENTAL TOUGHNESS**

**Attention Control and Emotional Regulation as Mediators in the Relationship Between
Mindfulness and Mental Toughness Amongst High-Level Cricketers**

by

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**Mini dissertation (in article format) submitted in partial fulfilment of the requirements
for the degree**

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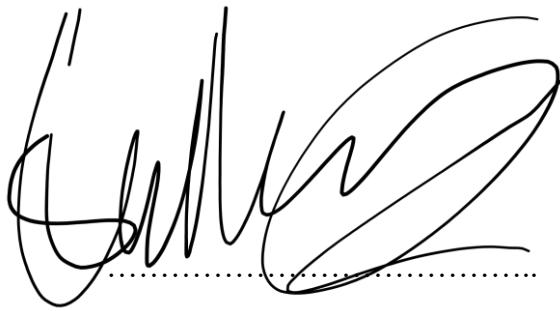
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November 2024

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Sachintha Dulanjana Galhenage

Date: 2024/11/19

Signed at: Bloemfontein, South Africa

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Note to the Examiner

The examiner's attention is kindly drawn to the student's intention to submit this dissertation (in article format) to the *Journal of Psychology of Sport and Exercise* for publication. For this reason, the student has followed the formatting and referencing guidelines contained in the seventh edition of the *American Psychological Association's Publication Manual* as prescribed by the journal. The "Instructions for authors" for the *Psychology of Sport and Exercise* have been included as Appendix A. The article currently exceeds the maximum length stipulated by the guidelines of the journal. This was necessitated by the primary purpose of the article, which was to demonstrate adequate research competence towards the partial fulfilment of the aforementioned degree.

The examiner's attention is also kindly drawn to the Turnitin Report in Appendix G. The similarity index of 20% is in large part due to the description of the measuring instruments and exposition of the data analysis. Given the need for a precise and systematic approach in this regard, it is extremely difficult to write these sections with sufficient variability to negate an elevated similarity index in part of the search report.

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List of Abbreviations

AC	Attention control
ATTC	Attention Control Scale
CSA	Cricket South Africa
DM	Dispositional mindfulness
ER	Emotional regulation
ERQ	Emotion Regulation Questionnaire
MAAS	Mindfulness Attention Awareness Scale
MAC	Mindfulness-Acceptance-Commitment
MBI	Mindfulness-based intervention
MT	Mental toughness
MTI	Mental Toughness Index
UFS	University of the Free State

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Abstract

Mental toughness is widely recognised as a crucial determinant of success in sport, with mindfulness being positively linked to its enhancement. However, the specific mechanisms through which mindfulness enhances mental toughness remain unclear. Attention control and emotional regulation have been identified as key mechanisms through which mindfulness may improve athletic performance. Within the cricket-specific sport psychology literature, these processes have been identified as key contributors to mental toughness. Given this commonality, the current study aimed to investigate whether attention control and emotional regulation mediate the interaction between dispositional mindfulness and mental toughness amongst high-level South African cricketers. A convenience sample of 211 development, academy, provincial, and franchise South African cricketers (63% male, 36% female, $M_{age} = 24.20$ years) was recruited. Respondents completed the Attention Control Scale, the Emotional Regulation Questionnaire, the Mindfulness Attention Awareness Scale, and the Mental Toughness Index. Ordinary least squares regression analysis was used to test the mediating effect of attention control and emotional regulation on the interaction between dispositional mindfulness and mental toughness. In combination, attention control, dispositional mindfulness, and emotional regulation accounted for 22.8% ($F_{(4,206)} = 15.214$, $p < .001$) of the variance in the sample's mental toughness scores. Dispositional mindfulness ($\beta = .137$, $p = .043$) and the emotional regulation strategy of cognitive reappraisal ($\beta = .326$, $p < .001$) emerged as independent predictors of mental toughness. Furthermore, attention control partially mediated the effect of dispositional mindfulness on mental toughness ($ab = .034$, 95% CI [.006, .112]). The findings of this study indicate that dispositional mindfulness and cognitive reappraisal are direct predictors of mental toughness. Attention

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control appears to be an important mechanism by which dispositional mindfulness enhances mental toughness amongst high-level South African cricketers.

Keywords: attention control, emotional regulation, mindfulness, mental toughness, cricketers

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Introduction

Mental Toughness

Mental toughness (MT) is a multifaceted psychological construct constituting cognitive, affective, and behavioural dimensions (Stamatis et al., 2020). It is often viewed as fundamental for high-level sporting performance (Hardy et al., 2014; Jones et al., 2007; Stamatis et al., 2020). Mental toughness can be defined as the consistent ability to produce a significant degree of subjective or objective performance in the face of adversities, challenges, and stressors (Gucciardi et al., 2014; Mahoney et al., 2014). Scholars have affirmed that MT is one of the most important psychological characteristics related to successful outcomes in elite sports (Guszkowska & Wójcik, 2021; McGeown et al., 2015; Ruparel, 2020; Stamatis et al., 2020). The interest in understanding and promoting MT in sport has resulted in increased empirical work across different sporting environments (Ajilchi et al., 2021; Bell et al., 2013; Mahoney et al., 2015; Rintaugu et al., 2022).

According to Subhan et al. (2019), cricket is a game in which players experience constant pressure; they are pushed to their limits of endurance and are constantly striving to achieve excellence. Bull et al. (2005) state that cricket is a sport that requires 'chronic' MT for the athlete to reach the pinnacle and to maintain a high level of performance in order to stay at the top. Cotterill and Barker (2013) assert that the most significant challenge for a cricketer is not learning the technical skills but managing the multitude of factors that can affect the individual's mind and thinking during a game. In addition, Weissensteiner et al. (2012) found that amongst highly skilled batsmen, only MT significantly predicted differences in batting performance. Despite the apparent increasing recognition of the importance of MT in cricket, empirical research seems to be limited.

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The developing understanding of MT in cricket is currently underpinned by two frameworks. Bull et al. (2005) developed a cricket-specific model of MT that emphasises the role of environmental influences, tough character, tough attitude, and tough thinking. Tough thinking represents the main psychological component of a mentally tough mind in this model (Bull et al., 2005). Tough thinking primarily demonstrates a player's ability to become aware of their thoughts and emotions and to maintain attention control (AC).

In the second model of cricket-specific MT, Gucciardi and Gordon (2009) present six core components of MT in cricketers. These are self-belief or confidence in one's ability to succeed; affective intelligence (refers to managing emotions to enhance performance); desire to achieve (emphasises the drive for continuous improvement); resilience (refers to the capacity to recover from setbacks and to persist through challenges); AC (the ability to maintain focus and concentration); and cricket smarts (involves understanding the game and applying this knowledge to achieve success). Both frameworks suggest that the components of MT in cricketers can be viewed as environmental and dispositional (character, resilience, desire to achieve, cricket smarts, and self-belief) or more state-like (e.g., tough thinking, tough attitudes, affective intelligence, and AC) (Bull et al., 2005; Gucciardi & Gordon, 2009).

Psychological interventions that are aimed at improving sporting performance have traditionally targeted state-like constructs such as attitudes, cognition, and emotional regulation (ER) (Birrer et al., 2012; Reyes-Bossio et al., 2022; Röthlin et al., 2016). However, scant attention has been paid to determining the behavioural, cognitive, and emotional mechanisms that reinforce MT (Connaughton et al., 2011; Gordon et al., 2017; Liew et al., 2019; Sorensen et al., 2016). Research has consistently demonstrated a positive association between mindfulness and MT (Andersen, 2011; Jones & Parker, 2018; Walker, 2016; Wilson

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et al., 2019; Wu et al., 2021). Furthermore, mindfulness-based interventions (MBIs) have been linked to the enhancement of athletes' MT (Ajilchi et al., 2019; Vella-Fondacaro & Romano-Smith, 2023; Wang, Tian et al., 2021). Despite these findings, a notable gap exists in the literature regarding the psychological processes associated with mindfulness-based MT interventions in general and specifically in cricket.

Mindfulness

Mindfulness is commonly defined as the process of purposefully paying attention to one's thoughts, feelings, and experiences in the present moment while taking a non-judgemental stance towards them (Kabat-Zinn, 1994; Kumari et al., 2023; Weiner et al., 2016;). Mindfulness has been conceptualised as either a state or a trait. State mindfulness refers to the temporary and situational experience of mindfulness, whereas trait mindfulness, also known as dispositional mindfulness (DM), describes an individual's natural tendency to be mindful in everyday life (Kiken et al., 2015). Since mindfulness is a natural quality that varies amongst individuals (as a trait) and fluctuates across time (as a state), it can be taught and developed through the systematic and regular use of a variety of meditative practices (Creswell, 2017; Sedlmeier, 2023; Visted et al., 2014). Research in sports psychology, particularly in relation to MT, has predominantly focused on DM (Jones & Parker, 2018; Walker, 2019; Wu et al., 2021).

Bishop et al. (2004) propose a two-component model of DM. The first component is the regulation of attention in order for the individual to focus on the immediate experience. The second component involves approaching one's experiences with curiosity, openness, and acceptance regardless of their valence and desirability. This model has garnered support from subsequent research (Desbordes et al., 2014; Hölzel et al., 2011; Mathews & Anderson, 2021). These two fundamental components of mindfulness (attention regulation and openness

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to experience) describe the active mechanisms that set mindfulness apart from other psychological constructs (Chambers et al., 2008; Gardner & Moore, 2020; Lindsay & Creswell, 2017).

Mindfulness-based interventions have gained increasing attention in the domain of sport psychology (Birrer et al., 2012; Wheeler et al., 2017; Zhu et al., 2022). These interventions have demonstrated efficacy in relation to athletic performance, athlete burnout, and injury rehabilitation (Bühlmayer et al., 2017; Eilam-Stock et al., 2023; Gross et al., 2016; Mardon et al., 2016; Wolch et al., 2020). Mindfulness-based interventions positively influence sports performance by enhancing psychological skills such as focused attention and MT and ER skills (Gardner & Moore 2020; Kittler et al., 2022; Noetel et al., 2017). Additionally, MBIs have demonstrated positive effects on physiological (e.g., salivary cortisol levels and immune responses) and psychological (e.g., flow, resilience, and anxiety reduction) (Liu et al., 2021; Nien et al., 2023) markers of wellbeing and performance amongst athletes.

There is increasing interest in understanding the underlying mechanisms by which MBIs may positively affect DM amongst athletes (Burzler et al., 2018; Hölzel et al., 2011; Lindsay & Cresswell, 2017; Lutz et al., 2015; Vago & Silbersweig, 2012; Wang, Tian et al., 2021), resulting in the development of various models that focus on identifying and understanding the possible mechanisms of mindfulness. Often, these models include AC and ER as prominent mechanisms of action (Hölzel et al., 2011; Moore & Malinowski, 2009; Shapiro et al., 2006; Vago & Silbersweig, 2012). For example, Hölzel et al. (2011) identified several cognitive-affective processes through which mindfulness meditation exerts its effects, and these included AC and ER. Similarly, in an attempt to understand the neural mechanisms

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underlying mindfulness, Vago and Silbersweig (2012) highlighted AC and ER as two key mechanisms of action.

Gardner (2009) posits that mindfulness may not affect athletic performance directly but rather indirectly through other psychological processes. Other researchers have elaborated upon this view (Bühlmayer et al., 2017; Jha et al., 2007; Josefsson et al., 2017; Röthlin et al., 2016). For example, Röthlin et al. (2016) demonstrated that competition anxiety mediates the relationship between DM and self-evaluated sport performance. Similarly, various studies have emphasised the impact mechanisms of AC and ER on the relationship between mindfulness and sporting performance (Birrer et al., 2021; Gao & Zhang 2023; Josefsson et al., 2017; Josefsson et al., 2019; Oguntuase & Sun, 2022; Rogowska & Tataruch, 2024). For instance, Birrer et al. (2012) developed a hypothetical framework of specific impact mechanisms that explains how and why mindfulness may enhance athletic performance. This framework proposes that mindfulness may, through specific impact mechanisms such as AC and ER, indirectly influence various psychological skills that are conducive to improved sports performance (Birrer et al., 2012; Josefsson et al., 2017).

Emotional Regulation

Emotional Regulation is defined as the process by which individuals modulate cognitions and behaviours in response to the emotions they experience (Gross, 2015). According to Gershgoren and colleagues (2023), athletes' capacity to facilitate, maintain, or inhibit specific emotions determines the efficacy with which they are able to regulate their emotions. This regulatory ability is said to be crucial in optimising desirable precompetitive states and enhancing overall performance (Beatty & Janelle, 2019; Robazza et al., 2004; Robazza & Ruiz, 2018; Wagstaff, 2014).

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Gross' (1998, 2001) process model of ER outlines two regulation strategies, namely the antecedent-focused strategy and the response-focused strategy. Within this framework, cognitive reappraisal and expressive suppression are the most frequently researched strategies (Kelley et al., 2019). Cognitive reappraisal, an antecedent-focused strategy, involves reinterpreting the meaning of a stimulus to alter one's emotional responses (Gross & John, 2003; Sheppes & Gross, 2011). In contrast, expressive suppression is a response-focused strategy that is characterised by ongoing efforts to inhibit emotion-expressive behaviour (Zou et al., 2024). Kim and Tamminen (2022) indicate that cognitive reappraisal and expressive suppression are the two ER strategies that are most widely researched within the sporting and performance context.

Empirical evidence consistently supports the efficacy of cognitive reappraisal over expressive suppression as an effective ER strategy (Li et al., 2020; Szasz et al., 2011; Wang, Goldberg et al., 2021; Webb et al., 2012; Wolgast et al., 2011; Xu et al., 2023). Cognitive reappraisal is associated with adaptive states and behaviours such as elevated positive affect (Ioannidis & Siegling, 2015) and enhanced interpersonal functioning (Cabello et al., 2013). Conversely, expressive suppression diminishes positive emotional experiences, fails to provide relief from negative emotions, and incurs significant cognitive and physiological costs (Brans et al., 2013; Gross & John, 2003). Consequently, cognitive reappraisal has become viewed as a more adaptive ER strategy, while expressive suppression is considered less adaptive and perhaps even maladaptive (Gross & John, 2003; Kim & Tamminen, 2022; Lantrip et al., 2015; Preece et al., 2019).

Mindfulness-based interventions have demonstrated efficacy in enhancing ER amongst athletes (Augustus et al., 2023; Birrer et al., 2021; Josefsson et al., 2019). Research suggests that MBIs facilitate the recognition of physical sensations and their relationship with

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emotional states, increase self-awareness, and improve ER (Rogowska & Tataruch, 2024). A longitudinal study conducted by Josefsson et al. (2017) suggests that mindfulness practice may facilitate a deeper awareness of emotion, thus enabling more effective regulation of emotions amongst elite athletes. Furthermore, the Mindfulness-Acceptance-Commitment (MAC) intervention has been demonstrated to increase DM and to improve ER amongst athletes (Josefsson et al., 2019). Similarly, Oguntuase and Sun (2022) report that mindfulness practice improved ER amongst elite football players by fostering awareness and acceptance of distressing emotions without overwhelming the athletes or negatively affecting their performance.

Attention Control

Mindfulness, as outlined by Bishop et al. (2004), incorporates an attention-based element (Wimmer et al., 2020). As highlighted by Shapiro et al. (2006), a fundamental aspect of mindfulness revolves around the conscious commitment to attend to one's moment-to-moment experience. Attention control thus appears to be strongly related to DM. Attention control can be broadly divided into two domains. The first is sustained attention, in which the individual focuses on a single task or stimuli while blocking out distractions. The second is divided attention, which involves allocating attentional resources to multiple stimuli or altering the individual's perspective on a task by focusing attention on different aspects of a stimulus (Chung-Fat-Yim et al., 2022; Derryberry & Reed, 2002).

These components of attention, observed in relation to DM, not only aid in developing an enhanced capacity to resist distractions and maintain focus (Wang et al., 2017) but also facilitate flexible attention, enabling individuals to shift their focus effectively (Chambers et al., 2008; Jha et al., 2007; Vieth & Von Stockhausen, 2022; Wang et al., 2017). The ability to direct and control attention is a critical component of success in any area of

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skilled performance (Moran, 2004). Furthermore, several studies have underscored the significance of AC in sports performance, emphasising the need for athletes to maintain focus on task-relevant information during competition while avoiding internal and external distractions (Furley & Wood, 2016; Röthlin et al., 2016; Tassi et al., 2023).

Mindfulness seems to be strongly associated with AC in the general population (Birrer et al., 2021; Tang et al., 2015; Verhaeghen, 2020), as well as amongst elite athletes (Bu et al., 2019; Röthlin et al., 2020). Neurophysiological evidence indicates that regular, brief engagement in mindfulness meditation significantly enhances AC processes (Krumholz et al., 2021; Moore et al., 2012). Moreover, it has been reported that even a single brief session (10–30 minutes) of mindfulness training or mindfulness meditation can elevate state mindfulness and enhance AC amongst novice meditators (Dickenson et al., 2012; Norris et al., 2018; Watier & Dubois, 2016). Gao and Zhang (2023) investigated the effects of a 20-minute pre-competition mindfulness meditation intervention on AC amongst university marksmen athletes. Participants in this study reportedly displayed increased focus, reduced distractibility, and improved closed-skill performance.

The Current Study

Mental toughness has emerged as a pivotal determinant of performance in cricket and is considered essential for players to reach and maintain the highest level of performance (Bull et al., 2005; Cotterill & Barker, 2013). Cricket-specific MT frameworks identify AC and ER as important components of MT (Bull et al., 2005; Gucciardi & Gordon, 2009). In addition, several studies demonstrate a relationship between mindfulness and MT (Ajilchi et al., 2019; Jones & Parker, 2018; Walker, 2016; Wu et al., 2021). Furthermore, mindfulness has been integrated into several interventions aimed at developing MT (Ajilchi et al., 2019;

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Gucciardi et al., 2009; Jones & Parker, 2018; Wilson et al., 2019). An emerging body of research suggests that DM and mindfulness interventions might have an impact on general sporting performance, and MT more specifically, through AC and EC (Josefsson et al., 2017; Vieth & Von Stockhausen, 2022; Wang et al., 2017; Wang, Tian et al., 2021; Wilson et al., 2019). However, according to Birrer and colleagues (2021), further research is required in this regard. Moreover, research into the determinants of MT in cricket appears to be limited. Consequently, the current study aims to explore AC and ER as potential pathways through which DM might influence MT amongst high-level cricketers.

Methodology

Respondents

The sample comprised high-level cricketers from the Under-19, amateur (development), academy, and franchise teams from all provinces affiliated with Cricket South Africa (CSA). High-level athletes are defined as individuals who have been selected by their national sports federations based on meeting specific performance criteria (Schaal et al., 2011; Swann et al., 2015). No exclusion criteria were applied during recruitment of the respondents. Therefore, all individuals included in the abovementioned squads during the 2022/2023 season were eligible for inclusion in the study.

A convenience sample of 211 high-level cricketers was eventually recruited for the study. The ages of the respondents ranged between 18 years of age and 37 years of age ($M=24.20$; $SD=4.95$). Males (63%) constituted most of the sample, while 36% of the respondents identified as female and 0.9% as non-binary. Most of the respondents competed at provincial (44.5%) or franchise (36.5%) level. The remaining respondents competed at Under-19 (3.3%) or academy/development (15.6%) level. With respect to reported playing

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roles, 21.3% of the respondents were batters, 22.7% were bowlers, and 55.9% were all-rounders¹.

The total number of high-level cricketers (development, academy, provincial, and franchise) currently playing in South Africa is approximately 760 (<https://cricket.co.za/>).

Consequently, applying a confidence interval of 95% ($Sample\ Size = \frac{z^2 \times p(1-P)}{1 + \frac{(z^2 \times p(1-P))}{e^2 n}}$), a

minimum sample of 256 respondents would be required to provide the study with adequate statistical power for the proposed analysis (Neuman, 2011). While the number of respondents ($n=211$) recruited for this study fell short of this requirement, the sample size met the criteria for the minimum number of respondents necessary to conduct regression analysis (Tabachnick & Fidell, 2007). According to Tabachnick and Fidell (2007), the minimum sample size suitable for regression analysis is the number of predictors multiplied by eight, plus 50. The current study included four predictors. Consequently, the sample size ($n=211$) exceeded the recommended minimum criteria (i.e., $[4 \times 8] + 50 = 82$).

Measuring Instruments

The Mindfulness Attention Awareness Scale (MAAS) (Brown & Ryan, 2003) served as a measure of DM. The MAAS is a 15-item unidimensional measure of DM that demonstrated good internal consistency ($\alpha = .89$) in a non-clinical sample of South African adults (Kotzé & Nel, 2016). Responses are presented along a six-point Likert-type scale ranging from 1 (*almost always*) to 6 (*almost never*). The MAAS is scored by summing responses across all items. Higher scores reflect higher levels of DM (Brown & Ryan, 2003).

¹ Wicketkeepers were classified as all-rounders.

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Mental toughness was measured by the Mental Toughness Index (MTI) (Gucciardi et al., 2014). The MTI is an eight-item unidimensional measure of MT in sport that demonstrated good internal consistency ($\alpha = .90$) in a sample of British cyclists (Jones & Parker, 2018). Responses are presented along a seven-point Likert-type scale anchored by 'False, 100% of the time' and 'True, 100% of the time'. The MTI is scored by summing responses across all items. Higher scores indicate higher levels of MT (Gucciardi et al., 2014).

Attention control was measured using the Attention Control Scale (ATTC) (Derryberry & Reed, 2002). The ATTC is a 20-item multidimensional measure that assesses two key components of attention, namely attention focusing and attention shifting. The ATTC demonstrated good internal consistency for the total score ($\alpha = .88$) in a sample of Polish students (Fajkowska & Derryberry, 2010). Responses are presented along a four-point Likert-type scale ranging from 1 (*almost never*) to 4 (*always*). While the ATTC yields two subscale scores and a total score, the reliability of the subscale scores has been called into question (Abasi et al., 2017; Fajkowska & Derryberry, 2010). Consequently, it has been recommended that the ATTC total score be used in preference to the subscale scores (Abasi et al., 2017; Fajkowska & Derryberry, 2010). Responses across all 20 items are summed to provide a total attention score. It is deemed that the higher the ATTC total score, the better is the individual's ability to control their attention (Derryberry & Reed, 2002).

The Emotion Regulation Questionnaire (ERQ) (Gross & John, 2003) was employed as a measure of ER. The ERQ is a 10-item measure designed to assess individual differences in the habitual use of two ER strategies, namely cognitive reappraisal and expressive suppression. The ERQ has demonstrated acceptable to good internal consistency (emotional suppression: $\alpha = .70$; cognitive reappraisal: $\alpha = .82$) in a sample of British athletes (Uphill et

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al., 2012). Responses are presented along a seven-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Separate scale scores are derived for two ER strategies: cognitive reappraisal (six items) and expressive suppression (four items). Subscale scores are calculated by summing responses across their component items. Higher scores indicate higher usage of the particular ER strategy (Gross & John, 2003).

Procedure

Ethical clearance for the study was obtained from the General/Human Research Ethics Committee (GHREC) at the University of the Free State (UFS). The ethical clearance letter (UFS-HSD2023/0265/23) is included as Appendix B. Additionally, permission was granted by the CSA to contact all 14 cricket unions and their respective coaches/managers to facilitate access to players for participation in the study. The relevant permission letters are included as Appendix C.

A non-experimental, cross-sectional correlational research design was employed to study the relationships between the variables (Stangor, 2015). Data collection was completed via an online platform. The coaches/managers of each team were contacted and requested to distribute a recruitment email to all their squad members (Appendix D). The email introduced the study and included a link to an electronic informed consent form (Appendix E) and the research questionnaires (Appendix F). The respondents were able to access the questionnaire over a two-month period (5 July 2023–5 September 2023). All respondents provided written informed consent prior to participating in the study.

Data Analysis

Initially, normative, descriptive, and correlational analyses were performed. Thereafter, a between group multivariate analysis of variance (MANOVA) was carried out to test for differences in DM, MT, ER, and AC with respect to gender, level of competition, and

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playing role. Ordinary least squares (OLS) regression analysis was subsequently employed to investigate the potential mediating effect of ER and AC on the interaction between DM and MT (Hayes, 2017). The Statistical Package for the Social Sciences – version 29 (SPSS 29) (IBM Corporation, 2022) and the PROCESS macro version 4 for SPSS (Hayes, 2022) were used to conduct the data analysis.

Results

Descriptive Statistics and Correlations

Table 1 indicates that all the measuring instruments included in the study met the minimum required internal consistency of $\alpha > .60$ (Ponterotto & Ruckdeschel, 2007) for inclusion in psychological research. Cronbach's α coefficients ranged between .701 for the ATTC and .911 for the MTI. Furthermore, measures of skewness and kurtosis revealed no outliers or violations of assumptions of normality.

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Table 1

Reliabilities, Correlations, and Distribution of the Study Variables

	Attention control	Cognitive reappraisal	Expressive suppression	Mindfulness	Mental toughness
Mental toughness	.251**	.416**	.239**	.228**	-
Mindfulness	.418**	.128	-.044	-	
Expressive suppression	-.019	.386**	-		
Cognitive reappraisal	.206**	-			
α	.701	.760	.766	.900	.911
M	52.38	29.56	17.76	62.65	43.40
SD	6.75	5.96	5.55	14.70	9.19
Range	35-68	9-42	4-28	21-90	8-56
Kurtosis	-.222	.303	-.429	-.259	3.408
Skewness	.036	-.312	-.351	-.276	-1.688

Note: ** $p < .01$.

Attention control: The Attention Control Scale; Cognitive reappraisal and expressive suppression: The Emotion Regulation Questionnaire; Mindfulness: Mindfulness Attention Awareness Scale; Mental toughness: Mental Toughness Index

According to Table 1, MT demonstrates a moderate positive correlation with cognitive reappraisal ($r = .416, p < .001$) while also exhibiting weak positive correlations with DM ($r = .288, p < .001$), expressive suppression ($r = .239, p < .001$) and AC ($r = .251, p < .001$). Dispositional mindfulness demonstrates a moderate positive relationship with AC ($r = .418, p < .001$). However, there is no significant relationship between DM and either cognitive reappraisal ($r = .128, p = .063$) or expressive suppression ($r = -.044, p = .529$). Lastly, while expressive suppression and cognitive reappraisal are moderately positively correlated ($r = .386, p < .001$) and cognitive reappraisal is weakly correlated with AC

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($r = .206, p = .003$), no statistically significant linear relationship exists between AC and expressive suppression ($r = -.019, p = .785$). The reported statistically significant correlation coefficients are indicative of small ($r = .10$ to $.29$) to medium ($r = .30$ to $.49$) effect sizes (Cohen, 1988).

Tests for Differences in Gender, Level of Competition, and Playing Role

A MANOVA was carried out to test for possible gender (male, female, and non-binary), level of competition (Under-19, academy/development, provincial, and franchise), and playing role (batter, bowler, and all-rounder) differences in AC, cognitive reappraisal, expressive suppression, DM, and MT. To reduce the likelihood of a Type I error, a Bonferroni adjusted level of significance of .014 was set (Tabachnick & Fidell, 2007).

Preliminary testing did not reveal serious violations of the assumptions of normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance, or multicollinearity. The MANOVA yielded no significant gender differences regarding the combination of dependent variables (AC, cognitive reappraisal, expressive suppression, DM, and MT) ($F_{(10, 372)} = 2.176, p = .019$; Wilks' lambda = .968; partial eta squared = .055). Similarly, no significant differences were found with respect to the combination of dependent variables across level of competition ($F_{(15, 514)} = 1.381, p = .331$; Wilks' lambda = .151; partial eta squared = .036) and playing role ($F_{(10, 372)} = 1.359, p = .197$; Wilks' lambda = .953; partial eta squared = .035). Consequently, the conceptual mediation model presented below in Figure 1 was only tested for the total sample.

Mediation Model

The proposed interactions between DM, MT, AC, and ER are conceptually represented in Figure 1. In this conceptual model, it is proposed that DM influences AC (Path a_1), which in turn affects MT (Path b_1). Therefore, DM is thought to influence MT indirectly

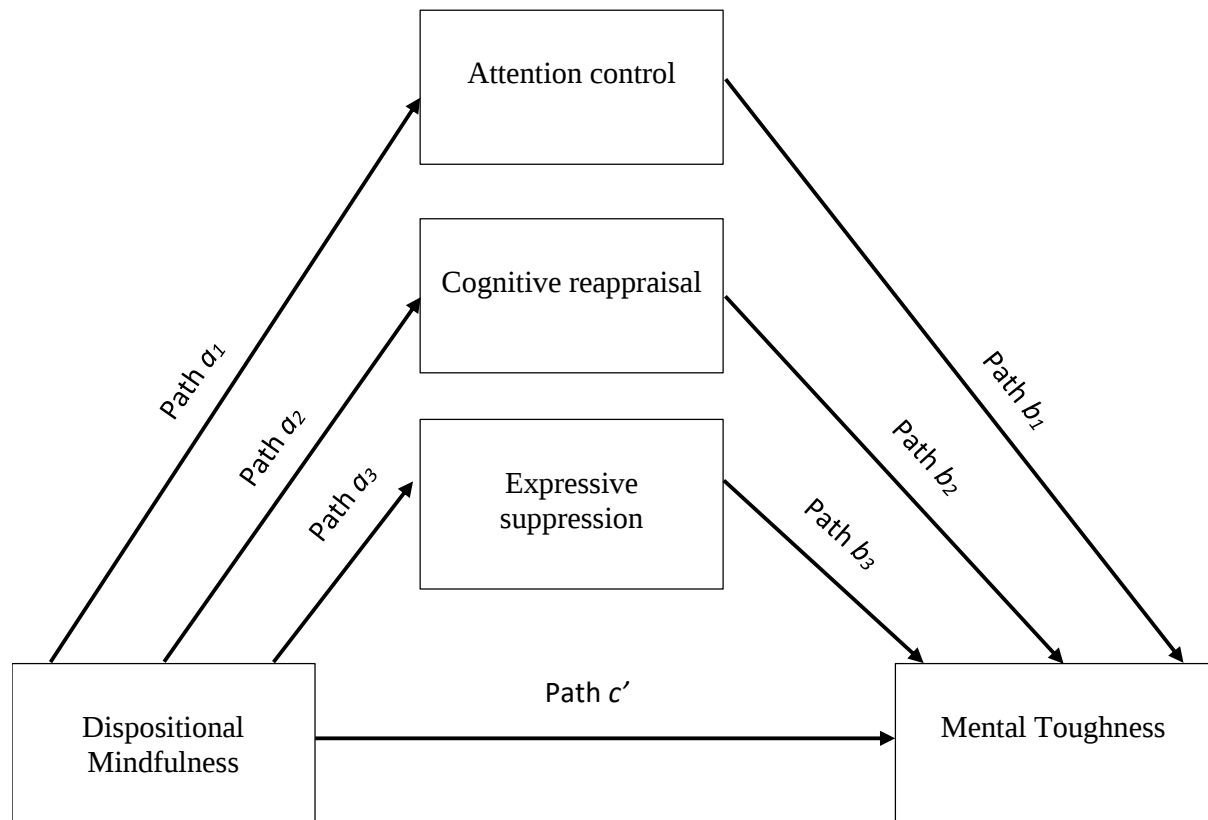
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through AC via Path ab_1 . Furthermore, it is proposed that DM influences cognitive reappraisal (Path a_2), which affects MT (Path b_2). Hence, DM may indirectly influence MT through cognitive reappraisal via Path ab_2 . In addition, DM is proposed to influence expressive suppression (Path a_3), which has an impact on MT (Path b_3). Therefore, DM may indirectly influence MT through expressive suppression via Path ab_3 . As proposed in Figure 1, when AC, cognitive reappraisal, and expressive suppression are kept constant, DM is thought to influence MT directly (Path c).

The Conceptual Parallel Mediation Model presented in Figure 1 uses the mediating effect of AT, cognitive reappraisal, and expressive suppression in the relationship between DM and MT.

Figure 1

Conceptual Parallel Mediation Model



A bias-corrected bootstrapping procedure was used to test for the possible mediating effect/s of AC and/or cognitive reappraisal and/or expressive suppression on the interaction between DM and MT (Hayes, 2017). The direct and indirect effects of DM on MT were investigated by regressing the proposed mediators on DM (AC = path a_1 ; cognitive reappraisal = path a_2 ; expressive suppression = path a_3), while MT was regressed on AC (path b_1), on cognitive reappraisal (path b_2), and on expressive suppression (path b_3). In addition, MT was regressed on DM via AC, cognitive reappraisal, and expressive suppression (path c').

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Table 2 indicates that in combination, DM, AC, cognitive reappraisal, and expressive suppression account for 22.8% of the variance in the MT scores of the respondents ($F_{(4, 206)} = 15.214, p = <.001, R^2 = .228$). Only DM ($p = .043$) and cognitive reappraisal ($p <.001$) emerged as significant predictors of MT. However, when compared with DM ($\beta = .137$), cognitive reappraisal ($\beta = .326$) explains a greater proportion of the variance in the sample's MT.

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Table 2*Regression Model Coefficients for DM, AC, Cognitive Reappraisal, and Expressive Suppression as Predictors of MT (N = 211)*

	Mental toughness							
	<i>b</i>	β	<i>SE</i>	95% CI	<i>p</i>	<i>F</i>	<i>dfs</i>	<i>R</i> ²
Full model	-	-	-	-	<.001	15.214	4: 206	.228
Dispositional mindfulness	.086	.137	.042	[.003, .169]	.043	-	-	-
Attention control	.175	.129	.093	[-.009, .359]	.062	-	-	-
Cognitive reappraisal	.502	.326	.105	[.294, .710]	<.001	-	-	-
Expressive suppression	.201	.121	.111	[-.018, .419]	.071	-	-	-
DM → AC → MT	.034	.054	.027	[.006, .112] ^a	-	-	-	-
DM → CR → MT	.026	.042	.027	[-.008, .100]	-	-	-	-
DM → ES → MT	-.003	-.005	.011	[-.028, .017]	-	-	-	-

CI: confidence interval; AC: attention control; CR: cognitive reappraisal; DM: dispositional mindfulness; ES: expressive suppression; MT: mental toughness

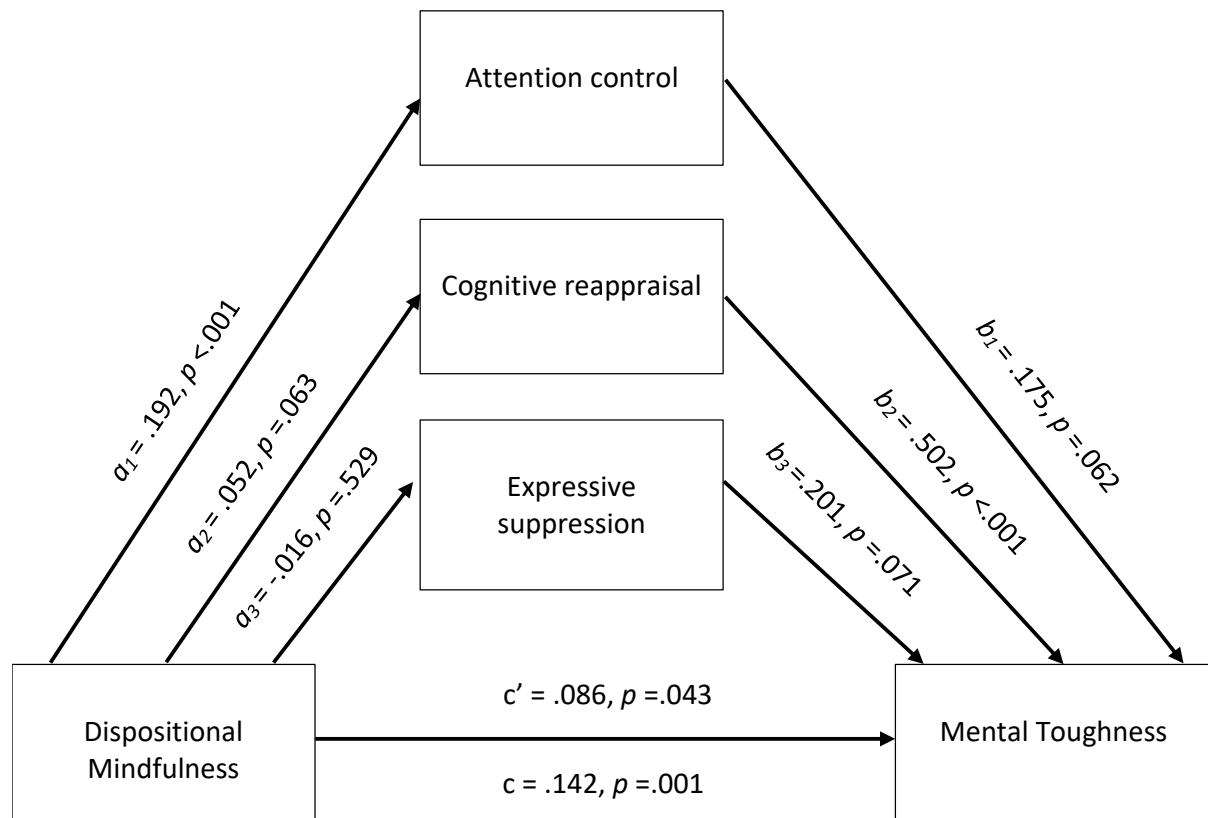
^a Effects are statistically significant as the confidence interval does not include 0

The results of the parallel mediation analysis depicted in Table 2 indicate that only AC partially mediates the interaction between DM and MT in the current sample ($a^1b^1 = .034$, 95% CI [.006, .112]). Consequently, an increase in MD is associated with an increase in AC, which in turn, is associated with an increase in MT. Cognitive reappraisal, while an independent predictor of MT, does not mediate the interaction between DM and MT ($a^2b^2 = .026$, 95% CI [-.008, .100]). In other words, while an increase in cognitive reappraisal is associated with increased MT, an increase in DM is not associated with increased cognitive reappraisal. Expressive suppression also fails to mediate the relationship between DM and MT ($a^3b^3 = -.003$, 95% CI [-.028, .017]).

The results of the parallel mediation analysis are graphically presented in Figure 2. In addition to the partial mediating effect of AC on the interaction between DM and MT as mentioned above, it is evident that DM continues to demonstrate a statistically significant relationship with MT even after controlling for the effects of AC and cognitive reappraisal, and the direct effect of expressive suppression ($c' = .086$, $p = .043$, 95% CI [.003, .169]).

Figure 2

The Mediating Effect of Attention Control, Cognitive Reappraisal, and Expressive Suppression in the Relationship Between Dispositional Mindfulness and Mental Toughness



Note: All effects are presented as unstandardised; a_1 is the effect of dispositional mindfulness on attention control, a_2 is the effect of dispositional mindfulness on cognitive reappraisal, and a_3 is the effect of dispositional mindfulness on expressive suppression; b_1 is the effect of attention control on mental toughness, b_2 is the effect of cognitive reappraisal on mental toughness, and b_3 is the effect of expressive suppression on MT; c' is the direct effect of dispositional mindfulness on mental toughness; c is the total effect of dispositional mindfulness on mental toughness.

Discussion

The current study aimed to contribute to the growing literature on the mechanisms of mindfulness and the extent to which DM, AC, and ER are associated with MT amongst

high-level cricketers. In addition, the study explored the potential mediating effects of AC and ER on the interaction between DM and MT in this population.

In the current study, MT was positively associated with AC, cognitive reappraisal, and expressive suppression. This is in keeping with the literature on MT and performance-enhancing states and processes in sport (e.g., Gucciardi et al., 2014; Jones et al., 2007; Liew et al., 2019; Mahoney et al., 2014; Stamatis et al., 2020) and with the limited body of cricket-specific MT research (Bell et al., 2013; Bull et al., 2005; Cotterill & Barker, 2013; Gucciardi & Gordon, 2009). The positive relationship found between DM and MT and between DM and AC in the present study corresponds to the growing body of empirical literature on the benefits of mindfulness within the arena of human performance (e.g., Ajilchi et al., 2019; Bühlmayer et al., 2017; Eilam-Stock et al., 2023; Röthlin et al., 2020; Wu et al., 2021). Contrary to expectation, however, DM did not demonstrate a significant relationship with ER (Josefsson et al., 2017; Vieth & Von Stockhausen, 2022; Wang et al., 2017; Wang, Tian et al., 2021; Wilson et al., 2019). While this anomalous finding may be peculiar to the specific sample and context of the current study, it may also provide support for claims that the relationships between mindfulness and specific affective-cognitive processes within the sporting domain are not yet well understood and require further investigation (Birrer et al., 2021; Josefsson et al., 2019).

In combination, DM, AC, cognitive reappraisal, and expressive suppression accounted for a statistically significant proportion of the variance in the MT of high-level South African cricketers. This finding supports the contention made in two cricket-specific theoretical frameworks that management of attentional resources and regulation of emotional states are important for MT (Bull et al., 2005; Gucciardi & Gordon, 2009). Furthermore, the current study offers additional support for the link between DM and MT in athlete

populations (Andersen, 2011; Jones & Parker, 2018; Walker, 2016; Wilson et al., 2019; Wu et al., 2021).

More importantly, this study adds to the limited evidence base for a positive association between DM and MT amongst cricketers (Griffith, 2012). However, DM, AC, and ER accounted for a relatively small proportion of the variance in the MT of the respondents in this study. These psychological processes, therefore, appear to be only a part of the MT issue in high-level cricket. Several other variables such as personality traits, cognitive styles, resilience, and affective states could also be associated with MT in this population (Bell et al., 2013; Gordon et al., 2017; Subhan et al., 2019).

The existing cricket-specific frameworks of MT propose that both AC and ER make a significant contribution to MT (Bull et al., 2005; Gucciardi & Gordon, 2009). However, in the current study, only the ER strategy of cognitive reappraisal was found to be independently related to MT. Consequently, the extent to which cricketers are able to reinterpret events, thoughts, and experiences in order to modulate their emotional response appears to have a direct impact on their MT (Griffith, 2012; Gucciardi & Gordon, 2009). This would seem to support the general trend in the literature identifying cognitive reappraisal as a generally adaptive ER strategy (Augustus et al., 2023; Birrer et al., 2021; Josefsson et al., 2019). While the current study does not support the contention that expressive suppression is a potentially harmful ER strategy (Gross & John, 2003; Kim & Tamminen, 2022; Lantrip et al., 2015; Preece et al., 2019), the results seem to suggest that expressive suppression does not have a significant impact on MT. A potential explanation for this finding might be that expressive suppression is a consequence or behavioural outcome of MT rather than a predictor of it. In addition, the current regression model might not reflect the complexity of

the interaction between cognitive reappraisal, expressive suppression, and MT (Gross, 2001; Gross & John, 2003).

Despite being hypothesised to be central to MT amongst cricketers (Bull et al., 2005; Gucciardi & Gordon, 2009), AC failed to demonstrate an independent association with MT in the current study. However, AC did partially mediate the interaction between DM and MT. This finding supports the contention of Birrer and colleagues (2012) that one of the ways that mindfulness has an impact on improved sporting performance is through improved attention, enabling athletes to be less distracted and better able to focus on goal-relevant aspects. The attention-based element of mindfulness could possibly result in athletes being more likely to improve their action orientation and MT (Birrer et al., 2012). The partial mediation effect of AC may provide further support for existing literature that suggests that DM contributes to MT by improving athletes' ability to sustain and shift their attention (Vieth & Von Stockhausen, 2022; Wang et al., 2017). This finding is particularly relevant for high-level cricketers, as the attentional component of cricket requires an exceptional amount of focus (Bull et al., 2022) in order to adhere to the minimal error tolerance inherent in the sport (Connor et al., 2020). Additionally, it is proposed that AC may enhance critical components of MT that are linked to skills such as maintaining focus and composure under pressure (Bull et al., 2005; Gucciardi & Gordon, 2009).

Cognitive reappraisal was associated with MT in the current study but did not mediate the interaction between DM and MT. Consequently, it appears that while cognitive reappraisal is associated with MT, it is not a psychological process through which DM influences MT and nor is DM significantly associated with cognitive reappraisal. This is contrary to much of the literature on the association between DM and the reduced impact of emotional distress amongst both athletes and the general public (Droutman et al., 2022; Celen

et al., 2024; Josefsson et al., 2017; Rogowska & Tataruch, 2024; Zhou et al., 2023). It could be argued that since DM is proposed to influence emotional states via awareness and acceptance rather than through active control or experiential avoidance, the lack of an association between DM, cognitive reappraisal, and expressive suppression is to be expected (Hawkes & Neale, 2020; Nargon-Gainey et al., 2017; Zhou et al., 2023). Garland et al. (2009) have suggested that although DM and cognitive reappraisal may share complementary mechanisms, these constructs may fulfil distinct functions. Alternatively, the psychological processes underlying cognitive reappraisal may require a level of cognitive control and evaluation that is not directly associated with DM. The association between DM and cognitive reappraisal may be mediated by processes such as increased self-awareness and distress tolerance, which allow the individual to engage in the identification, evaluation, and reappraisal of thoughts and perceptions. However, these components of cognitive reappraisal may not be associated with the more detached and non-judgemental nature of mindfulness (Birrer et al., 2012; Birrer et al., 2021; Bishop et al., 2004; Kabat-Zinn, 1994). It is possible that psychological processes such as acceptance and defusion may exhibit a more direct relationship with DM amongst cricketers or provide some insight into the possibility of an indirect relationship between DM and cognitive reappraisal (Gardner, 2009; Gardner & Moore, 2020).

Some research demonstrates differences in MT with respect to levels of competition and playing experience in certain sports (Guszkowska & Wójcik, 2021; Kristjánsdóttir et al., 2019; Weissensteiner et al., 2012; Wolter et al., 2022). No such differences were apparent in the current study. However, the relatively small sample, the categorisation of wicketkeepers as allrounders, and the lack of data on playing experience may have masked differences in the current data set. It has also been suggested that MT has been conceptualised from a

predominantly masculine perspective. Consequently, traditional conceptualisations and operationalisations of MT may not be applicable to female athletes. Empirical data on the impact of gender, level of competition, and playing role on AC, DM, and ER is sparse (Millán-Sánchez et al., 2023; Rintaugu et al., 2022; Rogowska & Tataruch, 2024; Wolter et al., 2022). No differences were found with respect to AC, DM, and ER across gender, playing role, and level of competition in the current sample. However, the constraints of sample size and design mentioned below should be considered when interpreting these findings.

Study Limitations and Directions for Future Research

The current study addresses a hereto unresearched topic within the MT literature in general and in regard to cricket specifically. However, the study is not without limitations. First, the study was conducted within a specific geographical and sociocultural context. Consequently, the findings cannot be generalised to other sporting or cricketing contexts. In addition, the respondents were recruited via convenience sampling, and this negates the possibility of making meaningful inferences regarding the impact of variables such as level of competition, playing experience, and gender on the outcome of the study. Moreover, the sample was not large enough to provide adequate statistical power on which to base meaningful conclusions. It is recommended that future research replicate this study across a variety of cricketing and other sporting contexts with larger and more representative samples.

Second, the current study made use of a cross-sectional design. Consequently, no conclusions could be drawn with respect to causality. There is hence a need for longitudinal studies that are aimed at establishing possible causal relationships between AC, DM, ER, and MT amongst high-level cricketers and are focused on very specific mechanisms.

Third, the regression model only accounted for a moderate proportion of the sample's MT scores. It is thus apparent that several variables that were not included in the study may make an additional contribution to the MT of high-level cricketers. Future research should test the effect of the other variables that are included in the theoretical models of MT such as resilience, self-belief, and decision-making (Bull et al., 2005; Gucciardi & Gordon, 2009).

Fourth, the mediation model only tested the direct mediating effect of AC and ER on the interaction between DM and MT. Additional research is required with respect to the possibility of more complex interactions between these variables and the possible reciprocal effects. Experimental and intervention-based research may also prove helpful in teasing out the nature and direction of the relationships between AC, DM, ER, and MT further.

Fifth, the relatively small sample, the categorisation of wicketkeepers as allrounders, and the lack of data on playing experience may have masked differences in the current data set. Future research should consider larger sample sizes and include more fine-grained analyses of playing experience, level of competition, and player role.

Finally, with the exception of the MTI, the study made use of generic measures. This was necessitated partly by a lack of valid sport-specific measures of DM, AC, and ER. In addition, very little of the literature on AC and ER has used athlete populations. Nevertheless, the current study should be replicated making use of alternative operationalisations and measures of AC and ER.

Conclusion

The current study found that DM and cognitive reappraisal are significant predictors of MT amongst high-level cricketers. Attention control mediates the relationship between DM and MT. These results further the understanding of the MT frameworks that have been

proposed in relation to cricket. The study further highlights the roles that AC and ER, and more specifically cognitive reappraisal, play in enhancing MT amongst high-level cricketers. This research adds to the growing body of literature on the impact of the mechanisms by which DM enhances sports performance. Practically, these findings suggest that cognitive behavioural interventions for coaches and administrators focused on mindfulness practices, attention-focused exercises, and cognitive reappraisal strategies could be beneficial in promoting and improving athletic performance. The effect of tailored mindfulness interventions and their mechanisms to enhance MT should be explored in future studies.

Declaration of Competing Interests

The authors declares that there are no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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Appendices

Appendix A: Instructions for Authors: *Psychology of Sport and Exercise*

PSYCHOLOGY OF SPORT AND EXERCISE

An Official Journal of the European Federation of Sport Psychology ([FEPSAC](#))

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Psychology of Sport and Exercise is an international forum for scholarly reports in the psychology of sport and exercise, broadly defined. The journal is open to the use of diverse methodological approaches. Manuscripts that will be considered for publication will present results from high quality empirical research, systematic reviews, meta-analyses, commentaries concerning already published PSE papers or topics of general interest for PSE readers, and reports of professional practice (which will need to demonstrate academic rigour and go beyond mere description).

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Types of article

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A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

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List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Math formulae

Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Artwork

Electronic artwork

General points

- Make sure you use uniform lettering and sizing of your original artwork.
- Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
- Indicate per figure if it is a single, 1.5 or 2-column fitting image.
- For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.
- Please note that individual figure files larger than 10 MB must be provided in separate source files.

MENTAL TOUGHNESS

A detailed [guide on electronic artwork](#) is available.

You are urged to visit this site; some excerpts from the detailed information are given here.

Formats

Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):

EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'.

TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.

TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi.

TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.

Please do not:

- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low.
- Supply files that are too low in resolution.
- Submit graphics that are disproportionately large for the content.

Color artwork

Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article.** Please indicate your preference for color: in print or online only. [Further information on the preparation of electronic artwork.](#)

Figure captions

Ensure that each illustration has a caption. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References

Citation in text

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the

journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

MENTAL TOUGHNESS

Data references

This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

Preprint references

Where a preprint has subsequently become available as a peer-reviewed publication, the formal publication should be used as the reference. If there are preprints that are central to your work or that cover crucial developments in the topic, but are not yet formally published, these may be referenced. Preprints should be clearly marked as such, for example by including the word preprint, or the name of the preprint server, as part of the reference. The preprint DOI should also be provided.

References in a special issue

Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support [Citation Style Language styles](#), such as [Mendeley](#). Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. [More information on how to remove field codes from different reference management software.](#)

Reference formatting

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/ book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style

Text: Citations in the text should follow the referencing style used by the American Psychological Association. You are referred to the Publication Manual of the American Psychological Association, Seventh Edition, ISBN 978-1-4338-3215-4, copies of which may be [ordered online](#).

List: references should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples:

Reference to a journal publication:

Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2010). The art of writing a scientific article. *Journal of Scientific Communications*, 163, 51–59.
<https://doi.org/10.1016/j.sc.2010.00372>.

Reference to a journal publication with an article number:

Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2018). The art of writing a scientific article. *Heliyon*, 19, Article e00205. <https://doi.org/10.1016/j.heliyon.2018.e00205>.

Reference to a book:

Strunk, W., Jr., & White, E. B. (2000). *The elements of style* (4th ed.). Longman (Chapter 4).

Reference to a chapter in an edited book:

Mettam, G. R., & Adams, L. B. (2009). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), *Introduction to the electronic age* (pp. 281–304). E-Publishing Inc.

Reference to a website:

Powertech Systems. (2015). *Lithium-ion vs lead-acid cost analysis*. Retrieved from <http://www.powertechsystems.eu/home/tech-corner/lithium-ion-vs-lead-acid-cost-analysis/>. Accessed January 6, 2016

Reference to a dataset:

[dataset] Oguro, M., Imahiro, S., Saito, S., & Nakashizuka, T. (2015). *Mortality data for Japanese oak wilt disease and surrounding forest compositions*. Mendeley Data, v1. <https://doi.org/10.17632/xwj98nb39r.1>.

Reference to a conference paper or poster presentation:

Engle, E.K., Cash, T.F., & Jarry, J.L. (2009, November). *The Body Image Behaviours Inventory-3: Development and validation of the Body Image Compulsive Actions and Body Image Avoidance Scales*. Poster session presentation at the meeting of the Association for Behavioural and Cognitive Therapies, New York, NY.

Reference to software:

Coon, E., Berndt, M., Jan, A., Svyatsky, D., Atchley, A., Kikinzon, E., Harp, D., Manzini, G., Shelef, E., Lipnikov, K., Garimella, R., Xu, C., Moulton, D., Karra, S., Painter, S., Jafarov, E., & Molins, S. (2020, March 25). *Advanced Terrestrial Simulator (ATS) v0.88 (Version 0.88)*. Zenodo. <https://doi.org/10.5281/zenodo.3727209>.

Reference style

Text: Citations in the text should follow the referencing style used by the American Psychological Association 7th Edition. You are referred to the most recent publication

manual of the American Psychological Association. Information can be found at
<https://apastyle.apa.org/>.

List: references should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples:

Reference to a journal publication:

Woodman, T., Akehurst, S., Hardy, L., & Beattie, S. (2010). Self-confidence and performance: A little self-doubt helps. *Psychology of Sport and Exercise*, 11(6), 467-470.
<https://doi.org/10.1016/j.psychsport.2010.05.009>

Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2010). The art of writing a scientific article. *Journal of Scientific Communications*, 163, 51-59.

Reference to a book:

Strunk, W., Jr., & White, E. B. (1979). *The elements of style*. (4th ed.). New York: Longman, (Chapter 4).

Reference to a chapter in an edited book:

Mettam, G. R., & Adams, L. B. (2009). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), *Introduction to the electronic age* (pp. 281-304). New York: E-Publishing Inc.

Appendix B: Ethical Clearance Letter



GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

26-Apr-2023

Dear Mr Sachintha Galhenage

Application Approved

Research Project Title:

Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers

Ethical Clearance number:

UFS-HSD2023/0265/23

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. Furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

Yours sincerely

Dr Adri Du Plessis

Chairperson: General/Human Research Ethics Committee

205 Nelson Mandela Drive P.O. Box 339
Park West Bloemfontein 9500
Bloemfontein 9301 Tel: +27 (0)51 401 9337
South Africa adriplessis@ufs.ac.za
www.ufs.ac.za



Appendix C: Permission Letters



Cricket South Africa (NPC)
86, 5th Street, Melrose Estate, 2196
PO Box 55009, Northlands, 2116
Tel: +27 (0)11 880 2810
Fax: +27 (0)11 880 6578
Website: www.cricket.co.za

5th July 2023

Ms Sachintha Galhenage
sgalhenage@yahoo.com
c/o University of Free State

Dear Sachintha

RE: PERMISSION TO CONTACT CRICKET SOUTH AFRICA'S PLAYERS FOR RESEARCH PURPOSES

In my capacity as Chief Medical Officer: Cricket South Africa, I grant permission for the study titled "Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers" to be conducted and to invite provincial coaches players to participate voluntarily.

DR SHUAIB MANJRA

CHIEF MEDICAL OFFICER



**CRICKET FREE STATE
MANGAUNG OVAL**

**Att Horak Street
Bloemfontein**

T: +27 (51) 447 5715

F: +27 (51) 447 2208

www.knightscricket.co.za

2022/08/01

The Chairperson

General/Human Research Ethics Committee

University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Free State Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The Free State Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind regards Free State Cricket

X Snyders (President) • Z Thamae (Vice President) • W Boyes (Vice President) • E Tlhakung • E Qwelane • S Katzee • K Molo • J Mosala



Eastern Province Cricket (NPC)
Registration Number 2003/005730/08
St. Georges Park Stadium
PO Box 12327, Centrahill, 6006 | www.stgeorgespark.co.za
Office : +27 41 585 1646 | Fax: +27 41 506 6677



2022/08/01

The Chairperson

General/Human Research Ethics Committee

University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Eastern Province Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.

The Eastern Province Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind Regards

Eastern Province Cricket

DIRECTORS: Mr L Coetzee ^{NID} (President), Mr L Miggels ^{NID} (Vice President), Ms D Marais ^{NID}, Mr. L. Nkantsu ^{ID} (Lead), Mr E Jacobs (Chief Executive Officer), Mrs N Tys ^{ID}, Mr R Potgieter ^{NID}, Mr A MacPherson ^{NID}, Mr Tono Mle ^{NID}, Mr S Jodwana ^{NID}, Mr T Harper ^{ID}, Mr S Cokile ^{ID}, Mr M Lorgat ^{ID}. (**Independent Director** ^{ID}; **Non-Independent Director** ^{NID})

2022/08/09

The Chairperson

General/Human Research Ethics Committee

University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Lions Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The Lions Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind regards



Reuben Mandlazi

Cricket Services Manager

reubenm@cricket.co.za

MENTAL TOUGHNESS



KwaZulu Natal Cricket Union
P.O. Box 47266, Greyville, 4023,
Kingsmead Stadium

2 Kingsmead Way,
off Masabalala Yengwa Avenue,
Durban 4001

Telephone: 031 335 4200

Fax: 031 332 5288

Playing Affairs Fax: 031 335 5288

Email: dolphins@cricket.co.za

VAT No: 4760101461

25 November 2022

The Chairperson

General/Human Research Ethics Committee

University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Kwa Zulu-Natal Cricket Union has approved the application by Mr Sachintha Galhenage (student number: 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The Kwa Zulu-Natal Cricket Union undertakes to promote and facilitate participation by players in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind Regards

Yours sincerely,

Yashveer Singh



President Yunus Bobat | Vice-Presidents Daniel Govender & Victor Xulu | Treasurer Dilip Hariram | CEO Heinrich Strydom | 026-796-NPO

www.dolphinscricket.co.za





2022/08/01
The Chairperson
General/Human Research Ethics Committee
University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Limpopo Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.

The Limpopo Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers' names or email addresses.

Kind regards
Limpopo Cricket



Mpumalanga Cricket Union

Silver Circle Avenue
Bankenveld Estate
eMalaheni, 1035
VAT No.: 4360212817

Postnet Suite 354
Private bag X7260
Witbank, 1035

Website: www.pumascricket.co.za
E-Mail: jacov@cricket.co.za
Mobile: 083 580 6657

11 October 2022

The Chairperson

General/Human Research Ethics Committee

University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Mpumalanga Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The Mpumalanga Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Regards

Jaco Visagie
CEO

Jaco Visagie (CEO)



2022/08/01

The Chairperson
General/Human Research Ethics Committee
University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Northern Cape Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The Northern Cape Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind regards

Thapelo January
Acting CEO-Northern Cape Cricket



2022/08/01

The Chairperson
General/Human Research Ethics Committee
University of the Free State

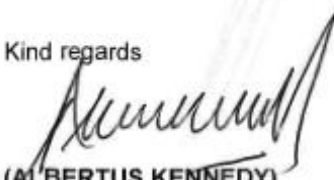
Dear Sir/Madam,

Permission Letter: Approval to conduct research study

This is to confirm that the South Western District Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The South Western District Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind regards


(ALBERTUS KENNEDY)

CHIEF EXECUTIVE OFFICER: SWD CRICKET

2022/08/01

The Chairperson
General/Human Research Ethics Committee
University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Western Province Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The Western Province Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.



Kind regards
Israar Roman
Western Province Blitz Team Manager



Border Cricket NPC
Buffalo Park Cricket Ground
Buffalo Park Drive, East London, 5201
PO Box 803, East London, 5200
Telephone: 043 7437757 | Facsimile: 043 7433293
Email: bev@cricket.co.za

2022/08/05

The Chairperson
General/Human Research Ethics Committee
University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Border Cricket has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

Border Cricket undertakes to promote and facilitate participation by players in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Border Cricket further requests that we will receive immediate feedback on the outcome of the study to see how we can apply the research, which could potentially make a difference to our game.

Kind regards

CORRIE VAN ZYL
ACTING CHIEF EXECUTIVE OFFICER

Border Cricket (Association Incorporated under Section 21)
Directors: S Ndzundzu, N Rubushe, L Dinge, M Macanda, P Dhlodhlo*, J Korkie*, K Mintoor* & L Vusani*

C Van Zyl (Acting Chief Executive Officer)
Company registration number: 2000/012072/08

(* denotes Independent Director)



Eastern Cricket

(NPC - Non Profit Company)

“Committed to a Spirit of Unity and Co-operation”

REG. NO. 2002/005498/08

VAT No. 4880204922

2022/10/19

The Chairperson
General/Human Research Ethics Committee
University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Eastern Cricket has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The Eastern Cricket undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind regards,

Not Signed – Electronically send

Berrelyn Platt
Club Cricket Coordinator



Telephone: (011) 746 9000 · Facsimile: 086 631 1521
Willowmoore Park Cricket Stadium · Harpur Avenue, Benoni
P.O Box 596, Benoni, 1500 · Website: www.easterncricket.co.za





2022/08/01

The Chairperson
General/Human Research Ethics Committee
University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Northerns Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The Northerns Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind Regards
Northerns Cricket Union

22 June 22





Kwa-Zulu Natal Inland Cricket Union
P.O. Box 2729, Pietermaritzburg, 3200,
The Oval Cricket Ground

1 Park Drive, Pelham,
Pietermaritzburg 3200

Telephone: 033 345 2791

Fax: 033 345 0202

Email: kzninlandrecpecricket.co.za

VAT No.: 4760101461

2022/08/01

The Chairperson

General/Human Research Ethics Committee

University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the Kwa Zulu-Natal Inland Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected titled: Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.

The Kwa Zulu-Natal Inland Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind regards Kwa Zulu-Natal Inland Cricket

President Shaun van der Byl | **Vice-President** Bongani Sibya | **CEO** Jason Sathiasaelan | **026-796-NPO**

 @Tuskers.Cricket

 @Tuskers.Cricket

 @Tuskers_Cricket





2022/08/01

The Chairperson

General/Human Research Ethics Committee

University of the Free State

Dear Sir/Madam

Permission Letter: Approval to conduct research study

This is to confirm that the North West Cricket Union has approved the application by Mr Sachintha Galhenage (student number 2016066256) from the University of Free State to approach us to assist in recruiting participants for the research projected tilted: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers.**

The North West Cricket Union undertakes to promote and facilitate participation by player in the project. It is understood that administrators at each Provincial Cricket Union will be required to distribute a recruitment email and link to the research questionnaire to players via email. At no time will Mr Galhenage have access to the cricketers names or email addresses.

Kind regards North West Cricket

Isaac Minter
(Isaac Minter)

Reg No: 2004/022639/08



Appendix D: Invitation Email

Dear Cricketer

You are hereby invited to participate in a research project entitled: **Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers**. The project has received ethical clearance from the General/Human Research Ethics Committee at the University of the Free State (UFS-HSD 2023/0265/23) and approved by your cricket union.

The research project is focused on the relationship between attention, emotional regulation, mindfulness and mental toughness among high-level cricketers in South Africa. As a high-level cricketer, your input would be extremely useful.

Please follow the link below to find out more about the study, complete the informed consent form and complete the questionnaire (if you so wish). It should take approximately 10 to 15 minutes to complete the questionnaire.

(https://docs.google.com/forms/d/e/1FAIpQLSfMOhdcSXvOiDNEc_IkevHYtV5aObxGuxrlth87aluv92qqmA/viewform?usp=pp_url)

Your participation is greatly appreciated.

Should you have any questions or concerns about the research project, you are welcome to contact Sachintha Galhenage (the researcher) at 0767789203 or sgalhenage@yahoo.com, Prof Stephen Walker (research supervisor) at 051 401 2424 or walkersp@ufs.ac.za, or the secretary of the General and Human Research Ethics Committee, Ms C Vercueil at 051 401 7083 or vercueilcc@ufs.ac.za.

Sincerely,

Sachintha Galhenage

MENTAL TOUGHNESS

**Appendix E: Information Sheet and Informed Consent****RESEARCH STUDY INFORMATION LEAFLET AND CONSENT FORM****TITLE OF THE RESEARCH PROJECT**

Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers

PRINCIPLE INVESTIGATOR:

Sachintha Galhenage

Sgalhenage@yahoo.com

076 7789 203

PROJECT INFORMATION:

We are interested in discovering more about the psychological factors that contribute to mental toughness among high-level cricket players in South Africa. More specifically, we are interested in the way in which mindfulness potentially contributes to mental toughness through attention and emotional regulation. As a high-level cricketer you are able to provide valuable information in this regard.

Should you decide to participate in this research project, you would be expected to complete a series of questionnaires exploring mindfulness, mental toughness, emotional regulation and attention control. It is expected that the questionnaires would take between 10 and 15 minutes to complete. You will be asked to provide demographic information such as your age, gender, current level of competition and identified role in the team. This information will be treated in

the strictest confidence with only the Principal Investigator and his research supervisor having access to it. All data gathered from the study will be analysed and reported at the group level. This means that the findings from the study will be reported for all participants and that no individual athlete's data or information will be identifiable. The researcher will ensure the physical security and confidentiality of all questionnaires and electronic versions of the data (e.g., spread sheets).

Participation in this research project is entirely voluntary and you have the right to refuse to do so. You also have the right to withdraw from the data collection at any time. You will not be penalized in any way for refusing to participate in the study. Similarly, you will not derive any direct benefit from your participation in the research. However, the data you provide will make a significant contribution towards better understanding both the roles that mindfulness, attention and emotional regulation in the mental toughness of cricketers.

Participation in this study poses no threat to your physical or emotional wellbeing. It will, however, require some of your time and require some data. Consequently, it is suggested that you complete the questionnaire at a time that is convenient to you. Making use of the cricket unions data network or similar free services will ensure that you do not incur any data costs. Completing questionnaires of this nature might cause individuals to reflect on how they approach challenges in their lives. Should this be your experience, you are welcome to make contact with the South African Depression and Anxiety Group (0800 567 567/sadag.org) helpline to discuss any questions or concerns you might have.

This research project has received ethical clearance from the General and Human Research Ethics Committee at the University of the Free State. Your cricket union has also given us permission to approach you to participate in the study. You are welcome to direct any question you have regarding your participation in this project to Sachintha Galhenage (076 7789 203 [/Sgalhenage@yahoo.com](mailto:Sgalhenage@yahoo.com)) or the research supervisor, Prof Stephen Walker (051 401 2424/walkersp@ufs.ac.za) . Furthermore, you are encouraged to contact the secretary of the General Human Research Ethics Committee at the University of the Free State (Mrs C

MENTAL TOUGHNESS



Vercueil: 051 401 7083; vercueilcc@ufs.ac.za) should you have any concerns or complaints regarding any aspect of this research.

Thank you for taking the time to read this information sheet. If you have decided not to participate in the research, please click “I do not agree” at the bottom of the informed consent form. If, after reading the informed consent form, you are willing to participate in the study, please click “I agree to participate in the study”.

CONSENT TO PARTICIPATE IN THIS STUDY

By selecting the “**agree**” option at the bottom of this informed consent form, I confirm that I voluntarily agree to participate in the research study: *Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers* conducted by Sachintha Galhenage (the “**Researcher**”).

I, the undersigned Participant, further confirm that–

1. the Researcher has explained the nature, procedure, potential benefits and anticipated inconvenience of my participation in the Study;
2. I have read (or had explained to me) and understood the Study as explained in the information page;
3. I have had sufficient opportunity to ask questions and am prepared to participate in the Study;
4. I understand that my participation in the Study is entirely voluntary and that I am free to withdraw at any time without penalty (if applicable);
5. I voluntarily provide the UFS and the Researcher with my personal information and consent to the UFS and the Researcher collecting, disclosing and processing my personal information in order to conduct the Study and any related activities in relation thereto;

MENTAL TOUGHNESS

6. I hereby acknowledge and confirm that I understand the purpose for which the UFS and the Researcher may collect, store, use, delete, destroy, outsource, transfer or otherwise process, as the context and circumstances may require and as contemplated in terms of POPIA, my personal information as set out herein;
7. I am aware that the findings of the Study will be anonymously processed into a research report, journal publications and/or conference proceedings and that my personal information will be aggregated and deidentified at such stage;
8. I also give the UFS permission to share, without notification, the collected data with other researchers at the UFS or other Higher Education Institutions. This permission is dependent on the same principles of ethical research practices, anonymity/confidentiality, safekeeping of information, and other issues listed above applying.

I, the Participant, agree to completion of the questionnaire

☐

Agree

☐

Do not agree

Appendix F: Questionnaires

Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers 2024/03/01, 13:50

Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers

* Indicates required question

1. Age *

Mark only one oval.

☐ 18 or older

☐ Younger than 18 Skip to section 9 (**Thank you for your participation!**)

Information sheet

PLEASE READ THE FOLLOWING INFORMATION REGARDING THE STUDY
RESEARCH STUDY INFORMATION LEAFLET

TITLE OF THE RESEARCH PROJECT

Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers

PRINCIPLE INVESTIGATOR:

Sachintha Galhenage

Sgalhenage@yahoo.com

076 7789 203

PROJECT INFORMATION:

We are interested in discovering more about the psychological factors that contribute to mental toughness among high-level cricket players in South Africa. More specifically, we are interested in the way in which mindfulness potentially contributes to mental toughness through attention and emotional regulation. As a high-level cricketer you are able to provide valuable information in this regard.

Should you decide to participate in this research project, you would be expected to complete a series of questionnaires exploring mindfulness, mental toughness, emotional regulation and attention control. It is expected that the questionnaires would take between 10 and 15 minutes to complete. You will be asked to provide demographic information such as your age, gender, current level of competition and identified role in the team. This information will be treated in the strictest confidence with only the Principal Investigator and his supervisor having access to it. All data gathered from the study will be analysed and reported at the group level. This means that the findings from the study will be reported for all athletes taking part in the study and that no individual athlete's data or information will be identifiable. The researcher will ensure the physical security and confidentiality of all questionnaires and electronic versions of the data (e.g., spread sheets).

Participation in this research project is entirely voluntary and you have the right to refuse to do so. You also have the right to withdraw from the data collection at any time. You will not be penalized in any way for refusing to participate in the study. Similarly, you will not derive any direct benefit from your participation in the research. However, the data you provide will make a significant contribution towards better understanding both the roles that mindfulness, attention and emotional regulation in the mental toughness of cricketers.

Participation in this study poses no threat to your physical or emotional wellbeing. It will, however, require some of your time and require some data. Consequently, it is suggested that you complete the questionnaire at a time that is convenient to you. Making use of the cricket unions data network or similar free services will ensure that you do not incur any data costs. Completing questionnaires of this nature might cause individuals to reflect on their emotional wellbeing or to look differently at how they approach challenges in their lives. Should this be your experience, you are welcome to make an appointment with the team doctor of your province or the South African Depression and Anxiety Group helpline to discuss any questions or concerns you might have.

This research project has received ethical clearance from the General Human Research Ethics Committee at the UFS (UFS-HSD2023/0265/23). Your cricket union has also given us permission to approach you to participate in the study. You are welcome to direct any questions you have regarding your participation in this project to Sachintha Galhenage (076 7789 203 /Sgalhenage@yahoo.com) or the research supervisor, Prof Stephen Walker (051 401 2424/walkersp@ufs.ac.za). Furthermore, you are encouraged to contact the secretary of the General Human Research Ethics Committee at the University of the Free State (Mrs C Vercueil: 051 401 7083; vercueilcc@ufs.ac.za) should you have any concerns or complaints regarding any aspect of this research.

Attention control and emotional regulation as mediators in the rel...en mindfulness and mental toughness amongst high-level cricketers 2024/03/01, 13:50

Thank you for taking the time to read this information sheet. If you have decided not to participate in the research, please click "I do not agree" at the bottom of the informed consent form. If, after reading the informed consent form, you are willing to participate in the study, please click "I agree to participate in the study".

Informed Consent

CONSENT TO PARTICIPATE IN THIS STUDY

By selecting the “**agree**” option at the bottom of this informed consent form, I confirm that I voluntarily agree to participate in the research study: *Attention control and emotional regulation as mediators in the relationship between mindfulness and mental toughness amongst high-level cricketers* conducted by Sachintha Galhenage (the “**Researcher**”).

I, the undersigned Participant, further confirm that–

1. the Researcher has explained the nature, procedure, potential benefits and anticipated inconvenience of my participation in the Study;
2. I have read (or had explained to me) and understood the Study as explained in the information page;
3. I have had sufficient opportunity to ask questions and am prepared to participate in the Study;
4. I understand that my participation in the Study is entirely voluntary and that I am free to withdraw at any time without penalty (if applicable);
5. I voluntarily provide the UFS and the Researcher with my personal information and consent to the UFS and the Researcher collecting, disclosing and processing my personal information in order to conduct the Study and any related activities in relation thereto;
6. I hereby acknowledge and confirm that I understand the purpose for which the UFS and the Researcher may collect, store, use, delete, destroy, outsource, transfer or otherwise process, as the context and circumstances may require and as contemplated in terms of POPIA, my personal information as set out herein;
7. I am aware that the findings of the Study will be anonymously processed into a research report, journal publications and/or conference proceedings and that my personal information will be aggregated and deidentified at such stage;
8. I also give the UFS permission to share, without notification, the collected data with other researchers at the UFS or other Higher Education Institutions. This permission is dependent on the same principles of ethical research practices, anonymity/confidentiality, safekeeping of information, and other issues listed above applying.

2. Mark only one circle *

Mark only one oval.

☐ I AGREE TO PARTICIPATE IN THE STUDY

☐ I DO NOT AGREE TO PARTICIPATE IN THE STUDY (Skip to section 9) (Please click "SUBMIT
Skip to section 9 (**Thank you for your participation!**)

Demographics

3. Age *

4. Gender *

Check all that apply.

☐ Male

☐ Female

☐ Non-binary

5. Level of competition *

Mark only one oval.

☐ Under 19

☐ Development (rural)

☐ Academy

☐ Provincial

☐ Franchise

6. Identified role in the team *

Mark only one oval.

- ☐ Batsmen
☐ Bowler
☐ All-rounder
☐ Wicketkeeper/Batsmen

Mindful Attention Awareness Scale (MAAS)

Instructions: Below is a collection of statements about everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1 (Almost Always); 2 (Very Frequently); 3 (Somewhat Frequent); 4 (Somewhat Infrequent); 5 (Very Infrequently); 6 (Almost Never)

7. I could be experiencing some emotion and not be conscious of it until some time later. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

8. I break or spill things because of carelessness, not paying attention, or thinking of something else.

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

9. I find it difficult to stay focused on what's happening in the present. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

10. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

11. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

12. I forget a person's name almost as soon as I've been told it for the first time. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

13. It seems I am "running on automatic" without much awareness of what I'm doing. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

14. I rush through activities without being really attentive to them. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

15. I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

16. I do jobs or tasks automatically, without being aware of what I'm doing. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

17. I find myself listening to someone with one ear, doing something else at the same time. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

18. I drive places on "automatic pilot" and then wonder why I went there. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

19. I find myself preoccupied with the future or the past. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

20. I find myself doing things without paying attention. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

21. I snack without being aware that I'm eating. *

Mark only one oval.

1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

Mental Toughness Index (MTI)

Instructions: Using the scale below, please indicate how true each of the following statements is an indication of how you typically think, feel, and behave as an athlete – remember there are no right or wrong answers, so be as honest as possible.

1	2	3	4	5	6	7
False, 100% of the time						True, 100% of the time

22. I believe in my ability to achieve my goals. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

23. I am able to regulate my focus when performing tasks. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

24. I am able to use my emotions to perform the way I want to. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

25. I strive for continued success. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

26. I execute my knowledge of what is required to achieve my goals. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

27. I consistently overcome adversity. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

28. I am able execute appropriate skills or knowledge when challenged. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

29. I can find a positive in most situations. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

Emotion Regulation Questionnaire (ERQ)

Instructions: I would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the scale below. Please take note that 1= Strongly disagree, 7= Strongly agree and 4= Neutral.

MINDFULNESS, ATTENTION CONTROL AND EMOTIONAL REGULATION IN MENTAL TOUGHNESS

Attention control and emotional regulation as mediators in the relation between mindfulness and mental toughness amongst high-level cricketers 2024/03/01, 13:50

	1	2	3	4	5	6	7	
Strongly disagree	☐	☐	☐	☐	☐	☐	☐	Strongly agree

30. When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

31. I keep my emotions to myself. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

32. When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

33. When I am feeling positive emotions, I am careful not to express them. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

34. When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

35. I control my emotions by not expressing them. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

36. When I want to feel more positive emotion, I change the way I'm thinking about the situation.

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

37. I control my emotions by changing the way I think about the situation I'm in. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

38. When I am feeling negative emotions, I make sure not to express them. *

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

39. When I want to feel less negative emotion, I change the way I'm thinking about the situation.

Mark only one oval.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐

Attention Control Scale (ATTC)

Instructions: Here are some different ways that people can feel about working and concentrating. Please indicate how strongly each statement applies to you.

- 1 = Almost never
2 = Sometimes
3 = Often
4 = Always

40. 1. It's very hard for me to concentrate on a difficult task when there are noises around. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

41. When I need to concentrate and solve a problem, I have trouble focusing my attention. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

42. When I am working hard on something, I still get distracted by events around me. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

43. My concentration is good even if there is music in the room around me. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

44. When concentrating, I can focus my attention so that I become unaware of what's going on in the room around me.

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

45. When I am reading or studying, I am easily distracted if there are people talking in the same room.

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

46. When trying to focus my attention on something, I have difficulty blocking out distracting thoughts.

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

47. I have a hard time concentrating when I'm excited about something. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

48. When concentrating I ignore feelings of hunger or thirst. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

49. I can quickly switch from one task to another. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

50. It takes me a while to get really involved in a new task. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

51. It is difficult for me to coordinate my attention between the listening and writing required when taking notes during lectures.

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

52. I can become interested in a new topic very quickly when I need to. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

53. It is easy for me to read or write while I'm also talking on the phone. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

54. I have trouble carrying on two conversations at once. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

55. I have a hard time coming up with new ideas quickly. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

56. After being interrupted or distracted, I can easily shift my attention back to what I was doing before.

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

57. When a distracting thought comes to mind, it is easy for me to shift my attention away from it.

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

58. It is easy for me to alternate between two different tasks. *

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

59. It is hard for me to break from one way of thinking about something and look at it from another point of view.

Mark only one oval.

1	2	3	4
☐	☐	☐	☐

Appendix G: Turnitin Report

S.Galhenage Research 2024
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Submission ID: 2520604965
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Introduction

Mental Toughness

Mental toughness (MT) is a multifaceted psychological construct constituting cognitive, affective, and behavioural dimensions (Stamatis et al., 2020). It is often viewed as fundamental for high-level sporting performance (Hardy et al., 2014; Jones et al., 2007; Stamatis et al., 2020). Mental toughness can be defined as the consistent ability to produce a significant degree of subjective or objective performance in the face of adversities, challenges, and stressors (Gucciardi et al., 2014; Mahoney et al., 2014). Scholars have affirmed that MT is one of the most important psychological characteristics related to successful outcomes in elite sports (McGeown et al., 2015; Guskowska & Wójcik, 2021; Ruparel, 2020; Stamatis et al., 2020). The interest in understanding and promoting MT in sport has resulted in increased empirical work across different sporting environments (Bell et al., 2013; Ajilchi et al., 2021; Mahoney et al., 2015; Rintaugu et al., 2022).

According to Subhan et al. (2019), cricket is a game in which players experience constant pressure; they are pushed to their limits of endurance and are constantly striving to achieve excellence. Bull et al. (2005) state that cricket is a sport that requires 'chronic' MT for the athlete to reach the pinnacle and to maintain a high level of performance in order to stay at the top. Cotterill and Barker (2013) assert that the most significant challenge for a cricketer is not learning the technical skills but managing the multitude of factors that can affect the individual's mind and thinking during a game. In addition, Weissensteiner et al. (2012) found that amongst highly skilled batsmen, only MT significantly predicted differences in batting performance. Despite the apparent increasing recognition of the importance of MT in cricket, empirical research seems to be limited.

The developing understanding of MT in cricket is currently underpinned by two frameworks. Bull et al. (2005) developed a cricket-specific model of MT that emphasises the

role of environmental influences, tough character, tough attitude, and tough thinking. Tough thinking represents the main psychological component of a mentally tough mind in this model (Bull et al., 2005). Tough thinking primarily demonstrates a player's ability to become aware of their thoughts and emotions and to maintain attention control (AC).

In the second model of cricket-specific MT, Gucciardi and Gordon (2009) present six core components of MT in cricketers. These are self-belief or confidence in one's ability to succeed; affective intelligence (refers to managing emotions to enhance performance); desire to achieve (emphasises the drive for continuous improvement); resilience (refers to the capacity to recover from setbacks and to persist through challenges); AC (the ability to maintain focus and concentration); and cricket smarts (involves understanding the game and applying this knowledge to achieve success). Both frameworks suggest that the components of MT in cricketers can be viewed as environmental and dispositional (character, resilience, desire to achieve, cricket smarts, and self-belief) or more state-like (e.g., tough thinking, tough attitudes, affective intelligence, and AC) (Bull et al., 2005; Gucciardi & Gordon, 2009).

Psychological interventions that are aimed at improving sporting performance have traditionally targeted state-like constructs such as attitudes, cognition, and emotional regulation (ER) (Birrer et al., 2012; Reyes-Bossio et al., 2022; Röthlin et al., 2016). However, scant attention has been paid to determining the behavioural, cognitive, and emotional mechanisms that reinforce MT (Connaughton et al., 2011; Gordon et al., 2017; Liew et al., 2019; Sorensen et al., 2016). Research has consistently demonstrated a positive association between mindfulness and MT (Andersen, 2011; Jones & Parker, 2018; Walker, 2016; Wilson et al., 2019; Wu et al., 2021). Furthermore, mindfulness-based interventions (MBIs) have been linked to the enhancement of athletes' MT (Ajilchi et al., 2019; Vella-Fondacaro & Romano-Smith, 2023; Wang, Tian et al., 2021). Despite these findings, a notable gap exists

in the literature regarding the psychological processes associated with mindfulness-based MT interventions in general and specifically in cricket.

Mindfulness

Mindfulness is commonly defined as the process of purposefully paying attention to one's thoughts, feelings, and experiences in the present moment while taking a non-judgemental stance towards them (Kabat-Zinn, 1994; Weiner et al., 2016; Kumari et al., 2023). Mindfulness has been conceptualised as either a state or a trait. State mindfulness refers to the temporary and situational experience of mindfulness, whereas trait mindfulness, also known as dispositional mindfulness (DM), describes an individual's natural tendency to be mindful in everyday life (Kiken et al., 2015). Since mindfulness is a natural quality that varies amongst individuals (as a trait) and fluctuates across time (as a state), it can be taught and developed through the systematic and regular use of a variety of meditative practices (Creswell, 2017; Sedlmeier, 2023; Visted et al., 2014). Research in sports psychology, particularly in relation to MT, has predominantly focused on DM (Jones & Parker, 2018; Walker, 2019; Wu et al., 2021).

⁶ Bishop et al. (2004) propose a two-component model of DM. The first component is the regulation of attention on order for the individual to focus on the immediate experience. The second component involves approaching one's experiences with curiosity, openness, and acceptance regardless of their valence and desirability. This model has garnered support from subsequent research (Desbordes et al., 2014; Hölzel et al., 2011; Mathews & Anderson, 2021). These two fundamental components of mindfulness (attention regulation and openness to experience) ⁴ describe the active mechanisms that set mindfulness apart from other psychological constructs (Chambers et al., 2008; Gardner & Moore, 2020; Lindsay & Creswell, 2017).

Mindfulness-based interventions have gained increasing attention ⁴ in the domain of sport psychology (Birrer et al., 2012; Wheeler et al., 2017; Zhu et al., 2022). These ¹ interventions have demonstrated efficacy in relation to athletic performance, athlete burnout, and injury rehabilitation (Bühlmayer et al., 2017; Gross et al., 2016; Mardon et al., 2016; Eilam-Stock et al., 2023; Wolch et al., 2020). Mindfulness-based interventions positively influence sports performance by enhancing psychological skills such as focused attention and MT and ER skills (Gardner & Moore 2020; Kittler et al., 2022; Noetel et al., 2017). Additionally, MBIs have demonstrated positive effects on physiological (e.g., salivary cortisol levels and immune responses) and psychological (e.g., flow, resilience, and anxiety reduction) (Liu et al., 2021; Nien et al., 2023) markers of wellbeing and performance amongst athletes.

There is increasing interest in understanding the underlying mechanisms by which MBIs may positively affect DM amongst athletes (Burzler et al., 2018; Hölzel et al., 2011; Lindsay & Cresswell, 2017; Lutz et al., 2015; Vago & Silbersweig, 2012; Wang, Tian et al., 2021), resulting in the development of various models that focus on identifying and understanding the possible mechanisms of mindfulness. Often, these models include AC and ER as prominent mechanisms of action (Hölzel et al., 2011; Moore & Malinowski, 2009; Shapiro et al., 2006; Vago & Silbersweig, 2012). For example, Hölzel et al. (2011) identified several cognitive-affective processes through which mindfulness meditation exerts its effects, and these included AC and ER. Similarly, in an attempt to understand the neural mechanisms underlying mindfulness, Vago and Silbersweig (2012) highlighted AC and ER as two key mechanisms of action.

Gardner (2009) posits that mindfulness may not affect athletic performance directly but rather indirectly through other psychological processes. Other researchers have elaborated upon this view (Bühlmayer et al., 2017; Jha et al., 2007; Josefsson et al., 201; Röthlin et al.,

2016). For example, Röthlin et al. (2016) demonstrated that competition anxiety mediates the relationship between DM and self-evaluated sport performance. Similarly, various studies have emphasised the impact mechanisms of AC and ER on the relationship between mindfulness and sporting performance (Birrer et al., 2021; Gao & Zhang 2023; Josefsson et al., 2017; Josefsson et al., 2019; Oguntuase & Sun, 2022; Rogowska & Tataruch, 2024). For instance, Birrer et al. (2012) developed a hypothetical framework of specific impact mechanisms that explains how and why mindfulness may enhance athletic performance. This framework proposes that mindfulness may, through specific impact mechanisms such as AC and ER, indirectly influence various psychological skills that are conducive to improved sports performance (Birrer et al., 2012; Josefsson et al., 2017).

Emotional Regulation

Emotional Regulation is defined as the process by which individuals modulate cognitions and behaviours in response to the emotions they experience (Gross, 2015). According to Gershoren and colleagues (2023), athletes' capacity to facilitate, maintain, or inhibit specific emotions determines the efficacy with which they are able to regulate their emotions. This regulatory ability is said to be crucial in optimising desirable precompetitive states and enhancing overall performance (Beatty & Janelle, 2019; Robazza et al., 2004; Robazza & Ruiz, 2018; Wagstaff, 2014).

Gross' (1998, 2001) process model of ER outlines two regulation strategies, namely the antecedent-focused strategy and the response-focused strategy. Within this framework, cognitive reappraisal and expressive suppression are the most frequently researched strategies (Kelley et al., 2019). Cognitive reappraisal, an antecedent-focused strategy, involves reinterpreting the meaning of a stimulus to alter one's emotional responses (Gross & John, 2003; Sheppes & Gross, 2011). In contrast, expressive suppression is a response-focused strategy that is characterised by ongoing efforts to inhibit emotion-expressive behaviour (Zou

et al., 2024). Kim and Tamminen (2022) indicate that cognitive reappraisal and expressive suppression are the two ER strategies that are most widely researched within the sporting and performance context.

Empirical evidence consistently supports the efficacy of cognitive reappraisal over expressive suppression as an effective ER strategy (Li et al., 2020; Szasz et al., 2011; Wang, Goldberg et al., 2021; Webb et al., 2012; Wolgast et al., 2011; Xu et al., 2023). Cognitive reappraisal is associated with adaptive states and behaviours such as elevated positive affect (Ioannidis & Siegling, 2015) and enhanced interpersonal functioning (Cabello et al., 2013). Conversely, expressive suppression diminishes positive emotional experiences, fails to provide relief from negative emotions, and incurs significant cognitive and physiological costs (Brans et al., 2013; Gross & John, 2003). Consequently, cognitive reappraisal has become viewed as a more adaptive ER strategy, while expressive suppression is considered less adaptive and perhaps even maladaptive (Gross & John, 2003; Kim & Tamminen, 2022; Lantrip et al., 2015; Preece et al., 2019).

Mindfulness-based interventions have demonstrated efficacy in enhancing ER amongst athletes (Augustus et al., 2023; Birrer et al., 2021; Josefsson et al., 2019). Research suggests that MBIs facilitate the recognition of physical sensations and their relationship with emotional states, increase self-awareness, and improve ER (Rogowska & Tataruch, 2024). A longitudinal study conducted by Josefsson et al. (2017) suggests that mindfulness practice may facilitate a deeper awareness of emotion, thus enabling more effective regulation of emotions amongst elite athletes. Furthermore, the Mindfulness-Acceptance-Commitment (MAC) intervention has been demonstrated to increase DM and to improve ER amongst athletes (Josefsson et al., 2019). Similarly, Oguntuase and Sun (2022) report that mindfulness practice improved ER amongst elite football players by fostering awareness and acceptance

of distressing emotions without overwhelming the athletes or negatively affecting their performance.

Attention Control

Mindfulness, as outlined by Bishop et al. (2004), incorporates an attention-based element (Wimmer et al., 2020). As highlighted by Shapiro et al. (2006), a fundamental aspect of mindfulness revolves around the conscious commitment to attend to one's moment-to-moment experience. Attention control thus appears to be strongly related to DM. Attention control can be broadly divided into two domains. The first is sustained attention, in which the individual focuses on a single task or stimuli while blocking out distractions. The second is divided attention, which involves allocating attentional resources to multiple stimuli or altering the individual's perspective on a task by focusing attention on different aspects of a stimulus (Chung-Fat-Yim et al., 2022; Derryberry & Reed, 2002).

These components of attention, observed in relation to DM, not only aid in developing an enhanced capacity to resist distractions and maintain focus (Wang et al., 2017) but also facilitate flexible attention, enabling individuals to shift their focus effectively (Chambers et al., 2008; Jha et al., 2007; Vieth & Von Stockhausen, 2022; Wang et al., 2017). The ability to direct and control attention is a critical component of success in any area of skilled performance (Moran, 2004). Furthermore, several studies have underscored the significance of AC in sports performance, emphasising the need for athletes to maintain focus on task-relevant information during competition while avoiding internal and external distractions (Furley & Wood, 2016; Röthlin et al., 2016; Tassi et al., 2023).

Mindfulness seems to be strongly associated with AC in the general population (Birrer et al., 2021; Tang et al., 2015; Verhaeghen, 2020), as well as amongst elite athletes (Bu et al., 2019; Röthlin et al., 2020). Neurophysiological evidence indicates that regular, brief engagement in mindfulness meditation significantly enhances AC processes (Krumholz

⁷ et al., 2021; Moore et al., 2012). Moreover, it has been reported that even a single brief session (10–30 minutes) of mindfulness training or mindfulness meditation can elevate state mindfulness and enhance AC amongst novice meditators (Dickenson et al., 2012; Norris et al., 2018; Watier & Dubois, 2016). Gao and Zhang (2023) investigated the effects of a 20-minute pre-competition mindfulness meditation intervention on AC amongst university marksmen athletes. Participants in this study reportedly displayed increased focus, reduced distractibility, and improved closed-skill performance.

The Current Study

Mental toughness has emerged as a pivotal determinant of performance in cricket and is considered essential for players to reach and maintain the highest level of performance (Bull et al., 2005; Cotterill and Barker, 2013). Cricket-specific MT frameworks identify AC and ER as important components of MT (Bull et al., 2005; Gucciardi & Gordon, 2009). In addition, several studies demonstrate a relationship between mindfulness and MT (Ajilchi et al., 2019; Jones & Parker, 2018; Walker, 2016; Wu et al., 2021). Furthermore, mindfulness has been integrated into several interventions aimed at developing MT (Ajilchi et al., 2019; Gucciardi et al., 2009; Jones & Parker, 2018; Wilson et al., 2019). An emerging body of research suggests that DM and mindfulness interventions might have an impact on general sporting performance, and MT more specifically, through AC and EC (Josefsson et al., 2017; Wang et al., 2017; Wang, Tian et al., 2021; Wilson et al., 2019; Vieth & Von Stockhausen, 2022). However, according to Birrer and colleagues (2021), further research is required in this regard. Moreover, research into the determinants of MT in cricket appears to be limited. Consequently, ¹ the current study aims to explore AC and ER as potential pathways through which DM might influence MT amongst high-level cricketers.

Methodology

Respondents

The sample comprised high-level cricketers from the Under-19, amateur (development), academy, and franchise teams from all provinces affiliated with Cricket South Africa (CSA). High-level athletes are defined as individuals who have been selected by their national sports federations based on meeting specific performance criteria (Schaal et al., 2011; Swann et al., 2015). No exclusion criteria were applied during recruitment of the respondents. Therefore, all individuals included in the abovementioned squads during the 2022/2023 season were eligible for inclusion in the study.

A convenience sample of 211 high-level cricketers was eventually recruited for the study. The ages of the respondents ranged between 18 years of age and 37 years of age ($M=24.20$; $SD=4.95$). Males (63%) constituted most of the sample, while 36% of the respondents identified as female and 0.9% as non-binary. Most of the respondents competed at provincial (44.5%) or franchise (36.5%) level. The remaining respondents competed at Under-19 (3.3%) or academy/development (15.6%) level. With respect to reported playing roles, 21.3% of the respondents were batters, 22.7% were bowlers, and 55.9% were all-rounders¹.

The total number of high-level cricketers (development, academy, provincial, and franchise) currently playing in South Africa is approximately 760 (<https://cricket.co.za/>). Consequently, applying a confidence interval of 95% ($Sample\ Size = \frac{z^2 \times p(1-p)}{1 + \frac{z^2 \times p(1-p)}{e^2 n}}$), a minimum sample of 256 respondents would be required to provide the study with adequate

¹ Wicketkeepers were classified as all-rounders.

² statistical power for the proposed analysis (Neuman, 2011). While the number of respondents ($n=211$) recruited for this study fell short of this requirement, the sample size met the criteria for the minimum number of respondents necessary to conduct regression analysis (Tabachnick & Fidell, 2007). According to ⁵ Tabachnick and Fidell (2007), the minimum sample size suitable for regression analysis is the number of predictors multiplied by eight, plus 50. The current study included four predictors. Consequently, the sample size ($n=211$) exceeded the recommended minimum criteria (i.e., $[4 \times 8] + 50 = 82$).

Measuring Instruments

¹ The Mindfulness Attention Awareness Scale (MAAS) (Brown & Ryan, 2003) served as a measure of DM. ¹ The MAAS is a 15-item unidimensional measure of DM that demonstrated good internal consistency ($\alpha = .89$) in a non-clinical sample of South African adults (Kotzé & Nel, 2016). Responses are presented along a six-point Likert-type scale ranging from 1 (almost always) to 6 (almost never). The MAAS is scored by summing responses across all items. Higher scores reflect higher levels of DM (Brown & Ryan, 2003).

Mental toughness was measured by the Mental Toughness Index (MTI) (Gucciardi et al., 2014). The MTI is an eight-item unidimensional measure of MT in sport that demonstrated good internal consistency ($\alpha = .90$) in a sample of British cyclists (Jones & Parker, 2018). Responses are presented along a seven-point Likert-type scale anchored by 'False, 100% of the time' and 'True, 100% of the time'. The MTI is scored by summing responses across all items. Higher scores indicate higher levels of MT (Gucciardi et al., 2014).

¹ Attention control was measured using the Attention Control Scale (ATTC) (Derryberry & Reed, 2002). The ATTC is a 20-item multidimensional measure that assesses two key components of attention, namely attention focusing and attention shifting. The ATTC demonstrated good internal consistency for the total score ($\alpha = .88$) in a sample of

Polish students (Fajkowska & Derryberry, 2010). Responses are presented along a four-point Likert-type scale ranging from 1 (almost never) to 4 (always). While the ATTC yields two subscale scores and a total score, the reliability of the subscale scores has been called into question (Abasi et al., 2017; Fajkowska & Derryberry, 2010). Consequently, it has been recommended that the ATTC total score be used in preference to the subscale scores (Abasi et al., 2017; Fajkowska & Derryberry, 2010). Responses across all 20 items are summed to provide a total attention score. It is deemed that the higher the ATTC total score, the better is the individual's ability to control their attention (Derryberry & Reed, 2002).

The Emotion Regulation Questionnaire (ERQ) (Gross & John, 2003) was employed as a measure of ER. The ERQ is a 10-item measure designed to assess individual differences in the habitual use of two ER strategies, namely cognitive reappraisal and expressive suppression. The ERQ has demonstrated acceptable to good internal consistency (emotional suppression: $\alpha = .70$; cognitive reappraisal: $\alpha = .82$) in a sample of British athletes (Uphill et al., 2012). Responses are presented along a seven-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). Separate scale scores are derived for two ER strategies: cognitive reappraisal (six items) and expressive suppression (four items). Subscale scores are calculated by summing responses across their component items. Higher scores indicate higher usage of the particular ER strategy (Gross & John, 2003).

Procedure

Ethical clearance for the study was obtained from the General/Human Research Ethics Committee (GHREC) at the University of the Free State (UFS). The ethical clearance letter (UFS-HSD2023/0265/23) is included as Appendix B. Additionally, permission was granted by the CSA to contact all 14 cricket unions and their respective coaches/managers to facilitate access to players for participation in the study. The relevant permission letters are included as Appendix C.

A non-experimental, ¹cross-sectional correlational research design was employed to study the relationships between the variables (Stangor, 2015). Data collection was completed via an online platform. ¹The coaches/managers of each team were contacted and requested to distribute a recruitment email to all their squad members (Appendix D). The email introduced the study and included a link to an electronic informed consent form (Appendix E) and the research ²questionnaires (Appendix F). The respondents were able to access the questionnaire over a two-month period (5 July 2023–5 September 2023). All respondents provided written informed consent prior to participating in the study.

³Data Analysis

Initially, normative, descriptive, and correlational analyses were performed. Thereafter, a between group multivariate analysis of variance (MANOVA) was carried out to test for differences in DM, MT, ER, and AC with respect to gender, ²level of competition, and playing role. ²Ordinary least squares (OLS) regression analysis was subsequently employed to investigate the potential mediating effect of ER and AC on the interaction between DM and MT (Hayes, 2017). ²The Statistical Package for the Social Sciences – version 29 (SPSS 29) (IBM Corporation, 2022) and the PROCESS macro version 4 for SPSS (Hayes, 2022) were used to conduct the data analysis.

Results

Descriptive Statistics and Correlations

Table 1 indicates that all the measuring instruments included in the study met the minimum required internal consistency of $\alpha < .60$ (Ponterotto & Ruckdeschel, 2007) for inclusion in psychological research. Cronbach's α coefficients ranged between .701 for the ATTC and .911 for the MTI. Furthermore, ²measures of skewness and kurtosis revealed no outliers or violations of assumptions of normality.

Table 1.

Reliabilities, Correlations, and Distribution of the Study Variables

	Attention control	Cognitive reappraisal	Expressive suppression	Mindfulness	Mental toughness
Mental toughness	.251**	.416**	.239**	.228**	-
Mindfulness	.418**	.128	-.044	-	
Expressive suppression	-.019	.386**	-		
Cognitive reappraisal	.206**	-			
α	.701	.760	.766	.900	.911
M	52.38	29.56	17.76	62.65	43.40
SD	6.75	5.96	5.55	14.70	9.19
Range	35-68	9-42	4-28	21-90	8-56
Kurtosis	-.222	.303	-.429	-.259	3.408
Skewness	.036	-.312	-.351	-.276	-1.688

Note: ** $p < .01$.

Attention control: The Attention Control Scale; Cognitive reappraisal and expressive suppression: The Emotion Regulation Questionnaire; Mindfulness: Mindfulness Attention Awareness Scale; Mental toughness: Mental Toughness Index

According to Table 1, MT demonstrates a moderate positive correlation with cognitive reappraisal ($r = .416, p < .001$) while also exhibiting weak positive correlations with DM ($r = .288, p < .001$), expressive suppression ($r = .239, p < .001$) and AC ($r = .251, p < .001$). Dispositional mindfulness demonstrates a moderate positive relationship with AC ($r = .418, p < .001$). However, there is no significant relationship between DM and either cognitive reappraisal ($r = .128, p = .063$) or expressive suppression ($r = -.044, p = .529$). Lastly, while expressive suppression and cognitive reappraisal are moderately positively correlated ($r = .386, p < .001$) and cognitive reappraisal is weakly correlated with AC ($r = .206, p = .003$), no statistically significant linear relationship exists between AC and

expressive suppression ($r = -.019, p = .785$). The reported statistically significant correlation coefficients are indicative of small ($r = .10$ to $.29$) to medium ($r = .30$ to $.49$) effect sizes (Cohen, 1988).

Tests for Differences in Gender, Level of Competition, and Playing Role

A MANOVA was carried out to test for possible gender (male, female, and non-binary), level of competition (Under-19, academy/development, provincial, and franchise), and playing role (batter, bowler, and all-rounder) differences in AC, cognitive reappraisal, expressive suppression, DM, and MT. To reduce the likelihood of a Type I error, a Bonferroni adjusted level of significance of .014 was set (Tabachnick & Fidell, 2007).

Preliminary testing did not reveal serious violations of the assumptions of normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance, or multicollinearity. The MANOVA yielded no significant gender differences regarding the combination of dependent variables (AC, cognitive reappraisal, expressive suppression, DM, and MT) ($F_{(10, 372)} = 2.176, p = .019$; Wilks' lambda = .968; partial eta squared = .055). Similarly, no differences were found with respect to the combination of dependent variables across level of competition ($F_{(15, 514)} = 1.381, p = .331$; Wilks' lambda = .151; partial eta squared = .036) and playing role ($F_{(10, 372)} = 1.359, p = .197$; Wilks' lambda = .953; partial eta squared = .035). Consequently, the conceptual mediation model presented below in Figure 1 was only tested for the total sample.

Mediation Model

The proposed interactions between DM, MT, AC, and ER are conceptually represented in Figure 1. In this conceptual model, it is proposed that DM influences AC (Path a_1), which in turn affects MT (Path b_1). Therefore, DM is thought to influence MT indirectly through AC via Path ab_1 . Furthermore, it is proposed that DM influences cognitive reappraisal (Path a_2), which affects MT (Path b_2). Hence, DM may indirectly influence MT

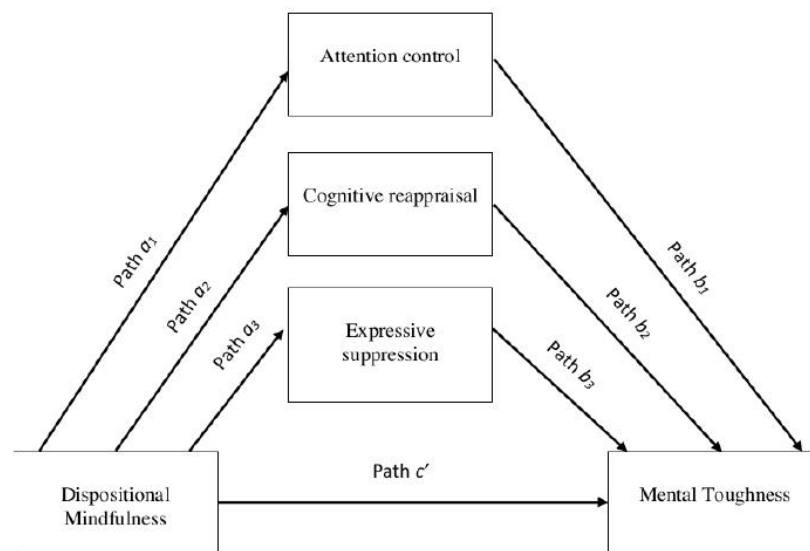
15

through cognitive reappraisal via Path ab_2 . In addition, DM is proposed to influence expressive suppression (Path a_3), which has an impact on MT (Path b_3). Therefore, DM may indirectly influence MT through expressive suppression via Path ab_3 . As proposed in Figure 1, when AC, cognitive reappraisal, and expressive suppression are kept constant, DM is thought to influence MT directly (Path c).

The Conceptual Parallel Mediation Model presented in Figure 1 uses the mediating effect of AC, cognitive reappraisal, and expressive suppression in the relationship between DM and MT.

Figure 1.

Conceptual Parallel Mediation Model



A bias-corrected bootstrapping procedure was used to test for the possible mediating effect/s of AC and/or cognitive reappraisal and/or expressive suppression on the interaction between DM and MT (Hayes, 2017). The direct and indirect effects of DM on MT were investigated by regressing the proposed mediators on DM (AC = path a_1 ; cognitive reappraisal = path a_2 ; expressive suppression = path a_3), while MT was regressed on AC (path b_1), on cognitive reappraisal (path b_2), and on expressive suppression (path b_3). In addition, MT was regressed on DM via AC, cognitive reappraisal, and expressive suppression (path c').

Table 2 indicates that in combination, DM, AC, cognitive reappraisal, and expressive suppression account for 22.8% of the variance in the MT scores of the respondents ($F_{(4, 206)} = 15.214, p = <.001, R^2 = .228$). Only DM ($p = .043$) and cognitive reappraisal ($p <.001$) emerged as significant predictors of MT. However, when compared with DM ($\beta = .137$), cognitive reappraisal ($\beta = .326$) explains a greater proportion of the variance in the sample's MT.

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Table 2.

Regression Model Coefficients for DM, AC, Cognitive Reappraisal, and Expressive Suppression as Predictors of MT (n = 211)

	Mental toughness						
	b	β	SE	95% CI	p	F	R ²
Full model	-	-	-	-	<.001	15.214	.228
Dispositional mindfulness	.086	.137	.042	[-.003, .169]	.043	-	-
Attention control	.175	.129	.093	[-.009, .359]	.062	-	-
Cognitive reappraisal	.502	.326	.105	[-.294, .710]	<.001	-	-
Expressive suppression	.201	.121	.111	[-.018, .419]	.071	-	-
DM → AC → MT	.034	.054	.027	[-.006, .112] ^a	-	-	-
DM → CR → MT	.026	.042	.027	[-.008, .100]	-	-	-
DM → ES → MT	-.003	-.005	.011	[-.028, .017]	-	-	-

CI: confidence interval; AC: attention control; CR: cognitive reappraisal; DM: dispositional mindfulness; ES: expressive suppression; MT: mental toughness

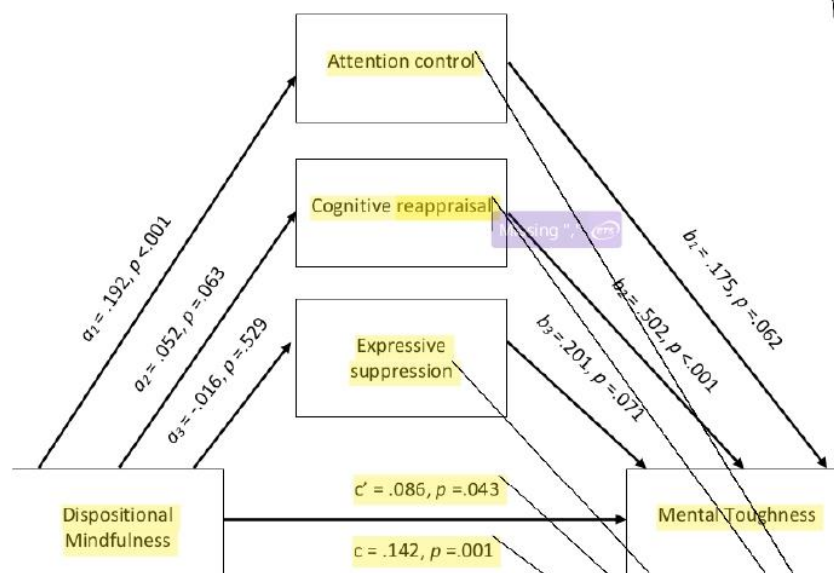
^a Effects are statistically significant as the confidence interval does not include 0

The results of the parallel mediation analysis depicted in Table 2 indicate that only AC partially mediates the interaction between DM and MT in the current sample ($a^1b^1 = .034$, 95% CI [.006, .112]). Consequently, an increase in MD is associated with an increase in AC, which in turn, is associated with an increase in MT. Cognitive reappraisal, while an independent predictor of MT, does not mediate the interaction between DM and MT ($a^2b^2 = .026$, 95% CI [-.008, .100]). In other words, while an increase in cognitive reappraisal is associated with increased MT, an increase in DM is not associated with increased cognitive reappraisal. Expressive suppression also fails to mediate the relationship between DM and MT ($a^3b^3 = -.003$, 95% CI [-.028, .017]).

The results of the parallel mediation analysis are graphically presented in Figure 2. In addition to the partial mediating effect of AC on the interaction between DM and MT as mentioned above, it is evident that DM continues to demonstrate a statistically significant relationship with MT even after controlling for the effects of AC and cognitive reappraisal, and the direct effect of expressive suppression ($c' = .086$, $p = .043$, 95% CI [.003, .169]).

Figure 2.

The Mediating Effect of Attention Control, Cognitive Reappraisal, and Expressive Suppression in the Relationship Between Dispositional Mindfulness and Mental Toughness



Note: All effects are presented as unstandardised; a_1 is the effect of dispositional mindfulness on attention control, a_2 is the effect of dispositional mindfulness on cognitive reappraisal, and a_3 is the effect of dispositional mindfulness on expressive suppression; b_1 is the effect of attention control on mental toughness, b_2 is the effect of cognitive reappraisal on mental toughness, and b_3 is the effect of expressive suppression on MT; c' is the direct effect of dispositional mindfulness on mental toughness; c is the total effect of dispositional mindfulness on mental toughness.

Discussion

The current study aimed to contribute to the growing literature on the mechanisms of mindfulness and the extent to which DM, AC, and ER are associated with MT amongst

high-level cricketers. In addition, the study explored the potential mediating effects of AC and ER on the interaction between DM and MT in this population.

In the current study, MT was positively associated with AC, cognitive reappraisal, and expressive suppression. This is in keeping with the literature on MT and performance-enhancing states and processes in sport (e.g., Gucciardi et al., 2014; Jones et al., 2007; Liew et al., 2019; Mahoney et al., 2014; Stamatis et al., 2020) and with the limited body of cricket-specific MT research (Bell et al., 2013; Bull et al., 2005; Cotterill & Barker, 2013; Gucciardi & Gordon, 2009). The positive relationship found between DM and MT and between DM and AC in the present study corresponds to the growing body of empirical literature on the benefits of mindfulness within the arena of human performance (e.g., Ajilchi et al., 2019; Bühlmayer et al., 2017; Röthlin et al., 2020; Eilam-Stock et al., 2023; Wu et al., 2021). Contrary to expectation, however, DM did not demonstrate a significant relationship with ER (Josefsson et al., 2017; Wang et al., 2017; Wang, Tian et al., 2021; Wilson et al., 2019; Vieth & Von Stockhausen, 2022). While this anomalous finding may be peculiar to the specific sample and context of the current study, it may also provide support for claims that the relationships between mindfulness and specific affective-cognitive processes within the sporting domain are not yet well understood and require further investigation (Birrer et al., 2021; Josefsson et al., 2019).

In combination, DM, AC, cognitive reappraisal, and expressive suppression accounted for a statistically significant proportion of the variance in the MT of high-level South African cricketers. This finding supports the contention made in two cricket-specific theoretical frameworks that management of attentional resources and regulation of emotional states are important for MT (Bull et al., 2005; Gucciardi & Gordon, 2009). Furthermore, the current study offers additional support for the link between DM and MT in athlete

populations (Andersen, 2011; Jones & Parker, 2018; Walker, 2016; Wilson et al., 2019; Wu et al., 2021).

More importantly, this study adds to the limited evidence base for a positive association between DM and MT amongst cricketers (Griffith, 2012). However, DM, AC, and ER accounted for a relatively small proportion of the variance in the MT of the respondents in this study. These psychological processes, therefore, appear to be only a part of the MT issue in high-level cricket. Several other variables such as personality traits, cognitive styles, resilience, and affective states could also be associated with MT in this population (Bell et al., 2013; Gordon et al., 2017; Subhan et al., 2019).

The existing cricket-specific frameworks of MT propose that both AC and ER make a significant contribution to MT (Bull et al., 2005; Gucciardi & Gordon, 2009). However, in the current study, only the ER strategy of cognitive reappraisal was found to be independently related to MT. Consequently, the extent to which cricketers are able to reinterpret events, thoughts, and experiences in order to modulate their emotional response appears to have a direct impact on their MT (Griffith, 2012; Gucciardi & Gordon, 2009). This would seem to support the general trend in the literature identifying cognitive reappraisal as a generally adaptive ER strategy (Augustus et al., 2023; Birrer et al., 2021; Josefsson et al., 2019). While the current study does not support the contention that expressive suppression is a potentially harmful ER strategy (Gross & John, 2003; Kim & Tamminen, 2022; Lantrip et al., 2015; Preece et al., 2019), the results seem to suggest that expressive suppression does not have a significant impact on MT. A potential explanation for this finding might be that expressive suppression is a consequence or behavioural outcome of MT rather than a predictor of it. In addition, the current regression model might not reflect the complexity of the interaction between cognitive reappraisal, expressive suppression, and MT (Gross, 2001; Gross & John, 2003).

Despite being hypothesised to be central to MT amongst cricketers (Bull et al., 2005; Gucciardi & Gordon, 2009), AC failed to demonstrate an independent association with MT in the current study. However, AC did partially mediate the interaction between DM and MT. This finding supports the contention of Birrer and colleagues (2012) that one of the ways that mindfulness has an impact on improved sporting performance is through improved attention, enabling athletes to be less distracted and better able to focus on goal-relevant aspects. The attention-based element of mindfulness could possibly result in athletes being more likely to improve their action orientation and MT (Birrer et al., 2012). The partial mediation effect of AC may provide further support for existing literature that suggests that DM contributes to MT by improving athletes' ability to sustain and shift their attention (Vieth & Von Stockhausen, 2022; Wang et al., 2017). This finding is particularly relevant for high-level cricketers, as the attentional component of cricket requires an exceptional amount of focus (Bull et al., 2022) in order to adhere to the minimal error tolerance inherent in the sport (Connor et al., 2020). Additionally, it is proposed that AC may enhance critical components of MT that are linked to skills such as maintaining focus and composure under pressure (Bull et al., 2005; Gucciardi & Gordon, 2009).

Cognitive reappraisal was associated with MT in the current study but did not mediate the interaction between DM and MT. Consequently, it appears that while cognitive reappraisal is associated with MT, it is not a psychological process through which DM influences MT and nor is DM significantly associated with cognitive reappraisal. This is contrary to much of the literature on the association between DM and the reduced impact of emotional distress amongst both athletes and the general public (Drouman et al., 2022; Celen et al., 2024; Josefsson et al., 2017; Rogowska & Tataruch, 2024; Zhou et al., 2023). It could be argued that since DM is proposed to influence emotional states via awareness and acceptance rather than through active control or experiential avoidance, the lack of an

association between DM, cognitive reappraisal, and expressive suppression is to be expected (Hawkes & Neale, 2020; Nargon-Gainey et al., 2017; Zhou et al., 2023). Garland et al. (2009) have suggested that although DM and cognitive reappraisal may share complementary mechanisms, these constructs may fulfil distinct functions. Alternatively, the psychological processes underlying cognitive reappraisal may require a level of cognitive control and evaluation that is not directly associated with DM. The association between DM and cognitive reappraisal may be mediated by processes such as increased self-awareness and distress tolerance, which allow the individual to engage in the identification, evaluation, and reappraisal of thoughts and perceptions. However, these components of cognitive reappraisal may not be associated with the more detached and non-judgemental nature of mindfulness (Birrer et al., 2012; Birrer et al., 2021; Bishop et al., 2004; Kabat-Zinn, 1994). It is possible that psychological processes such as acceptance and defusion may exhibit a more direct relationship with DM amongst cricketers or provide some insight into the possibility of an indirect relationship between DM and cognitive reappraisal (Gardner, 2009; Gardner & Moore, 2020).

Some research demonstrates differences in MT with respect to levels of competition and playing experience in certain sports (Guszkowska & Wójcik, 2021; Kristjánsdóttir et al., 2019; Weissensteiner et al., 2012; Wolter et al., 2022). No such differences were apparent in the current study. However, the relatively small sample, the categorisation of wicketkeepers as allrounders, and the lack of data on playing experience may have masked differences in the current data set. It has also been suggested that MT has been conceptualised from a predominantly masculine perspective. Consequently, traditional conceptualisations and operationalisations of MT may not be applicable to female athletes. Empirical data on the impact of gender, level of competition, and playing role on AC, DM, and ER is sparse (Millán-Sánchez et al., 2023; Rintaugu et al., 2022; Rogowska & Tataruch, 2024; Wolter et

al., 2022). No differences were found with respect to AC, DM, and ER across gender, playing role, and level of competition in the current sample. However, the constraints of sample size and design mentioned below should be considered when interpreting these findings.

⁴ **Study Limitations and Directions for Future Research**

The current study addresses a hereto unresearched topic within the MT literature in general and in regard to cricket specifically. However, the study is not without limitations. First, the study was conducted within a specific geographical and sociocultural context. Consequently, the findings cannot be generalised to other sporting or cricketing contexts. In addition, the respondents were recruited via convenience sampling, and this negates the possibility of making meaningful inferences regarding the impact of variables such as level of competition, playing experience, and gender on the outcome of the study. Moreover, the sample was not large enough to provide adequate statistical power on which to base meaningful conclusions. It is recommended that future research replicate this study across a variety of cricketing and other sporting contexts with larger and more representative samples.

Second, the current study made use of a cross-sectional design. Consequently, no conclusions could be drawn with respect to causality. There is hence a need for longitudinal studies that are aimed at establishing possible causal relationships between AC, DM, ER, and MT amongst high-level cricketers and are focused on very specific mechanisms.

Third, the regression model only accounted for a moderate proportion of the sample's MT scores. It is thus apparent that several variables that were not included in the study may make an additional contribution to the MT of high-level cricketers. Future research should test the effect of the other variables that are included in the theoretical models of MT such as resilience, self-belief, and decision-making (Bull et al., 2005; Gucciardi & Gordon, 2009).

Fourth, the mediation model only tested the direct mediating effect of AC and ER on the interaction between DM and MT. Additional research is required with respect to the possibility of more complex interactions between these variables and the possible reciprocal effects. Experimental and intervention-based research may also prove helpful in teasing out the nature and direction of the relationships between AC, DM, ER, and MT further.

Fifth, the relatively small sample, the categorisation of wicketkeepers as allrounders, and the lack of data on playing experience may have masked differences in the current data set. Future research should consider larger sample sizes and include more fine-grained analyses of playing experience, level of competition, and player role.

Finally, with the exception of the MTI, the study made use of generic measures. This was necessitated partly by a lack of valid sport-specific measures of DM, AC, and ER. In addition, very little of the literature on AC and ER has used athlete populations. Nevertheless, the current study should be replicated making use of alternative operationalisations and measures of AC and ER.

Conclusion

The current study found that DM and cognitive reappraisal are significant predictors of MT amongst high-level cricketers. Attention control mediates the relationship between DM and MT. These results further the understanding of the MT frameworks that have been proposed in relation to cricket. The study further highlights the roles that AC and ER, and more specifically cognitive reappraisal, play in enhancing MT amongst high-level cricketers. This research adds to the growing body of literature on the impact of the mechanisms by which DM enhances sports performance. Practically, these findings suggest that cognitive behavioural interventions for coaches and administrators focused on mindfulness practices, attention-focused exercises, and cognitive reappraisal strategies could be beneficial in

promoting and improving athletic performance. The effect of tailored mindfulness interventions and their mechanisms to enhance MT should be explored in future s