

## Mindfulness as predictors of mental toughness among student-athletes in Nigeria

Oguntuase, S. B. & Sun, Y.,  
School of Physical Education and Sport Science  
Tianjin University of Sport, Tianjin, 301617, China.

Bullem, S. B  
Department of Physical and Health Education,  
Cross River State College of Education, Akamkpa,  
Cross River State, Nigeria

**Corresponding author:** [oguntuasesolomon@yahoo.com](mailto:oguntuasesolomon@yahoo.com)

### Abstract

*The purpose of this research was to investigate mindfulness as predictor of mental toughness among university student-athletes in Nigeria. The study adopted descriptive research design and correlation type. Participants were 200 [male n = 128; female n = 72;  $M_{age} = 22.6$  years;  $SD = 4.67$ ] student-athletes. The measures completed by the participants were Five Facet Mindfulness Questionnaire (FFMQ) ( $r = .81$ ) and Sports Mental Toughness Questionnaire (SMTQ) ( $r = .79$ ). The results of the study showed positive correlation between mental toughness and act with awareness ( $r = .214$ ,  $p < .001$ ); and observe ( $r = .206$ ,  $p < .001$ ). Regression analyses found that the five facets of mindfulness combined accounted for 80% variance in the prediction of mental toughness. Conclusively, it was found that act with awareness was the most potent facet of mindfulness followed by observe predicting mental toughness. The findings offer practical implications for student-athletes, athletics coaches, higher institution authorities and sport psychologists aiming to help and develop an individual student-athlete mental toughness as they struggle to cope with plethora challenges associated with academic, sport and personal lives.*

**Keywords:** mindfulness, mental toughness, act with awareness, observe, student-athletes

### Introduction

University student-athletes are unique individual that find it difficult to combine the demands of academic, sporting and personal lives compared to non-student-athletes' colleagues. This particular population needs to demonstrate great mental capacity to be able to cope with challenges encountered in the pursuits of their goals. Mental toughness (MT) and mindfulness are considered to be mental attributes that are acquainted with great sports performance and overall well-being (Gardner & Moore, 2020; Zubair, Kamal & Artemeva,

2018; Gucciardi, 2016). These important attributes help the athletes to establish effective coping resources when stressed, under pressure, wear out, and also distinguish resilient and successful athletes from non-resilient and less successful athletes. It is as such crucial that student-athletes have the mental edge to remain committed and cope with the demands that are associated with great achievement (Collins & MacNamara, 2012). Examining mindfulness as predictors of mental toughness is a vital issue to establish, develop, maintain and improve performance of student-athletes.

Mental toughness in sport is a major psychological attribute for athletic peak performance. Till date, there is no consensus on the precise definition of mental toughness. Gucciardi, Hanton, Gordon, Mallett and Temby (2015, p.28) give a comprehensive definition of mental toughness as “a personal capacity to produce consistently high levels of subjective or objective performance despite everyday challenges and stressors as well as significant adversities”. Several studies have identified that mentally tough athletes are goal-focused, attentive, confident, optimistic, persevered, persistent, resilient, proficient at emotion regulation and behaviour, cope with stress and anxiety when faced with difficult situations (Lin, Mutz, Clough and Papageorgiou, 2017; Gucciardi, 2016; Walker, 2016; Jones et al., 2007)

Mental toughness is a condition where an athlete is self-protective in all circumstances that are open to improvement and development that can lead to goals achievement (Ponnusamy, Lines, Zhang, & Gucciardi, 2018). Plethora of studies have shown that many factors influence and predict mental toughness ability of athletes which results to greater sporting achievement and also distinguish mentally tough athletes from others that are not (Przybylski, 2018). Such factors include self-awareness and need satisfaction (Li, Martindale, & Sun, 2019), self-concept (Meggs, Ditzfeld, & Golby, 2014), narcissistic and rivalry (Manley, Jarukasemthawee, & Pisitsungkagarn, 2019), self-esteem (Zeiger & Zeiger, 2018), wellbeing (Zoe & Jessie, 2017), long time physical and psychological training (Marshall, 2017), awareness and non-judging of the events experienced by athletes (Walker, 2016).

Recently, mindfulness has been gaining recognition as a factor that improve athletic performance and various psychological factors which in turn contribute to outstanding performance. Kabat-Zinn (2003) defines mindfulness as the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment. The goal of mindfulness is not to take control of one's thoughts and emotions, but to help athletes center their efforts on engaging in the moment and allowing their thoughts and emotions to flow through their mind without judgment (Gardner & Moore, 2017; Zizzi & Andersen, 2017). Mindfulness is theorized to improve performance by promoting greater attentional focus and control, emotion regulation, and meta-cognitive awareness during competition (Birrer, Röthlin, & Morgan, 2012; Gardner & Moore, 2012). Bishop et al. (2004) highlighted that a higher level of mindfulness leads to becoming more open, aware and accept one's experiences. In addition, studies have shown that mindfulness is associated with and lower perceived stress, competitive anxiety, depression, reduce burnout (Lee, 2020; Gustafsson, et al. 2015; Blijlevens, et al. 2018), and also related to mental toughness in sporting context (Walker 2016; Jones & Parker, 2018). According to Baer et al., (2006), mindfulness is denominated into five facets namely; observe, describe, act with awareness, non-judging, and non-reactivity. The observe facet involves noticing or attending to internal and external feelings and thoughts experiences such as sensations, emotions, cognitions, sights, sounds and smells. Describe refers to labelling feelings, beliefs, ideas, opinions and expectations with words. Act with awareness means attending to the present moment situations without distraction. Non-judging of inner experience refers to taking a non-evaluative method towards inner thoughts and feelings.

Lastly, non-reactivity to inner experience aspect of mindfulness facet refers to allowing thoughts and feelings to come and go without hindering or being caught up in the process.

Studies have shown that five facets of mindfulness play significant roles on stress, anxiety, psychological well-being (e.g., Baer et al., 2008; Bergin & Pakenham, 2016; Zimmaro et al., 2016; Kaiseler et al., 2017; Bränström et al., 2011) and researchers have suggested that studies should use multifaceted measures of mindfulness to capture both attentional and attitudinal aspects of the concept (Keng & Tong, 2016). Anselmo and Go (2021) reported that students during sporting activities emphasised the importance of high level of mindfulness in terms of awareness and attention to predict their performance.

According to Gucciardi, Gordan and Dimmock (2008), mental toughness construct combines cognitive, affective and behavioural qualities which allow an athlete to persevere in a challenging situation and setback. Mentally tough athletes accept, embrace and challenge the situations to become better to achieve their goals (Anselmo & Ronald, 2021). The elements of mindfulness which include- awareness, acceptance and commitment can be said to relate and support the components of mental toughness (control, constancy and confidence) that aid and improve performance and achievement in sport (Abdul Rafeeqe & Sultana, 2016; Walker, 2016). Studies have shown that higher level of mindfulness is positively associated with mental toughness; experience of flow; and flexible cognitive control (Jones & Parker, 2018; Walker, 2016; Kee & Wang, 2008; Anicha, Ode, Moeller, & Robinson, 2012)

University student-athletes are a unique population that face a lot of challenges as they struggle to balance their academic, sporting and personal lives compared to their non-athletes' contemporaries. The demands encountered by this unique population include, regular exhaustive training and competition, stress and pressure to improve skills, heavy academic workloads, difficulty in managing time, injury and recovery (Nemeth, 2019; Cosh & Tully, 2015; Montecalbo & Cardenas, 2015). Though as outlined in the literature mindfulness is associated with overall development and improvement of athletic performance, mental toughness, mental health and academic life of university student-athletes (Gross, et al. 2018; Glass et al 2019; Wang, et al.; 2021; Walker, 2016; Connaughton et al., 2011), there is dearth of research in Nigeria on how university student-athletes perceived mindfulness as predictors of mental toughness; and how each facet of mindfulness is related to mental toughness?. It is in the light of this that the study investigated mindfulness as predictors of mental toughness among student-athletes in Nigeria.

### **Research Question**

What is the correlation between mindfulness indicators (observe, describe, act with awareness, non-judging, non-reactivity) and mental toughness among student-athletes?

### **Hypotheses**

The study hypothesized that;

1. There would be significant joint contribution of mindfulness (observe, describe, act with awareness, non-judging, non-reactivity) on mental toughness among student-athletes
2. There would be significant relative contribution of mindfulness (observe, describe, act with awareness, non-judging, non-reactivity) on mental toughness among student-athletes

## **Methods**

### **Participants**

A total of 200 university student-athletes were recruited for this study. The participants were from two first generation universities in Southwest, Nigeria, (University of Ibadan, Ibadan, Oyo State and Obafemi Awolowo University, Ile-Ife, Osun State). There were 128 male and 72 female participants proportionately sampled from different sports (athletics  $n=42$ , football  $n=36$ , volleyball  $n=21$ , basketball  $n=26$ , tennis  $n=16$ , table tennis  $n=19$ , badminton  $n=12$ , Judo  $n=11$ , swimming  $n=17$ ) with mean age ( $M_{age} = 22.6$  years;  $SD = 4.67$ ). All the participants had represented their faculty and university in the intramural and extramural competitions.

### **Measures**

Five Facet Mindfulness Questionnaire (FFMQ). The 15-item FFMQ (FFMQ-15) developed by Baer et al. (2008) is a short-version of 39-item FFMQ (2006) and includes three items for each facet. Items were selected from the FFMQ-39 based on their loadings on each facet and to maintain the breadth of content for each facet. FFMQ measures five facets of mindfulness: observing (e.g., I notice how foods and drinks affect my thoughts, bodily sensations, and emotions), describing (e.g., I'm good at finding words to describe my feelings.), act with awareness [e.g., I find myself doing things without paying attention] (reverse scored), non-judging [e.g., I believe some of my thoughts are abnormal or bad and I shouldn't think that way (reverse scored)] and non-reacting (e.g., When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it) rated on five points Likert Scale ranging from (1=never or very rarely true to 5= Very often or always true) was used to assess mindfulness of the participants. The factor structure and psychometric properties of the FFMQ-15 were tested by Gu et al. (2016). They found that the factor structure of the FFMQ-15 was consistent with that of the FFMQ-39 and there were large correlations between total facet scores of the short and long forms. This indicates that both versions of the FFMQ measured highly similar constructs.

Sports Mental Toughness Questionnaire (SMTQ). SMTQ was used to assess mental toughness of the participants. SMTQ is a 14-item questionnaire developed by Sheard et al. (2009) measured on a 4-point Likert scale (not at all true = 1 to very true = 4) with maximum score =56 and minimum score = 14. SMTQ has three subscales: confidence with 6-items (e.g., I have an unshakeable confidence in my ability; I have what it takes to perform well while under pressure), constancy with 4-items (e.g., I am committed to completing the tasks I have to do; "I give up in difficult situations" [reverse scored]) and control with 4-items (e.g., I worry about performing poorly, and I am overcome by self-doubt [reverse scored]). The SMTQ was found to be a reliable and valid measure of MT (Sheard et al., 2009). Internal consistency was found to be high with Cronbach's alphas of .80, .74, and .71 reported found for confidence, constancy, and control, respectively.

### **Procedure**

Ethical clearance was obtained from the appropriate authority. University student-athletes from two first generation universities in Southwest, Nigeria were the participants recruited for the study. The authorities of the various teams responded to the authors' permission to conduct the study after which the participants' informed consent was sought and secured. The participants complied to voluntarily participate in the study. The essence of the research was explained to the participants and administration of the self-report measures followed immediately for about 15 minutes.

### Data Analyses

Descriptive statistics of frequency count, mean and standard deviation was used to analyse demographic information of the participants. The parametric statistics of correlation and multiple regression models were used for the relationship and prediction. All statistical analyses were performed using IBM SPSS Statistics 22.0 (IBM Corp., Armonk, USA).

### Results

The result on table 1 below showed that mental toughness is positively correlated with act with awareness ( $r = .214$ ,  $p < .001$ ) and observe ( $r = .206$ ,  $p < .001$ ), except describe ( $r = .049$ ,  $p > .005$ ), non-judging ( $r = -.030$ ,  $p > .005$ ) and non-reactivity ( $r = .059$ ,  $p > .005$ ). This implies that increase in observe and awareness will increase mental toughness of student-athletes.

**Table 1: Zero-order Correlation Showing the Relationships between Observe, Describe, Act with awareness, Non-judging, Non-reactivity and Mental Toughness.**

| Variable           | N   | Mean    | St-Dev | Df  | R      | P     |
|--------------------|-----|---------|--------|-----|--------|-------|
| Mental Toughness   | 200 | 44.9400 | 4.851  | 199 | 1.00   | <.001 |
| Observe            | 200 | 11.9050 | 2.700  | 199 | .206** | <.001 |
| Describe           | 200 | 10.7850 | 2.727  | 199 | .049   | <.001 |
| Act with awareness | 200 | 5.9000  | 3.098  | 199 | .214** | <.001 |
| Non-judging        | 200 | 10.6350 | 3.602  | 199 | -.030  | <.001 |
| Non-reactivity     | 200 | 10.4150 | 3.729  | 199 | .059   | <.001 |

\*\* significant at 0.01, \* significant at 0.05.

**Table 2: The Joint Contributions of Independent Variables (Observe, Describe, Act with awareness, Non-judging, Non-reactivity) on Mental Toughness**

| R = .321                      R <sup>2</sup> = .103<br>Adj. R <sup>2</sup> = .080              Std. Error = 4.65405 |            |                |     |             |       |                   |
|---------------------------------------------------------------------------------------------------------------------|------------|----------------|-----|-------------|-------|-------------------|
| Model                                                                                                               |            | Sum of Squares | Df  | Mean Square | F     | Sig.              |
| 1                                                                                                                   | Regression | 481.207        | 5   | 96.241      | 4.443 | .001 <sup>b</sup> |
|                                                                                                                     | Residual   | 4202.073       | 194 | 21.660      |       |                   |
|                                                                                                                     | Total      | 4683.280       | 199 |             |       |                   |

Table 2 revealed a significant joint contribution of the independent variables (observe, describe, act with awareness, non-judging and non-reactivity) to the prediction of mental toughness. The result yielded a coefficient of multiple regressions  $R = 0.321$ , multiple  $R^2 = 0.103$  and Adjusted  $R^2 = .080$ . This suggests that the five independent variables combined accounted for 80% (Adj. $R^2 = .080$ ) variation in the prediction of mental toughness. The other variables accounting for the remaining 20% are beyond the scope of this study. The

ANOVA result from the regression analysis showed that there was a significant joint effect of the independent variables on mental toughness, [ $F_{(5,194)} = 4.443, P < 0.001$ ].

**Table 3: The Relative Contribution of the Independent Variables to the Prediction of Mental Toughness.**

| Model |                    | Unstandardized Coefficients |            | Standardized Coefficients | T      | Sig. |
|-------|--------------------|-----------------------------|------------|---------------------------|--------|------|
|       |                    | B                           | Std. Error | Beta                      |        |      |
| 1     | (Constant)         | 42.366                      | 1.862      |                           | 22.748 | .000 |
|       | Observe            | .393                        | .132       | .219                      | 2.970  | .003 |
|       | Describe           | .101                        | .138       | .057                      | .732   | .465 |
|       | Act with awareness | -.371                       | .111       | -.237                     | -3.356 | .001 |
|       | Non-judging        | -.123                       | .097       | -.092                     | -1.265 | .208 |
|       | Non-reactivity     | .029                        | .098       | .022                      | .297   | .767 |

Table 3 showed that the most potent facet of mindfulness was act with awareness ( $\beta = -.237, t = 3.356, P < 0.001$ ), followed by observe ( $\beta = .219, t = 2.970, P < 0.01$ ). This implies that an increase in act with awareness will lead to an increase in mental toughness by 23.7%, while increase in observe will increase their mental toughness by 21.9%.

## Discussion

The purpose of the current study was to examine mindfulness as predictors of mental toughness among student-athletes. The results of the present study indicated a positive correlation between mental toughness and mindfulness. Two out of five facets of mindfulness were positively correlated with mental toughness. These two facets of mindfulness are; act with awareness and observe; whereas describe, non-judging and non-reactivity mindfulness indicators were not correlated.

As predicted, mindfulness jointly contributed and predicted mental toughness among student-athletes. The findings of this study showed that mindfulness is a predictor of mental toughness. Specifically, student-athletes who are mindful of the task at hand will definitely pay attention to every detail, focus on the present moment, target to achieve the set-related goals and respond to challenging situation without reacting in non-adaptive manner which in turn could foster resilience and mental toughness to get the task done and maintain concentration. The present finding concurs with the findings of Walker (2016) that mindfulness predicted higher levels of control and mental toughness of adolescent female hockey players. The author added that high mindfulness participants reported higher control, constancy and greater mental toughness than individual player's with lower levels of mindfulness. Also, the study of Jones and Parker (2018) found that mindfulness was positively associated with mental toughness and negatively associated with pain catastrophizing. Lee (2020) revealed that mindfulness reduced perceived stress and increased development goal orientation of the athletes.

Two out of the five facets (act with awareness and observe) of mindfulness relatively contributed and predicted mental toughness suggesting that these particular facets have great impact on mental toughness among student-athletes. This coincides with the findings of Kaiseler et al. (2017) where three out of the five facets of mindfulness (observe, non-judge and act with awareness) significantly contributed to life stress with non-judge and act with awareness were found to be negative predictors of life stress and observe was found to be

positive predictor of life stress. Similarly, Baer et al. (2008) revealed that describe, awareness, non-judge and non-reactivity positively predicted psychological well-being, whereas psychological well-being was negatively predicted by the observe. In addition, high level of mindfulness in terms of awareness and attention was found to predict performance during sporting activities among students (Anselmo and Go, 2021). Bränström et al. (2011) found that there was reduction in the level of stress experienced by participants due to high level of act with awareness and non-judge facets of mindfulness. This study provides further support and expansion to the body of knowledge as regards distinct role of each facet of mindfulness on mental toughness. This study identified act with awareness and observe as most potent predictors of mental toughness among student-athletes. Act with awareness takes the lead role and further supported by previous studies. This could be the reason that act with awareness means having adequate knowledge or being informed about a certain event or development in order to provide a guide and manners to approach an event.

This research provides evidence on relationship that exist between mindfulness (five facets of mindfulness) and mental toughness; and distinct role that mindfulness played in predicting mental toughness among student-athletes. This study showed that act with awareness and observe facets of mindfulness seem to be specifically and essentially important as predictors of mental toughness among student-athletes. Therefore, this offers practical implications for student-athletes, athletics coaches, higher institution authorities and sport psychologists aiming to help and develop an individual student-athlete mental toughness as they struggle to cope with plethora challenges associated with academic, sport and personal lives.

### **Limitations**

The study is not without any methodological limitations. First, the study recruited small sample size which could limit the generalization of the result. Larger sample size should be considered in future studies to increase the statistical power of the parameter estimates. Second, the study employed only university student-athletes as the participants. Future studies should consider elite athletes with sport-specific to deepen understanding of how mindfulness could predict mental toughness since the demands of each sport is different. Third, this study employed cross-sectional correlational design and thus given no room for causal relationships between mindfulness and mental toughness. Future studies should employ intervention or longitudinal studies to examine causal relationships between the variables.

### **Acknowledgements**

The authors would like to thank all the participants (student-athletes) and collaborated authorities for their efforts and cooperation.

### **Conflict of Interest**

The authors declare no potential conflicts of interest with respect to the research, authorship, and /or publication of this article

### **References**

- Abdul-Rafeeqe, T.C., & Sultana, D. (2016). Mediating role of mindfulness on the relationship between mental toughness and athletics performance of inter university track and field athletes. *International Journal of Physical Education, Sports & Health*, 3, 4–7

- Anicha, C.L., Ode, S., Moeller, S.K., & Robinson, M.D. (2012). Toward a cognitive view of trait mindfulness: distinct cognitive skills predict its observing and non-reactivity facets. *J. Pers.* 80 (12), 255-285.
- Anselmo, R. M., & Ronald, S. G. (2021). Mindfulness, mental toughness, and motivation as correlates of college students' sports involvement: basis for a proposed guide for school administrators. *International Journal of Academic Multidisciplinary Research (IJAMR)* 5 (3), 197-21
- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27–45. doi: /10.1177/1073191105283504
- Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., Walsh, E., Duggan, D. & Williams, J. M. G. (2008). Construct validity of the five facets mindfulness questionnaire in meditating and non-meditating samples. *Assessment*, 15, 329–342. doi:10.1177/1073191107313003
- Bergin, A.J., & Pakenham, K.I. (2016). The stress-buffering role of mindfulness in the relationship between perceived stress and psychological adjustment. *Mindfulness*, 7 (4), 928-939. <http://doi.org/10.1007/s12671-016-0532-x>
- Birrer, D., Röthlin, P., & Morgan, G. (2012). Mindfulness to enhance athletic performance: theoretical considerations and possible impact mechanisms. *Mindfulness*, 3(3), 235–246. <https://doi.org/10.1007/s12671-012-0109-2>
- Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, 11(3), 230-241.
- Blijlevens, S.J.E.; Elferink-Gemser, M.T.; Wylleman, P.; Bool, K.; Visscher, C. (2018). Psychological characteristics and skills of top-level Dutch gymnasts in the initiation, development and mastery stages of the athletic career. *Psychol. Sport Exerc.* 38, 202–210
- Bränström, R., Duncan, L. G., & Moskowitz, J. T. (2011). The association between dispositional mindfulness, psychological well-being, and perceived health in a Swedish population-based sample. *British Journal of Health Psychology*, 16, 300-16. doi:10.1348/135910710x501683
- Collins, D., & MacNamara, Á. (2012). The rocky road to the top. *Sports Medicine*, 42, 907–914. doi:10.2165/11635140-000000000-00000.
- Connaughton, D., Thelwell, R., & Hanton, S. (2011). Mental toughness development: issues, practical implications and future direction. In: Gucciardi, D. F, Gordon S. Mental toughness in sport: developments in theory and research. New York: Routledge, 2011.
- Cosh, S., & Tully, P. (2015). Stressor, coping and support mechanisms for student-athletes combining elite sport and tertiary education: Implication for practice. *Sport Psychologist* 19, 120-133.
- Gardner, F. L., & Moore, Z. E. (2012). Mindfulness and acceptance models in sport psychology: A decade of basic and applied scientific advancements. *Canadian Psychology/Psychologie Canadienne*, 53(4), 309–318. doi:10.1037/a0030220
- Gardner, F. L., & Moore, Z. E. (2017). Mindfulness-based and acceptance-based interventions in sport and performance contexts. *Current Opinion in Psychology*, 16, 180–184. doi:10.1016/j.copsyc.2017.06.001
- Gardner, F.L., & Moore, Z. E. (2020). Mindfulness in sport contexts. In Handbook of Sport Psychology; John Wiley & Sons: Hoboken, NJ, USA, pp. 738–750
- Glass, C. R., Spears, C. A., Perskudas, R., & Kaufman, K. A. (2019). Mindful sport performance enhancement: Randomized controlled trial of a mental training



- program with collegiate athletes. *Journal of Clinical Sport Psychology*, 13(4), 609–628. <https://doi.org/10.1123/jcsp.2017-0044>
- Gross, M., Moore, Z. E., Gardner, F. L., Wolanin, A. T., Pess, R., & Marks, D. R. (2018). An empirical examination comparing the mindfulness-acceptance-commitment approach and psychological skills training for the mental health and sport performance of female student athletes. *International Journal of Sport and Exercise Psychology*, 16(4), 431–451. <https://doi.org/10.1080/1612197X.2016.1250802>
- Gu, J., Strauss, C., Crane, C., Barnhofer, T., Karl, A., Cavanagh, K., & Kuyken, W. (2016). Examining the factor structure of the 39-item and 15-item versions of the Five-Facet Mindfulness Questionnaire before and after Mindfulness-Based Cognitive Therapy for people with recurrent depression. *Psychological Assessment*. doi: 10.1037/pas0000263
- Gucciardi, D. F. (2016). The relationship between developmental experiences and mental toughness in adolescent cricketers. *Journal of Sport and Exercise Psychology*, 33(3), 370–393. <https://doi.org/10.1123/jsep.33.3.370>
- Gucciardi, D. F., Hanton, S., Gordon, S., Mallett, C. J., & Temby, P. (2015). The concept of mental toughness: Tests of dimensionality, nomological network, and traitness. *Journal of Personality*, 83, 26–44. doi:10.1111/jopy.12079
- Gucciardi, D.F., Gordan, S., & Dimmock, J.A. (2008). Towards an understanding of mental toughness in Australian Football, *Journal of Applied Sport Psychology*, 20, (3), 261–282
- Gustafsson, H., Skoog, T., Davis, P., Kenttä, G., & Haberl, P. (2015). Mindfulness and its relationship with perceived stress, affect, and burnout in elite junior athletes. *J. Clin. Sport Psychol.*, 9, 263–281
- Jones, G., Hanton, S., & Connaughton, D. A., (2007). Framework of mental toughness in the world's best performers. *Sport Psychologist*, 21(2):243-264. doi:10.1123/tsp.21.2.243
- Jones, M.I., & Parker, J.K. (2018). Mindfulness mediates the relationship between mental toughness and pain catastrophizing in cyclists. *European Journal of Sport Science*. 18, 872–881
- Kabat-Zinn, J. (2003). Mindfulness- based interventions in context: past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144-156.
- Kaiseler, M., Poolton, J.M., Backhouse, S.H., & Stanger, N (2017). The relationship between mindfulness and life stress in student-athletes: The mediating role of coping effectiveness and decision rumination. *Sport Psychologist*, 31 (3). 288-298. DOI: <https://doi.org/10.1123/tsp.2016-0083>
- Kee, Y.H.; Wang, C.K.J. (2008). Relationships between mindfulness, flow dispositions and mental skills adoption: A cluster analytic approach. *Psychol. Sport Exerc.*, 9, 393–411
- Keng, S.L., & Tong, E.M. (2016). Riding the tide of emotions with mindfulness: Mindfulness, affect dynamics, and the mediating role of coping. *Emotion*, 16, 706–718. doi:10.1037/emo0000165
- Lee, Y.H. (2020). The role of mindfulness and occupational stress in the goal orientations of development and winning. *Sport Manag. Rev.*, 23, 626–639
- Li, C., Martindale, R., & Sun, Y. (2019). Relationships between talent development environments and mental toughness: The role of basic psychological need

- satisfaction. *Journal of Sports Sciences*, 37(18), 2057–2065. <https://doi.org/10.1080/02640414.2019.1620979>
- Lin, Y., Mutz, J., Clough, P. J., & Papageorgiou, K. A (2017). Mental toughness and individual differences in learning educational and work performance, psychological well-being and personality: A systematic review. *Frontiers in Psychology*, 8, article 1345.
- Manley, H., Jarukasemthawee, S., & Pisitsungkagarn, K. (2019). The effect of narcissistic admiration and rivalry on mental toughness. *Personality and Individual Differences*, 148, 1–6. <https://doi.org/10.1016/j.paid.2019.05.009>
- Marshall, T. (2017). The effect of long-term physical training on the development of mental toughness in recreationally active participants Tony Marshall Justin Roberts Anglia Ruskin University, UK Stephen Pack Itay Basevitch Anglia Ruskin University, UK Claire Rossato Univ, 9(2), 29–43
- Meggs, J., Ditzfeld, C., & Golby, J. (2014). Self-concept organization and mental toughness in sport, (October), 37–41. <https://doi.org/10.1080/02640414.2013.812230>
- Montecalbo, R.C. & Cardenas, R.C. (2015). Nutritional knowledge and dietary habits of Philippine collegiate athletes. *International Journal of Sports Sciences*, 5(2), 45-50.
- Nemeth, J. (2019). Overcoming barriers to participation in sports. Retrieved from: <https://study.com/academy/lesson/overcoming-barriers-to-participation-in-sport>
- Ponnusamy, V., Lines, R. L. J., Zhang, C.-Q., & Gucciardi, D. F. (2018). Latent profiles of elite Malaysian athletes' use of psychological skills and techniques and relations with mental toughness. *Peer J*, 6, e4778. <https://doi.org/10.7717/peerj.4778>
- Przybylski, J. (2018). Mental toughness in sport questionnaire – MTSQ. *Current Issues in Personality Psychology*, 6(1), 67–78. <https://doi.org/10.5114/cipp.2018.72199>
- Sheard, M., Golby, J., & Wersch, A. V. (2009). Progress toward construct validation of the sports mental toughness questionnaire (SMTQ). *European Journal of Psychological Assessment*, 25 (3), 186-193. Doi.10.1027/1015-5759.25.3.186
- Walker, S. (2016). Mindfulness and mental toughness among provincial adolescent female hockey players. *South African Journal of Sports Medicine*, 28(2), 46-50. <https://doi.org/10.17159/2078-516x/2016/v28i2a1576>
- Wang, Y., Tian, J., & Yang, Q. (2021). On mindfulness training for promoting mental toughness of female college students in endurance exercise. *Hindawi Evidence-Based Complementary and Alternative Medicine Vol. 2021*, Article ID 5596111, 12 pages <https://doi.org/10.1155/2021/5596111>
- Zeiger, J. S., & Zeiger, R. S. (2018). Mental toughness latent profiles in endurance athletes. *PLoS ONE*, 13(2): e0193071
- Zimmaro, L.A., Salmon, P., Naidu, H., Rowe, J., Phillips, K., Rebholz, W.N., .Sephton, S. E. (2016). Association of dispositional mindfulness with stress, cortisol, and well-being among university undergraduate students. *Mindfulness*, 7, 874-885. doi:10.1007/s12671-0160526-8
- Zizzi, S. J., & Andersen, M. B. (2017). Being mindful in sport and exercise psychology: Pathways for practitioners and students. FiT Publishing
- Zoe, P., & Jessie, J. H. R. (2017). Mental health staff views on improving burnout and mental toughness. *Journal of Mental Health Training, Education and Practice*, 12(4), 249-259. <https://doi.org/10.1108/JMHTEP-03-2017-0021>
- Zubair, A., Kamal, A., & Artemeva, V. (2018). Mindfulness and resilience as predictors of subjective well-being among university students: A cross cultural perspective. *Journal of Behavioural Sciences*, 28 (2), 1-19.