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Mental Toughness*Robert Weinberg and Joanne Butt*

C6.P1

Since the upsurge of interest in mental toughness research that was sparked by a seminal paper in 2002 (Jones, Hanton, & Connaughton), researchers have learned a great deal about different aspects of mental toughness. However, despite all this research attention, there are lots of questions and issues that remain unanswered (or are controversial), including the stability of mental toughness, mental versus physical toughness, the relationship between mental toughness and mental health, different types of mental toughness, and the measurement and definition of mental toughness. This chapter will briefly discuss the current state of mental toughness literature, but as the title of the text implies, the focus will be on discussing the unknown and potential areas for future research.

C6.S1

State of the Art

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The first section in this chapter will summarize key aspects of mental toughness research where there appears to be general agreement among researchers. This does not mean that all research (or researchers) agree; rather, there is consistency in findings regarding a specific aspect of mental toughness (see Table 6.1).

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Psychological Attributes of Mental Toughness

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First, an area of research that has been consistent is that mental toughness pertains to a certain set of psychological attributes. In their seminal research, Jones et al. (2002) interviewed elite athletes, used focus groups, and used rating scales to identify the psychological attributes that make up mental toughness. They found 12 different psychological attributes underpinning

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Table 6.1 Five Key Reading in Mental Toughness in Sports

Authors	Methodological Design	Key Findings
Gucciardi (2017)	Narrative review	Different definitions and conceptualizations of mental toughness were discussed before the latest definition, considering previous research was offered.
Hardy et al. (2014)	Test construction	Being mentally tough results in certain behaviors/outcomes opposed to one's psychological attributes.
Horsburgh et al. (2009)	Twin study methodology	Mental toughness has both genetic and environmental influences and thus can sometimes be taught and sometimes be caught.
Jones et al. (2002)	Qualitative interviews	Mental toughness is multidimensional, being composed by a variety of psychological attributes.
Strycharczyk & Clough (2015)	Correlations	Mental toughness encompasses hardiness and resilience, and coaches learn how to build mental toughness.

mental toughness, but they designated coping with pressure, focused concentration, motivation, and self-belief as the four pillars of mental toughness. Subsequent research has found many other psychological attributes underlying mental toughness, although researchers do not always agree on all the attributes (see Gucciardi, 2017, for a review). The ones that are consistently found in research include focused concentration, self-belief (confidence), coping with pressure, goal-directed motivation (commitment), sense of control, optimism, and resilience (bouncing back from setbacks; see Harmison, 2011).

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Genetic Versus Learned Aspects of Mental Toughness

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A second area of mental toughness research where there is consensus is that mental toughness has both genetic and learned aspects to it (Harmison, 2011). Specifically, researchers using twin study methodology found that individual differences in mental toughness could be attributed to both genetic and environmental factors (Horsburgh et al., 2009). Specifically, they found

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individual differences in overall mental toughness to be primarily explained by both genetic and nonshared environmental factors ($r = .52$). Their results also revealed that the correlation coefficients between heritability and specific aspects of mental toughness (e.g., challenge, commitment) ranged from .36 to .56. These findings led Horsburgh et al. to conclude that mental toughness is similar to just about every other personality trait that has been studied to determine the extent to which genetics or environmental factors determine individual differences.

C6.P5 From a qualitative perspective, research by Connaughton et al. (2008) revealed that mental toughness can be developed in a number of different ways depending on the environment in which an athlete grows up. This can be considered as mental toughness being “caught” as opposed to “taught.” Specifically, mental toughness being caught might include natural rivalry with a sibling “archrival” competitor, overcoming negative critical incidents, creating training simulations, and coach motivational climate. Mental toughness being “taught” has included many of the mental skills to enhance performance and well-being such as anxiety management, focused attention, imagery, goal setting, and self-talk. In addition, researchers have implemented and positively evaluated, both quantitatively and qualitatively, the effectiveness of a mental training program (e.g., Gucciardi, Gordon, & Dimmock, 2009a).

C6.S4 **Is Mental Toughness Multidimensional or Unidimensional?**

C6.P6 A third area of general consensus is that mental toughness is multidimensional in nature and focuses on a collection of values, attitudes, emotions, and cognitions that are hypothesized to enable individuals to behave in such a way as to achieve their goals in the face of obstacles (Hardy, Bell, & Beattie, 2014). A few examples demonstrate the point of the perceived multidimensionality of mental toughness. Specifically, for Jones et al. (2002), these characteristics are motivation, confidence, attentional focus, and coping. For Gucciardi, Gordon, and Dimmock (2009b), the characteristics include challenge, sport awareness, tough attitudes, and desire for success. Finally, Harmison (2011) conceptualizes mental toughness as a social cognitive personality construct, which by definition is multidimensional. For example, affects, expectancies, and goals are part of the social cognitive approach to mental toughness. In summary, although these characteristics are

sometimes similar and sometimes dissimilar, these research studies all view mental toughness as a multidimensional construct.

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What Is the Relationship of Mental Toughness to Hardiness and Resilience?

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A fourth area of consensus is that mental toughness is more than resilience and hardiness. In fact, hardiness and resilience are seen as part of the larger construct of mental toughness. For example, Clough, Earle, and Sewell (2002) suggested that hardiness, a key concept within the field of health psychology, could be used to help explain mental toughness in sport. Hardiness has been defined as a personality trait that acts as a buffer to influence how an individual copes with stressful life events. Hardiness is thought to comprise the personality components of control, commitment, and challenge, but in terms of mental toughness, Clough et al. (2002) added the component of confidence. Thus, for these authors, hardiness is part of mental toughness, because mental toughness has the added component of confidence. It should be noted that Clough et al. have been criticized for failing to adequately justify the transferring of the health psychology construct of hardiness into a more sport-specific setting (Gucciardi & Gordon, 2009). Researchers understand that one cannot simply take a construct out of mainstream psychology (or health psychology in this specific case) and apply it to a sport-specific setting. Psychometrics need to be conducted to demonstrate the reliability and validity of mainstream psychology constructs being applied to sport.

C6.P8

In terms of the concept of resilience, like hardiness, it is seen as a part of the larger construct of mental toughness. For example, all mentally tough individuals are seen as resilient, but not all resilient individuals are seen as mentally tough. Although both resilience and mental toughness share the ability to bounce back from setbacks, mental toughness also includes an optimistic and confident attitude. The core aspects of resiliency revolve around the concepts of adversity and adaptation, whereas mentally tough individuals see challenges and adversity as an opportunity and not a threat, and have the positive approach to move forward with enhanced performance and well-being. In essence, resiliency is focused on adversity, whereas mental toughness is shown in a variety of situations (positive and negative), not just dealing with adversity and difficult or even horrific events (Weinberg & Gould, 2019)

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C6.S6 **What Are the Behaviors of Mentally Tough Individuals?**

C6.P9 A fifth area of agreement is that the individuals who are considered mentally tough exhibit certain types of behaviors in and around competition. These behaviors do not define a mentally tough individual; rather, they are representative of how a mentally tough individual behaves (Connaughton et al., 2008). For example, Hardy et al. (2014) developed a behavioral scale based on feedback by athletes including behaviors that were thought to be consistently exhibited by mentally tough athletes. The question stem was “an athlete is able to maintain a high level of personal performance in competitive matches,” and some example responses included “when the conditions were difficult,” “when the match is particularly tight,” and “when teammates are struggling.” Similarly, Anthony et al. (2018) defined specific behaviors that coaches were trying to teach in developing mental toughness. Examples of behaviors included adapts to changing situations, exhibits positive body language following a personal or team mistake, and displays decisive actions in pressure situations that are effective.

C6.S7 **Questions to Move the Field Forward**

C6.P10 While mental toughness research has achieved consistency in some conceptual areas, as noted earlier, there are still some issues surrounding the construct that future research needs to address. In this section of the chapter we will discuss some of these pertinent issues where our knowledge base and understanding are less consistent.

C6.S8 **1. Theoretical Question: How Stable Is Mental Toughness?**C6.S9 **2. Theoretical Question: Are There Different Types of Mental Toughness?**

C6.P11 Two main questions are raised in this section, the first being whether mental toughness is stable or unstable, and the second, which is somewhat connected, being whether there are different types of mental toughness for different situations. To continue to develop the conceptual clarity of mental toughness, it is important to consider whether mental toughness is more of a

personality disposition (i.e., trait-like), which tends to be stable over time and situations, or whether it is more unstable (i.e., state-like), and thus changes across different situations. In support of viewing mental toughness as more of a personality disposition, some earlier research studies have suggested that mental toughness consists of various attributes (e.g., confidence, determined, optimistic, handling pressure) that make performers mentally tough in general and across situations (e.g., Connaughton et al., 2008; Gucciardi et al., 2009a; Weinberg, Butt, & Culp, 2011). Quantitative studies and the subsequent development of different models of mental toughness have also highlighted specific attributes that are assumed to make performers mentally tough (e.g., 4Cs model; cf. Clough et al., 2002). Within these models it is typically hypothesized that the psychological attributes or personal resources allow individuals to perform effectively across a wide variety of situations, especially when these situations involve coping with pressure or adversity.

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Other research studies have found that mental toughness is relatively unstable (i.e., state-like) across (and even within) situations, suggesting that it might be determined by the constraints and requirements of specific situations. That is, some sport-specific research has reported that the requirements of different sports seem to require a different set of mentally tough attributes. Examples of this research can be found in Australian football (Gucciardi, Gordon, & Dimmock, 2008), soccer (Thelwell, Weston, & Greenlees, 2005), cricket (Bull et al., 2005), and elite soccer referees (Slack et al., 2014). Moving beyond sport-specific attributes and exploring situational mental toughness, Weinberg et al. (2017) explored tennis players' perceived shifts in mental toughness within and between matches. Findings indicated that athletes' mentally tough behaviors, cognitions, and affect varied across situations and at times many athletes were not able to sustain "being mentally tough." These research findings offer support for the state-like nature of mental toughness, indicating that depending on the situation and athletes' perceptions of the situation, mental toughness can fluctuate. It is recommended that researchers continue to identify the specific situations and athletes' perceptions of situations that elicit behaviors that are (or are not) mentally tough. This research should lead to the development of appropriate interventions that teach coping skills to elicit the most effective cognitions, affects, and behaviors for different situations. For example, gaining an understanding of competitive situations that could potentially evoke fluctuations in mental toughness (i.e., mental weakness) can be integrated into athletes'

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training environments to help prepare them better for performing in competition and critical moments.

C6.P13 Within the broader issue of stability and situational mental toughness, there is a continued need to explore the different types of mental toughness. In particular, one question that remains is whether different situations require different types of mental toughness rather than being mentally tough in general. As noted earlier, there might be a specific set of attributes necessary for particular sports (e.g., soccer vs. golf), but preliminary research regarding situations within sports (e.g., Weinberg et al., 2017; Bull et al., 2005) would tentatively indicate that certain types of mental toughness are required for certain situations that occur within sport. Being able to identify and assess different types of mental toughness would enable specific mental toughness training programs to be designed to help athletes develop the psychological and physical attributes that are necessary to be successful in their particular sport.

C6.S10

3. Applied Question: Does Mental Toughness Depend on Physical Toughness?

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The second issue within mental toughness research that remains uncertain is the role of physical toughness and whether it is an attribute of mental toughness. In some qualitative research, physical toughness (i.e., conditioning, physical fitness) has been reported as being essential for mental toughness to be displayed (e.g., Gucciardi et al., 2009a; Weinberg et al., 2011). That is, physical toughness was not considered an attribute of mental toughness per se, but rather, a necessary platform for individuals to demonstrate the mental attributes such as handling pressure and having strong belief. In an earlier quantitative study that was conducted (Crust & Clough, 2005), results revealed a linkage between mental toughness and physical endurance in which higher levels of mental toughness would “push” individuals to pursue their physical training. Taken together, these findings indicate that there is a connection between mental toughness and physical toughness, although scant research has focused on empirically investigating the relationship.

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In a classic model on “toughness,” Dienstiber (1991) demonstrated a specific physiological response to stress termed “toughness” or “physiological toughness.” In summary, the research highlights the changes in specific biomarkers that are associated with better or poorer performance and

also the relationship to positive psychological reactions such as lower anxiety, greater emotional stability, greater adaptability to stress, and enhanced mental/cognitive abilities—many of which are found to be attributes of mental toughness. Taking a psychophysiological approach to further understand mental toughness in the sporting context could be a fruitful line of research, especially when taking into account athletes' perceptions of threat or challenge in response to stressful situations and the mediating role that mental toughness could play. In addition, future research is still needed to explore whether creating pressurized training environments in sport enhance mental toughness. Some research in this area has identified that exposing athletes to certain training demands (e.g., manipulating task, environment) combined with training consequences (e.g., manipulating judgment, forfeit) can increase athletes' perceptions of pressure and cognitive anxiety intensity and directional interpretation (Stoker et al., 2019). However, the role of mental toughness in relation to pressure training and performance needs to be investigated.

C6.S11

4. Theoretical Question: What Is the Relationship Between Mental Toughness, Mental Health, and Physical Health?

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The third issue in mental toughness research where questions remain relates to athletes' mental and physical health. In recent years there has been an increased emphasis on the mental health of athletes, and one question being asked is whether mental toughness and mental health are contradictory concepts, especially in elite sport. An editorial by Bauman (2016) brought to light the potentially negative effects that being mentally tough might have on the mental health of elite athletes. Specifically, he argues that the culture of elite sport is one that encourages athletes to be "tough," which in part means not admitting to, reporting, or seeking professional help for mental health issues. Furthermore, there is a stigma that is associated with athletes reporting mental health issues, as they fear that they will be labeled as "mentally weak," or certainly not mentally tough. In response to this editorial, Gucciardi, Hanton, and Fleming (2017) conducted a narrative review to investigate the assertion that mental toughness and mental health are contradictory concepts in elite sport. While no empirical published research investigating the relationship of mental toughness to mental health in elite athletes was found, they did find some studies linking mental toughness

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and mental health in nonelite sport performers as well as performers in other contexts. For example, several studies with adolescent and adult athletes (e.g., Gucciardi & Jones, 2012) and military personnel (Arthur et al., 2015) have found mental toughness to be positively related to positive affect and enhanced performance, while negatively related to burnout, depression, stress, and anxiety. Therefore, based on some limited research with adolescent athletes, students, and military personnel, an argument can be made that mental toughness appears to represent a positive indicator of mental health, and that it in fact helps to facilitate positive mental health. Future research is needed to determine the relationship between mental toughness and positive mental health, and longitudinal intervention research could also offer more definitive conclusions.

C6.P17 Despite some limited positive contributions, there is other research and anecdotal reports suggesting that mental toughness might be in conflict with physical health and well-being. Gucciardi et al. (2017) reported that athletes typically underutilize mental health services because of the perceived stigma that might emanate from others. Thus, it is plausible that being known as a mentally tough player would likely just exacerbate the feeling that they would be perceived as mentally weak (especially by teammates and coaches) if they sought out psychological help. It is clear that this is one area in need of empirical research, and further understanding the reasons athletes often underutilize mental health services and whether mental toughness plays a mediating role is a starting point.

C6.P18 In a related line of physical health and well-being research, questions continue to be raised on whether mentally tough athletes are more likely to play through injury and pain because this is one important behavior that signals that an athlete is mentally tough. Indeed, Coulter, Mallett, and Singer (2016) explored mental toughness in the Australian Football League and found that players who played through injury, pain, and fatigue were seen as mentally tough and were held in high esteem compared to those players who did not conform to these standards. However, empirical research is limited in this area and it is also possible that other personality and/or external factors influence whether an athlete tries to participate while injured. Along these lines, it is also important to consider the culture surrounding specific sports. Specifically, in relation to Australian football, Gucciardi and colleagues (2017) noted the extent to which subcultural beliefs, norms, and values of being mentally tough foster an idealized form of hypermasculinity and make it less likely that athletes will seek out professional psychological help. It is

possible that this sort of competitive culture will likely provide norms to which athletes of different ages and gender adhere, as well as athletes playing sports varying in physical contact (e.g., football vs. tennis). Collectively, from reviewing the literature available, there is clearly a need for further empirical research to be conducted on mental toughness, sport culture, and athletes performing while feeling mentally well. Overall, research findings do emphasize that mental toughness (e.g., self-belief, focus, handling pressure, competitiveness) is an important psychological characteristic for athletes to develop, and this is supported across the wide range of literature focused on developing talented athletes. Future research should consider exploring optimal environments specific to sports and how these environments can appropriately engender mental toughness attributes at various athlete career stages.

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5. Methodological Question: How to Identify Mental Toughness?

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The final issue in mental toughness research where questions remain relates to measuring mental toughness and identifying who is mentally tough. While qualitative research has typically focused on determining what constitutes mental toughness and generating applied and often sport-specific frameworks, it is on the quantitative measurement (questionnaires) and, more specifically, the psychometric rigor of these measures that questions continue to be raised.

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One generic measure that has been used more than others but is also one that is often criticized is the Mental Toughness Questionnaire-48 (MTQ-48; Clough et al., 2002). The MTQ-48 was developed in conjunction with the 4Cs framework (as discussed earlier in this chapter) and as such was generated from the construct of hardiness in health psychology, with the addition of confidence. One of the main concerns raised regarding the 4Cs framework was its suitability for use in the sport setting and thus the validity of the MTQ-48 was questioned. Nonetheless, the MTQ-48 has been used in research within academic (e.g., Stock, Lynam, & Cachia, 2018) and sport settings (e.g., Slack et al., 2015). However, while the MTQ-48 shows promise as a measure of mental toughness, future research utilizing appropriate larger samples and confirmatory factor analysis processes is advised. With equivocal findings surrounding the MTQ-48, alternative measures

could be considered for future research. Two such measures offering potential include the Mental Toughness Inventory (MTI) (cf. Middleton, Martin, & Marsh, 2011) and the Sport Mental Toughness Questionnaire (SMTQ; Sheard, Golby, & Van Wersch, 2009). The SMTQ was designed and tested with a range of athletes and could well be suited for research with athletes of varying abilities (i.e., development, collegiate), while the MTI, following preliminary construct validation results, seems most suitable for research with elite athletes. The MTI is certainly considered a more robust measure than the early Psychological Performance Inventory (PPI; Loehr, 1986), which was also designed with elite athletes in mind, but research examining the PPI psychometric properties has not yet supported its factorial validity (e.g., Golby, Sheard, & Van Wersch, 2007).

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As an alternative to generic measures discussed previously, some researchers have developed sport-specific measures. As discussed earlier in this chapter, one question remains as to whether some of the mental toughness attributes are sport specific and therefore require a sport-specific quantitative measure. With this in mind, Gucciardi and colleagues have developed the Australian football Mental Toughness Inventory (AfMTI; Gucciardi et al., 2009b) as well as the Cricket Mental Toughness Inventory (CMTI; Gucciardi & Gordon, 2009). Both measures demonstrate the applied benefits of capturing sport-specific dimensions of mental toughness, and future research might consider developing more context-specific measures especially given the limitations of existing generic measures available. Nonetheless, the concern for these sport-specific measures is whether or not they are appropriate outside of that context. Thus, further development and testing are needed to perhaps identify whether sport-specific measures can be adapted to other similar sports (e.g., invasion games vs. aesthetic sports). It is also possible that a mixed approach can be taken to measuring mental toughness in the future so that a generic measure is not used on its own. As one example, mental toughness behaviors can be observed and measured in addition to using one of the multidimensional measures such as the MTQ-48 or the MTI. Bell, Hardy, and Beattie (2013) utilized this approach in their study with elite cricketers, which involved developing and measuring mental toughness behaviors. Originally a 15-item scale was developed and then statistically (factor analysis) it was reduced to an 8-item scale measuring specific behaviors (as opposed to psychological qualities). These behaviors related to maintaining a high level of performance when a match is particularly tight, when the conditions are difficult, when teammates are relying on one player

to perform well, when a player is struggling with an injury, and when there are a large number of spectators present.

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Conclusion

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Although we have learned a lot about mental toughness from empirical data, there is still a great deal that needs to be done to better understand the different aspects of mental toughness. The purpose of this chapter was to highlight consistent areas of research regarding mental toughness as well as areas that need further research and clarification. Specific areas for future study were offered to help move the field forward in terms of both research and practice. Hopefully, this chapter will stimulate researchers to continue to study the many aspects of mental toughness that need further clarification so both researchers and practitioners can better understand the cognitions, affects, and behaviors that are associated with mental toughness.

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