# Mental Toughness Training

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# Introduction

## What is Mental Toughness?

Mental Toughness (MT) is a term that is commonly used to describe an athlete who when under pressure has demonstrated some form of Mentally Tough behaviour (MTb) (Gucciardi, Hanton, Gordon, Mallet, & Tenby, 2015; Hardy, Bell, & Beattie, 2014). The outcome of such behaviours quite often results in the maintenance (or even enhancement) of performance under pressure (Bell, Hardy, & Beattie, 2013). MT is focused upon the resources that athletes use to bring about MTb and is generally assessed via self-report. Some researchers use sport specific multifactor approaches such as the Sport Mental Toughness Questionnaire (SMTQ; Sheard, Golby, & Wersch, 2009), whereas other researchers have found that MT is best assessed via a unidimensional approach such as the Mental Toughness Index (MTI; Gucciardi et al., 2015). MT behaviours are generally informant assessed (e.g., the athlete's coach rates how well the athlete maintains goal directed performance under pressure). Importantly, the current authors propose that before one can make reasonable claims about the usefulness of self-report assessments of MT, there needs to be an evaluation of whether MTb has actually occurred (Beattie, Alqallaf, & Hardy, 2017; Hardy et al., 2014; Gucciardi et al., 2015). However, researchers and practitioners should be aware that some MT behaviours may be concealed to the observer (e.g., cognitions or thought processes of the athlete).

We recommend three important ingredients for developing MT: 1) the athlete must practice in pressurised training environments that contain punishments or costs replicating those encountered in competition; 2) the athlete must have access to psychological resources or support that can be put into practice when dealing with pressurised training environments; and 3) the athlete must be motivated to succeed in the sport in which they compete.

## Qualitative Research on MT (Developmental Perspectives)

***From the athlete's perspective.*** The purpose of this chapter is to provide future directions for the training of MT. Therefore, a brief overview of research examining the development of MT

follows. As there are no long-term quantitative studies examining the development of MT, the review is limited to qualitative studies. Further, as this topic has been covered in-depth elsewhere (Anthony, Gucciardi, & Gordon, 2016), we only provide a brief overview. Qualitative methods, however, limit researcher's ability to differentiate between the causes, processes, outcomes and other correlates associated with MT (Hardy et al., 2014). Most of the qualitative research that has been performed is on elite athletes, such that ability is confounded with MT. This could lead erroneously to the implication that less elite athletes cannot be MT!

The environment (home, training and competition) seems to be a main pre-cursor for the development of MT. For example, Bull, Shambrook, James, and Brooks (2005) examined how existing MT English cricketers developed this characteristic. They identified a pool of 12 cricketers who had been voted as the most MT cricketers from the 1980's and 1990's by a sample of 101 cricket coaches. Environmental influences such as parental influence, childhood background (dealing with adversity at a young age), exposure to foreign cricket (experiencing other hostile environments), and having opportunities to survive early setbacks, were identified as pre-cursors to the development of MT.

The importance of the environment has also been noted as an antecedent for the development of MT in a sample 10 international female gymnasts from Great Britain and the United States (e.g., Thelwell, Such, Weston, Such, & Greenlees, 2010). The environment was broken down into four sub-categories. First, training environments where the club had obtained past success, and installed discipline, hard work, competitive attitudes, determination, and never give up attitudes. Second, family environments that installed competitive, positive and never give up attitudes, and had experienced some adversity (single parent families). Third, observing better gymnasts in competition and training and fourth, having high expectations from one's own country (derived from past success in the sport) helped to develop MT.

In their examination of the development of mental toughness in seven international athletes (athletes represented their country at Olympic or Commonwealth games), Connaughton, Hanton,

and Jones (2008) concluded that MT developed over the entire duration of an athlete's career (early, middle, and later years). MT could be developed via the coach's leadership behaviours, observing significant others in training and competition, parental advice, being in challenging, rewarding, and enjoyable motivational climates, gaining competitive experience, and perhaps most importantly, experiencing and overcoming critical incidents. Similar evidence for the long-term development of mental toughness was also shown by these authors in a study of the development and maintenance of MT in seven of the world's best performers (athletes had medalled at Olympic or World Championship level; Connaughton, Wadey, Hanton & Jones, 2010). At the initial involvement in sport, MT was installed by competitive training environments and the mastering of skills more quickly and to a higher level than peers. When progressing to the elite phase of their career, a structured and disciplined training environment, learning from role models, and "doing what needed to be done" developed MT. At the elite level, MT was developed through experience of high-level competitions, having a wide range of social support, applying mental skills, and experiencing critical incidents. Experiencing and overcoming critical incidents were seen as invaluable experiences in developing MT across athlete's careers. Critical incidents outside of sport (e.g., parental divorce), seemed to be a catalyst for the athlete to focus and prioritize training. This latter finding was reinforced by a study of "super-elite" and elite Olympic athletes showing that "super-elite" athletes (who had won multiple gold medals at successive Olympic Games or World Championships) were more likely than elite athletes to have experienced a critical negative life event during their development years and a later turning point that enhanced motivation and/or focus (Hardy, Barlow, Evans et al., 2017).

Recent quantitative research has examined the mediating role that self-regulated training behaviours has on the relationship between self-report MT with coach rated assessment of MT behaviours in a swimming environment (Beattie, Alqallaf, Hardy, & Ntoumanis, under review). Self-regulated training behaviours was assessed by athlete and the coach regarding how well the athlete engages with training. These authors reported positive relationships between self-report MT

and training behaviours and self-report MT and coach rated assessment of MTb. Further, self-regulated training behaviours also had a positive relationship with coach rated MTb. Finally, Beattie et al. found that training behaviours mediated the relationship between self-report MT and coach rated assessment of MTb. That is, self-regulated training behaviours (regardless of whether they were assessed by the coach or athlete) partially explained the positive relationship observed between self-assessed MT and coach rated perceptions of MTb (see Figure 1).

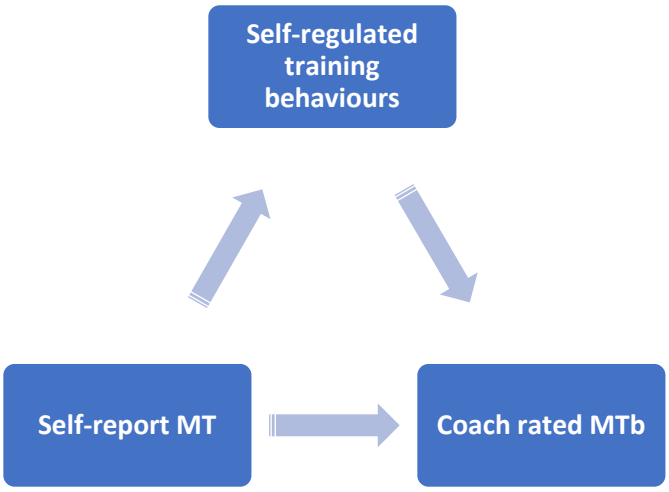


*Figure 1.* Self-regulated training behaviours indirectly explaining the relationship between self-report MT and coach rated MTb

***From the coach's perspective.*** Qualitative research has been conducted on coach's perceptions of how MT has been developed (Driska, Kamphoff, & Armentrout, 2012; Gucciardi, Gordon, Dimmock, & Mallet, 2009). Eleven male Australian Football League coaches were interviewed on how coaches could cultivate, facilitate as well as hinder MT (Gucciardi et al., 2009). Factors that facilitated the development of MT included, having a positive coach-athlete relationship, focussing upon personal development and providing stimulating training environments which exposed athletes to various challenges, pressures and adversity. MT was adversely affected when the coach prioritised success over development, focussed on player's weaknesses, or had low or unrealistic expectations particularly in unchallenging environments.

The importance of challenge for the development of mental toughness also emerged as an important factor among 13 highly experienced swimming coaches from the United States (Driska et

al. 2012). Three higher order themes were highlighted from interviews. First were actions of the coach, which included creating challenging and demanding expectations. The coach created such an environment by constantly challenging swimmers, having high expectations, demanding excellence, and creating emotional challenges. Second was the coach's general philosophy of training, including the development of MT. Coaches challenged their swimmers when addressing physical, technical and psychological needs. Goals and race intervals replicated "race pain" and as the swimmer's condition improved, the coach would design workouts where the swimmer would fail. Re-visiting the failure at a later stage of training emphasised to the swimmer that failures could be overcome. Finally, the coach developed a motivational climate that fostered MT. For example, some coaches rewarded swimmers who pushed beyond their limits, or praised athletes in front of their peers if they had displayed "tough minded" behaviours (e.g., bouncing back from a previous poor training session).

In a recent meta-analysis of qualitative research on mental toughness development, based on ten key qualitative studies (some discussed above), four important themes emerged (Anthony et al., 2016). These related to personal characteristics, interactions with the environment, progressive development, and breadth of experience. This led to a bioecological model of MT development through; *proximal processes* (continuingly evolving performer-environment exchanges); *personal characteristics* (athletes are producers as well as products of their own development); *contexts* (referred to as the athletes' physical and social environment); and finally *time* (when significant events occur).

***From the sport psychologist's perspective.*** Few researchers have examined the development of MT from the perspective of the sport psychologist. In one recent study, 15 sport psychologists from the U.S. and the UK considered experts in the field of MT were interviewed (Weinberg, Freysinger, Mellano, & Brookhouse, 2016). Psychologists reported that coaches could build MT in their athletes by being mindful about putting athletes into adverse situations and presenting them with opportunities to develop mental skills to cope effectively. Coaches should be critical but

encouraging, foster autonomy, see athletes as individuals, use multiple techniques in building MT and seek further education.

## Mental Toughness Interventions

***Athlete-centred training programs.*** Meta-analytic data supports the benefits of psychological and psychosocial skills training interventions for sport performance (Brown & Fletcher, 2017). Early efforts to train mental toughness were focused on developing athletes' psychological skills/resources considered important for sport performance. Sheard and Golby (2006) examined the effectiveness of a multi-component psychological skills training (PST) package that consisted of goal setting, visualisation, relaxation, concentration and thought stoppage with a sample of 36 national level swimmers. The intervention was delivered individually to athletes over a five week period via a series of 45 min sessions, with primary outcomes assessed pre-, post- and one month post-intervention. These outcomes included self-reports of perceptions of success, mental toughness, hardiness, self-esteem, self-efficacy, optimism, affect and swimming performance across a range of events. There were significant performance improvements in six of 12 events assessed post-intervention, and two of 12 swimming events one month post-intervention. Improvements at post-intervention were observed in all psychological measures, with the exception of the challenge subscale of hardiness. Nevertheless, there were three key limitations of this study that require consideration when interpreting these findings; first is the assessment of swimming performance (e.g., sample size for specific events ranged from 5-25 participants); second is the absence of a control group (e.g., improvements due to training and development over a 2-month period in other areas could not be ruled out). Finally, and perhaps most importantly, there was no pre and post informant assessment of MT behaviours.

In a group of adolescent Australian footballers, two intervention groups were compared against a waitlist control group (Gucciardi, Gordon & Dimmock, 2009a). A 'traditional' PST program involving sessions on self-regulation, arousal regulation, mental rehearsal, attentional control, self-efficacy and ideal performance states was compared with a mental toughness training

group. The MT intervention group involved sessions that targeted personal and team values, work ethic, self-motivation, self-belief, concentration and focus, resilience, emotional intelligence, sport intelligence and physical toughness, characteristics identified in a previous study (Gucciardi, Gordon, & Dimmock, 2008). Both the traditional and mental toughness programs encompassed six two hour sessions delivered weekly over a period of six weeks. Primary outcomes included self, parent and coach ratings of mental toughness, and self-reports of resilience and flow, which were measured pre-intervention and at the end of the competitive season. The MT and traditional groups differed significantly from the control group across several dimensions of mental toughness (self, parent and coach reports), resilience and flow at the end of the competitive season. However, there were minimal differences between the traditional and MT groups. Follow-up interviews with 10 players, one of their parents, and three coaches from the MT group underscored the importance of enhanced self-awareness, techniques for self-monitoring and self-regulation, and perspective-taking discussions for improvements in mental toughness (Gucciardi, Gordon, & Dimmock, 2009b). A strength of this study is that MT was partly corroborated by coaches and parents of the athletes. Nevertheless, there are three key limitations of this study, which include, the small sample size, no randomization of participants to groups, and the reliance on subjective measures of primary outcomes.

A final study conducted in this area of MT training, which was based on training in high pressure situations, was conducted with elite youth cricketers (Bell et al., 2013). The central focus of this intervention was to enhance the athlete's ability to achieve and maintain performance goals under pressure from a wide range of stressors. As pressurised performance environments contain a high frequency of punishment related stimuli (e.g., letting the team down, being dropped, adverse publicity), the players were repeatedly exposed to threat (i.e., punishment conditioned stimuli) in their regular training environment following task failure. This threatening environment was achieved by the use of punishments following task failure or a failure of personal discipline. The punishments used were essentially just inconveniences, additional work that had to be done, or loss

of opportunities, e.g., clearing dinner plates away, performing an additional training session at the end of the training day, or being excluded from a valuable practice session. At a theoretical level, the use of such punishment conditioned stimuli could produce two different effects, both of which should be beneficial. First, experiencing and overcoming punishment-conditioned stimuli in a training environment could systematically desensitise the individual to the stress and anxiety associated with the threat (Wolpe, 1958). Second, being repeatedly exposed to punishment conditioned stimuli could sensitize athletes' threat detection mechanisms thereby giving them the maximum opportunity to detect such threats earlier on subsequent occasions. The first of these effects is well-established in the desensitization literature (Wolpe, 1958). Evidence in support of the latter effect has been produced by a recent set of studies which showed that elite level cricketers who were sensitive to punishment and insensitive to reward also demonstrated superior threat detection, and were rated as having higher levels of MT behaviour by their coaches (Hardy et al., 2014). To avoid the potentially harmful effects of punishment, the intervention by Bell and colleagues had a number of potentially important features. It was designed and delivered in a multi-disciplinary, transformational manner with and through the coaching staff as part of the athlete's regular training program, as opposed to in a separate psychologist led intervention. The athletes and their parents voluntarily "signed up" to the program following a two day informed consent event. Importantly, the participants were also taught a number of simple individualised strategies to help them prepare to perform under pressure and recover focus and performance following failure. The intervention period was 12 months, and the intervention group was compared against a control group on a number of markers of mental toughness at pre-test and at various intervals over the year. In comparison to the control group, the intervention group demonstrated significant improvements in coach-rated MT behaviours, objectively assessed competitive performance statistics, indoor batting against pace, and a multistage fitness test. However, no significant difference occurred in a batting against spin assessment. Three limitations were acknowledged in this study. First, participants were not randomly allocated to groups. The control group consisted of players who had

been short listed for selection to the intervention program but not selected. Second, performance was not assessed solely under high pressure conditions; rather, a global assessment of the athlete's performance across the whole season was used (total runs scored, batting average, batting strike rate, percentage of team runs scored, total wickets taken, bowling average, bowling strike rate, percentage of team wickets). Third, the separate effects of exposure to punishment conditioned stimuli, transformational delivery, and the use of individualised coping strategies were not separately assessed.

***Coach-centred training programs***. Drawing from self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2017), an intervention program was evaluated targeting coach interpersonal style, particularly with regard to the satisfaction of athletes' needs for autonomy (feeling like the 'driver' or key contributor of one's own behaviour), competence (feeling resourceful to enact task-relevant behaviours and having the opportunity do so), and relatedness (feeling connected to and valued by important others) (Mahoney, Ntoumanis, Gucciardi, Mallett & Stebbings, 2016; see also Mahoney, Gucciardi, Gordon, & Mtoumanis, 2017). Participants were recruited from four rowing clubs in the United Kingdom, with the club used to randomise coaches (N = 18) and their athletes to the intervention ($n$ = 10 coaches; $n$ = 53 athletes) or waitlist control conditions ($n$ = 8 coaches; $n$ = 60 athletes). The intervention consisted of two, 2-hour workshops. In the first workshop, coaches were provided with information regarding the theoretical underpinnings of SDT and coach behaviours that foster or forestall psychological needs, and engaged in small group activities to test out the interpersonal strategies (workshop 1). Collectively, the information and experiences in the first workshop enabled coaches to generate strategies to incorporate within their coaching practice. In the second workshop, coaches were provided with opportunities to work through their reflections of the integration of these strategies within their coaching practice during a one week break between sessions (workshop 2). With the exception of psychological needs thwarting, which was higher at post-intervention and 2 months post-intervention, there were no other group improvements. Given the large attrition in athletes across measurement points

(intervention group = 47%, control group = 45%), it is likely that the study was underpowered to detect any potential differences. Nevertheless, interviews with the intervention coaches revealed a number of benefits (e.g., opportunity to share ideas in group settings, practical skill use) and barriers (e.g., time, regression to preferred coaching practice approach) to their participation in the training program. It is worth noting that this intervention was at odds with other studies of MT training. For example, coaches in one study created tough environments by demanding excellence and creating emotional and physical challenges which athletes will fail (Driska et al., 2014). It seems unlikely that interventions in which athletes self-reported psychological needs are always met by making the environment less challenging (for them) could enhance MT.

**Maximising Transparency and Clarity in Intervention Development and Reporting**

The existing work on mental toughness interventions underscores the complexity of such efforts in that training programs often incorporate several unique and interacting active components. Such complexity presents challenges for researchers who aim to report their research in ways that foster replication, synthesis, and translation into practice. Several reporting guidelines have been developed and published over the past decade with the goal to assist researchers in specifying key methodological information with transparency and clarity. Key reporting guidelines pertinent for intervention research include CONSORT (Schulz, Altman, Moher et al., 2010) and its extensions (Campbell et al., 2012; Eldridge et al., 2016; Vohra et al., 2015), and TREND (Des Jarlais et al., 2004); interested readers are referred to the Equator Network (http://www.equator-network.org) for a repository of over 350 checklists. One recommendation common to these guidelines for intervention research is to provide sufficient detail on the content of the specific techniques or 'active ingredients' (Michie et al., 2015) which characterise the researchers' efforts to modify or change behaviour (e.g., reinforcement, self-monitoring, feedback). To promote standardised descriptions of these active components, behavioural scientists have developed taxonomies of behaviour change techniques (BCT; Michie et al., 2013) which can be adopted for the development of interventions and their reporting. Such an approach has been used to provide a systematic review

of the literature on coach development programs to identify the theoretical underpinnings and active ingredients of effective interventions for coach behaviour (Allan, Vierimaa, Gainforth & Côté, in press). Yet to date, mental toughness researchers and more broadly sport and exercise psychology scholars (including us) have not taken sufficient notice of these guidelines for the development and reporting of psychosocial and behavioural interventions. Use of these guidelines early in the development of mental toughness interventions and for their dissemination via academic reports is essential for transparency and clarity regarding the active ingredients, in turn, shaping the next wave of research.

**Psychophysiological Indices of MT and MT Development**

In addition to influencing personality and psychological resources, interventions designed to foster MT would be expected to elicit certain psychophysiological changes which promote MT behaviours. Research directly examining the psychophysiological correlates of MT is currently sparse, but we can make several theory-driven hypotheses about how psychophysiological measures could reflect varying levels of MT.

***Predictions Derived from Challenge and Threat Appraisal Theory.*** According to challenge and threat appraisal theory (Blascovich & Tomaka, 1996; Jones, Meijen, McCarthy & Sheffield, 2009), when individuals encounter stressors that they are motivated to confront, their psychological appraisal of the situation determines their physiological response, which in-turn, influences their performance. In situations where an individual's perceived resources (e.g., skills, knowledge, external support) exceed their perceived demands (e.g., uncertainty, danger, required effort), a "challenge appraisal" is said to ensue, prompting activation of the sympathetic-adrenomedullary (SAM) axis. This mobilizes energy resources by releasing epinephrine and norepinephrine to elevate heart rate, ventricular contractility and cardiac output. Epinephrine can also bind with beta-2 receptors in skeletal muscle to prompt vasodilation in skeletal muscle beds, thereby reducing total peripheral resistance (Seery, 2011). This pattern of physiological responding is argued to facilitate

physical activity (e.g., fast and efficient movements in sport) by increasing the efficiency of blood flow to large skeletal muscles (Jones et al., 2009).

In situations where perceived demands exceed perceived resources, a "threat appraisal" ensues, prompting activation of both the SAM and the pituitary-adrenocortial (HPA) axes. SAM activation would prompt elevations in heart rate and ventricular contractility, while additional HPA activation would prompt the release of cortisol, which tempers vasodilation (Blascovich, Seery, Mugridge, Norris & Weisbuch, 2004). This pattern of physiological responding could compromise the relative efficiency of blood flow to the muscles, and would rather prepare individuals to withdraw from action than prime them to act more (Seery, 2011; see Figure 2).

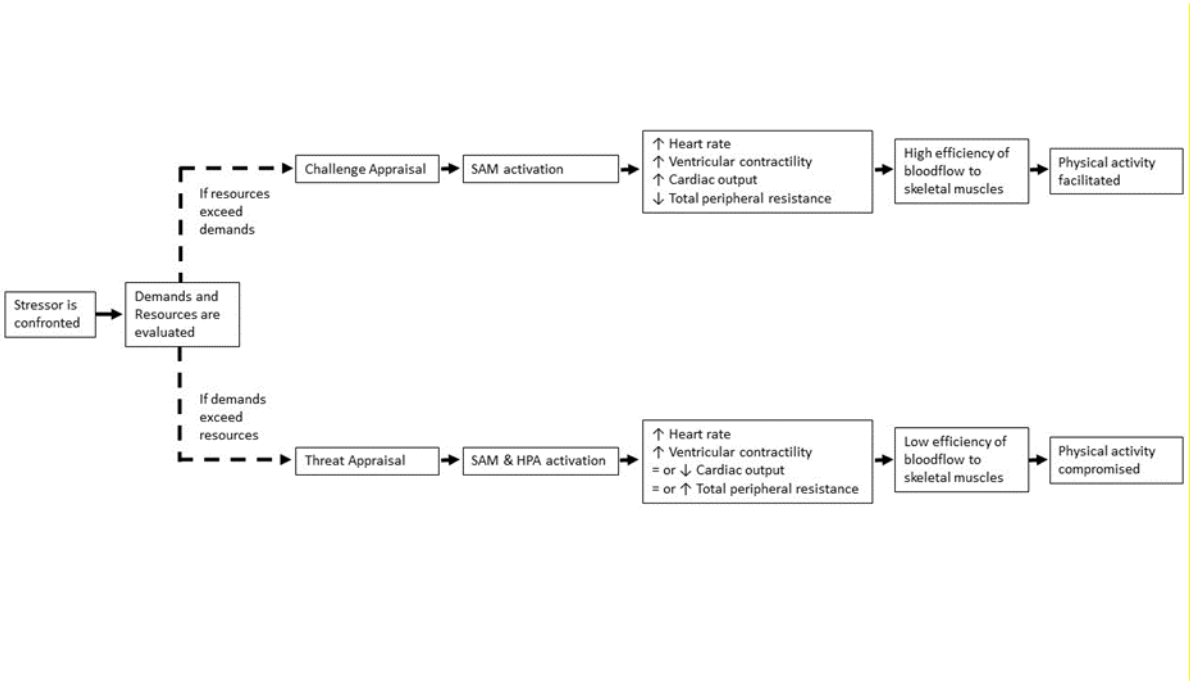


*Figure 2.* Overview of Challenge and Threat Appraisal Theory (Blascovich & Tomaka, 1996; Jones et al., 2009). Interventions to increase MT are expected to increase the likelihood of individuals following the upper "Challenge" path and psychophysiological responses.

Based on challenge and threat appraisal theory, one could reason that MT interventions, especially those that focus on increasing coping resources and preparedness, should increase the likelihood of stressors being appraised as a challenge rather than a threat. Accordingly, the

development of MT could be indexed by a relative increase in cardiac output and decrease in total peripheral resistance during stressful situations. Moreover, this pattern of physiological responding could underpin any beneficial effects of the MT intervention on performance; this awaits to be tested. Impedance cardiograph systems are traditionally used to assess cardiac output and total peripheral resistance. They are most commonly found in medical and research laboratories, with size and cost factors presenting a barrier to their widespread use in field settings. However, advancements in technology are yielding more portable, miniaturized and low-cost solutions that will increase the feasibility of field-based psychophysiological monitoring in the future (e.g., Yazdanian, Mahnam, Edrisi & Esfahani, 2016).

***Predictions Derived from Theories of Approach and Avoidance Motivation.*** Several researchers have associated increased approach motivation with higher levels of MT (Gucciardi, 2010) and performance (Lochbaum & Gottardy, 2015). At a cortical-level, approach motivation manifests as prefrontal-cortical-asymmetry, with relatively greater activation of the left prefrontal cortex than the right prefrontal cortex (Harmon-Jones & Gable, 2018). This physiological index originates from studies of participants with brain lesions. People with lesions in the left hemisphere (and, hence, dominance of the right hemisphere) showed depressive symptoms (e.g., avoidance, withdrawal), whereas those with lesions in the right hemisphere showed manic symptoms (e.g., approach) (Gainotti, 1972). If development of MT is characterised by an increase in approach behaviours and overcoming of stressors, there should be increased prefontal-cortical-asymmetry, with increased activation of the left prefrontal cortex. Again, this prediction has not to date been tested.

***Predictions Derived from Task-Specific Expert Performance Profiles.*** In addition to prompting general physiological changes consistent with challenge appraisals and approach motivation, MT interventions could encourage specific patterns of physiological activity known to support optimal performance. For instance, successful (compared to unsuccessful) golf-putting has been characterised by increased activation recorded at electrodes overlying the primary motor

cortex, likely reflecting more accurate motor programming of parameters such as force and direction (Babiloni et al., 2008; Cooke et al., 2014, 2015). In contrast, decreased activation of electrodes overlying the left-temporal regions likely reflects inhibition of verbal-analytic processes, which consistently characterises increased accuracy in gun-shooting (e.g., Kerick, Douglass & Hatfield, 2004; Gallicchio, Finkenzeller, Sattlecker, Lindinger, & Hoedlmoser, 2016). Accordingly, MT interventions may be expected to elicit more optimal task-specific psychophysiological profiles, such as the examples provided above for golf and shooting, and these profiles could further underpin the beneficial effects of MT training on performance.

Incidences of performance deterioration under stress have been attributed to stress disrupting the psychophysiological processes associated with optimal movement preparation (e.g., Cooke, Kavussanu, McIntyre & Ring, 2010; Hatfield et al., 2013). Accordingly, we hypothesise that a feature of MT should be the maintenance of optimal preparatory indices (e.g., cortical preparation indexed by the readiness potential and event-related desynchronization) during even the most intense high-stress situations. Moreover, an index of the development of MT would be the gradual alleviation of disruptions to preparatory psychophysiological activity upon the transition from low-stress to high-stress conditions. These predictions provide another basis for future interdisciplinary research.

**Summary and directions for future research**

The above sections detail some psychophysiological measures that would be expected to change as MT develops. This represents only a sample of measures and theories that could be drawn upon and used in the evaluation of MT interventions, rather than an exhaustive list. Readers interested in other psychophysiological-based theories and measures that could equally support MT development could also consider the neurovisceral integration model (Thayer, Hansen, Saus-Rose & Johnsen, 2009) and the psychomotor efficiency hypothesis (Hatfield & Hillman, 2001).

The future research suggestions voiced above involve monitoring cardiovascular and cortical activity longitudinally to charter MT developments over the course of a MT intervention.

Also, one could target the manipulation of these psychophysiological variables more directly, such as via biofeedback training. It is well established that biofeedback can train individuals to volitionally produce certain psychophysiological patterns, including some of those that have been identified as candidate correlates of MT in the sections above (e.g., Allen, Harmon-Jones & Cavender, 2001; Ring, Cooke, Kavussanu, McIntyre & Masters, 2015). It would be interesting for future research to examine whether such biofeedback interventions can directly encourage the development of MT as alternative or adjunct treatments to more traditional MT interventions such as those described elsewhere in this chapter.

Despite the wealth of studies examining the importance of different cognitions, attitudes, emotions, psychological resources, traits that have been associated with MT, there has only been a handful of interventions devoted to developing MT. Furthermore, as our review reveals, these studies differ in their methodological approach and in how they quantify success. Some use subjective self-report assessments as a primary outcome, some use objective assessments of MT behaviours and performance-related statistics as outcome variables. All of them, however, have implemented some form of psychological skills intervention, yet all fall short of adhering to guidelines for the development and reporting of psychosocial and behavioural interventions.

There is a need to avoid a blanket interventionist approach to developing MT, where every athlete gets the same intervention at the same time, over the same period, whether needed or not. Even if the intervention is theoretically driven, this approach is akin to the proverbial throwing mud at a wall! A further desirable outcome of any MT intervention research should be the demonstration of effects at more than just a self-report level and ideally at all levels. For example, beneficial outcomes should be seen in measures of personality (self- or other reported), psychological resources (self- or other reported), psychophysiological (objective), and behavioural (objective, observed, or informant rated) measures.

The success of individualised MT interventions might also be enhanced if practitioners integrated a whole-person perspective (see Coulter, Mallett, Singer, & Gucciardi, 2016). To account

for psychological individuality and to better understand the motives behind an athlete's behaviour, the practitioner should take note of three layers of understanding (McAdams & Pals, 2007). First, one must understand the athlete's dispositional traits (e.g., personality or beliefs). These traits are generally stable across time and contexts and can generally account for a large part of the athlete's behaviour. Second, there is a need to understand the athlete's characteristic adaptations (e.g., motives, goals, values, beliefs and identity). That is, athletes are motivated agents and are free to choose their own goals. The final layer of personality relates to the self-narrative perspective (e.g., how previous life events shape the person and the future). As above, super-elite athletes were more likely than elite athletes to have experienced a critical negative life event (Hardy et al. 2017; see also Howells, Sarkar, & Fletcher, 2017) and it appeared that those critical life events were in part a catalyst for the athlete succeeding with sport.

To conclude, MT cannot be developed in a void of adversity. The qualitative work of Driska et al. (2012) showing that tough training environments and transformational delivery of punishment-driven interventions (Bell et al. (2013) support this line of thinking. Further, research has also found support that self-regulated training environments (where the athlete takes ownership of their own training), partially explains the relationship between athlete self-report ratings of MT and coach assessment of how well the athlete performs under pressure (Beattie et al., under review). There is also a need for future MT interventions to be more individualised (Bell et al. 2013; Gucciardi et al., 2009a). To fully understand the athlete and tailor individualised MT interventions, the three layers of understanding pertaining to MT (McAdams & Pals, 2007) should prove helpful. There is also a need to better understand the relationships between self-report MT assessments, its correlates, objectively assessed MTb, psychophysiological responses to stress, and performance related variables under pressure. For example, it is unlikely that all behaviours demonstrated by the athlete that promote performance under pressure could be termed mentally tough behaviours. We also recommend that future MT interventions are based on principles of maximizing transparency and clarity in reporting and intervention development.

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