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15. MENTAL TOUGHNESS

Correlates with Educational Outcomes

MENTAL TOUGHNESS: CORRELATES WITH EDUCATIONAL OUTCOMES

In recent years research has increasingly acknowledged the role of non-cognitive factors in educational success. A wide range of non-cognitive factors have been examined, such as resilience, buoyancy, perseverance, self-efficacy, confidence, motivation, and personality. There is substantial evidence that these factors are important, particularly for educational attainment (e.g. Ackerman, Chamorro-Premuzic, & Furnham, 2011; Morrison Gutman & Schoon, 2013; Putwain, Nicholson, Connors, & Woods, 2013; Stankov & Lee, 2014), but also for classroom behaviour (e.g. Bugler, McGeown, & St Clair-Thompson, 2015), and successful educational transitions (e.g. Aikins, Bierman, & Parker, 2005). Within this context, the present chapter is concerned with the concept of mental toughness. Mental toughness is related to how people deal with challenges, stressors and pressure irrespective of prevailing circumstances. There is a comprehensive framework of mental toughness (Clough, Earle, & Sewell, 2002), allowing for the examination of a number of non-cognitive traits. This chapter will begin by describing the mental toughness framework. It will then discuss conceptual similarities with other non-cognitive factors, and propose a number of advantages of adopting the mental toughness framework. The chapter will then review a series of studies which have examined the relationships between mental toughness and educational outcomes and experiences. Finally, the chapter puts forward suggestions for future research and discusses possibilities for designing interventions which aim to enhance children's and adolescents' mental toughness.

THE MENTAL TOUGHNESS FRAMEWORK

Mental toughness describes a construct related to how people deal with challenges, stressors, and pressure irrespective of prevailing circumstances. Historically mental toughness has been studied within the domain of sports, as an attribute of successful athletes (e.g. Bull, Shambrook, James, & Brooks, 2005; Connaughton, Wadey, Hanton, & Jones, 2008; Gucciardi, Gordon, & Dimmock, 2009; Jones, Hanton, & Connaughton, 2007). However, there are numerous competitive and pressured environments that exist outside of sport (e.g. Crust, 2008; Gerber et al.,

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2013). Therefore, mental toughness can be usefully explored within other contexts, including education.

A number of theoretical models of mental toughness have been proposed (e.g. Clough et al., 2002; Coulter, Mallett, & Gucciardi 2010; Fourie & Potgieter 2001; Golby & Sheard, 2006; Golby, Sheard, & van Wersch, 2007; Gucciardi, Gordon, & Dimmock, 2008; Jones, Hanton, & Connaughton, 2002). However, according to the most commonly used model, mental toughness comprises four broad characteristics: commitment, challenge, control, and confidence (Clough et al., 2002). Commitment is defined as the perseverance and ability to carry out tasks successfully, despite problems or obstacles. Those who score high on commitment will set goals and strive to achieve them; indeed they will be determined to complete these goals, despite problems or obstacles they may encounter. Challenge is defined as seeking out opportunities for self-development. Those who score high on challenge will see new situations as opportunities for self-development, rather than as threats. Control refers to being influential in one's own life and is subdivided into life control and emotional control. Those high in life control will feel that they have the power to shape their own life and future, while those with high emotion control will be able to manage their emotions in difficult situations and to regulate their emotions to an appropriate level of intensity. Finally, confidence refers to levels of self-assurance and is divided into confidence in abilities and interpersonal confidence. Individuals who are confident in their abilities will feel confident at attempting new or difficult tasks, whereas those with high levels of interpersonal confidence will feel confident in social situations. All four components can be regarded as positive psychological traits which can be developed, given the right support, encouragement and environment.

Alongside this model of mental toughness, Clough et al. (2002) developed the Mental Toughness Questionnaire 48 (MTQ48). This has emerged as the most commonly used measure of mental toughness in the existing literature (Gucciardi, Hanton, & Mallett, 2012). The questionnaire is comprised of 48 items for which respondents agree/disagree on a 5-point Likert-type scale (ranging from 'I disagree strongly' to 'I agree strongly'). Studies have reported suitable reliability and validity of the questionnaire for use with adult and adolescent samples (Clough et al., 2002; Crust & Swann, 2011; Perry, Clough, Crust, Earle, & Nicholls, 2013; St Clair-Thompson, Bugler, Robinson, Clough, McGeown, & Perry, 2014).

CONCEPTUAL SIMILARITIES WITH OTHER NON-COGNITIVE FACTORS

Mental toughness clearly overlaps with a number of concepts that have proved useful within educational settings. Here we will discuss links between mental toughness and resilience, buoyancy, perseverance, self-efficacy, confidence, motivation and personality. The conceptual overlap between mental toughness and each of these other constructs is also summarised in Table 1.

Table 1. The definition, conceptual overlap and published research findings relating to each subcomponent of mental toughness

Mental toughness construct	*Definition*	*Conceptual similarities*	*Evidenced educational outcomes*
Commitment	The perseverance and ability to carry out tasks successfully, despite problems or obstacles	*Resilience* *Buoyancy* *Perseverance* (grit) *Motivation* (achievement goal theory and self-determination theory) *Personality* (conscientiousness)	Undergraduate students' psychological well-being (Stamp et al., 2015) Adolescents' classroom behaviour (St Clair-Thompson et al., 2014, study 2)
Challenge	The preference for challenging tasks, and tendency to seek out opportunities for self-development	*Perseverance* (engagement) *Perseverance* (grit) *Self-efficacy* *Motivation* (self-determination theory)	
Control of life	The feeling of being influential in one's own life and having the power to shape one's own life and future	*Motivation* (achievement goal theory and self-determination theory) *Personality* (conscientiousness)	Undergraduate students' grades and progression (Crust et al., 2014) Adolescents' school attainment and attendance (St Clair-Thompson et a., 2014, study 1) Adolescents' classroom behaviour (St Clair-Thompson et al., 2014, study 2)
Control of emotion	The ability to manage one's emotions in difficult situations, and to regulate emotions to an appropriate level of intensity	*Resilience* *Buoyancy* *Perseverance* (engagement)	

(Continued)

Table 1. (Continued)

Mental toughness construct	*Definition*	*Conceptual similarities*	*Evidenced educational outcomes*
Confidence in abilities	Self-assurance, and associated confidence at attempting new or difficult tasks	*Resilience* *Self-efficacy* *Confidence* *Motivation* (expectancy value theory)	Undergraduate students' psychological well-being (Stamp et al., 2015) Adolescents' peer relationships (St Clair-Thompson et al., 2014, study 3)
Confidence-interpersonal	The feeling of being confident or not intimidated in social situations	*Resilience*	Undergraduate students' grades and progression (Crust et al., 2014) Adolescents' peer relationships (St Clair-Thompson et al., 2014, study 3)

Resilience

Mental toughness aligns closely with resilience, referring to the ability to adapt effectively in situations of adversity or stress. Within an educational environment this may include responding to adversities resulting from disadvantaged backgrounds (e.g. Yaeger & Dweck, 2012), or to more everyday academic pressures such as poor performance or test anxiety (Putwain et al., 2013).Some approaches view resilience as a process in which environmental influences serve as risk factors or protective factors (e.g. Coleman, 2015; Egeland, Carlson, & Sroufe, 1993). These factors include supportive relationships with teachers, family factors including parental concern, and school factors such as pro-social skills training. They also acknowledge student characteristics such as self-esteem, motivation, and accepting responsibility (e.g. Coleman, 2015; Mullis, Rathge, & Mullis, 2003). Other approaches to resilience focus entirely on these individual characteristics, acknowledging a role for self-efficacy, control, planning, composure, and persistence (e.g. Martin & Marsh, 2006). Each approach has evidenced relationships between resilience and academic outcomes, including attainment (e.g. Mullis et al., 2003; Putwain et al., 2013). Mental toughness relates most closely to approaches focussing on attributes of the individual. It is suggested that resilient students are typically better at controlling negative emotions, persisting with tasks, and maintaining a belief in their ability.

These attributes align with emotional control, commitment, and confidence within the mental toughness framework.

Buoyancy

Mental toughness is also similar to the concept of academic buoyancy, referring to a capacity to overcome academic setbacks and challenges which occur in everyday life. This might, for example, include meeting upcoming deadlines or completing a difficult piece of work (Martin & Marsh, 2006, 2008, 2009; Putwain, Connors, Symes, & Douglas-Osborn, 2012). What distinguishes buoyancy from resilience is the severity of the challenge or setback; resilience typically refers to the ability to respond to major challenges or setbacks, while buoyancy refers to less severe but more frequent challenges (Martin & Marsh, 2008). Resilience therefore applies to a relative minority of students, whereas buoyancy applies to them all (Martin & Marsh, 2009). Academic buoyancy has been related to attainment (Martin, 2014; Collie, Martin, Malmberg, Hall, & Ginns, 2015), and also motivational and emotional outcomes such as greater persistence (Martin, Colmar, Davey, & Marsh, 2010) and lower anxiety (Martin, Ginns, Brackett, Malmberg, & Hall, 2013). When applied in an educational context, mental toughness may be similar to buoyancy in terms of referring to everyday rather than major challenges. Similar to buoyancy, mental toughness is also characterised by commitment and low anxiety levels (e.g. Clough et al., 2002). Thus it seems reasonable to suggest that the conceptual overlap with buoyancy relates particularly to the mental toughness subcomponents of commitment and emotional control.

Perseverance

Components of mental toughness, in particular commitment, also overlap with the concept of perseverance. Morison Gutman and Schoon (2013) discussed two manifestations of perseverance; engagement and grit. Engagement refers to how student behave, think and feel regarding their commitment to school, thus having behavioural, cognitive and emotional components (e.g. Fredericks, Blumenfeld, & Paris, 2004). Behavioural engagement refers to involvement in academic tasks, including behaviours such as effort, persistence, concentration, attention, asking questions, and contributing to class discussions (Birch & Ladd, 1997). Cognitive engagement is concerned with psychological investment in learning, a desire to go beyond the requirements, and a preference for challenge (Connell & Wellborn, 1991). Finally, emotional engagement refers to managing interest, boredom, happiness, sadness, and anxiety (e.g. Skinner & Belmont, 1993). There is substantial evidence for relationships between engagement and academic outcomes, including attainment, school drop-out, and school transitions (e.g. Fredericks et al., 2004; Vasalampi, Salmela- Aro, & Nurmi, 2009).With reference to the mental toughness

framework, mental toughness appears to overlap with both cognitive and emotional aspects of engagement in particular. The preference for challenge as a hallmark of cognitive engagement (Connell & Wellborn, 1991) is captured in the challenge subcomponent of mental toughness. In addition, emotional engagement has clear correspondences to control of emotion.

Grit is defined as perseverance for long-term goals, particularly in the face of adversity (Duckworth, Peterson, Matthews, & Kelly, 2007). Researchers have recently suggested that dedication to goals results in more effort being expended to achieve them (e.g. Silvia, Eddington, Beaty, Nusbaum, & Kwapil, 2013). Similar to engagement, grit is a significant predictor of attainment, as well as rule violation behaviour in school, satisfaction with school, and the likelihood of dropping out of education (Duckworth et al., 2007; Duckworth & Quinn, 2009; Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014; Ivcevic & Brackett, 2014). Grit predominantly entails maintaining effort and interest over a long period of time, despite failure and adversity, and also working strenuously towards challenges. It therefore shares some overlap with the commitment and challenge subcomponents of the mental toughness framework.

Self-Efficacy

Sub-components of mental toughness also align with self-efficacy. Self-efficacy refers to beliefs or judgments that people have about their own ability to perform well in a variety of tasks or situations, but particularly in novel or difficult tasks. A substantial amount of research has revealed that self-efficacy is a correlate and predictor of academic attainment (e.g. Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011; De Feyter, Caers, Vigna, & Berings, 2012; Stankov & Lee, 2014), even when controlling for other non-cognitive factors such as personality (e.g. Caprara et al., 2011). Self-efficacy is also related to academic motivation (McGeown et al., 2014) and meaningful cognitive engagement (Walker, Greene, & Mansel, 2006). It has also been suggested that children who have higher perceptions of their competence or abilities have a greater preference to engage in challenging learning activities (Boggiano, Main, & Katz, 1988). Self-efficacy therefore aligns most closely with the confidence in abilities subcomponent of mental toughness, but to some degree may also relate to the subcomponent of challenge.

Confidence

Confidence is a non-cognitive factor sharing some similarities with self-efficacy. It refers to a state of being certain about the success of a particular act, usually giving correct responses on a cognitive test. It has been suggested that confidence has the properties of a trait, a disposition to respond in a particular way relative to other individuals (e.g. Stankov, Lee, Luo, & Hogan, 2012). What distinguishes confidence from self-efficacy however, is that confidence is a general trait. In contrast, self-

beliefs or self-efficacy appear to be domain-specific (Stankov, 2013; Stankov et al., 2012). Confidence also commonly relates to a task that has just been completed, in comparison to self-efficacy which usually refers to tasks to be completed in the future. Recent research has made a convincing argument for the potential for confidence to be the strongest non-cognitive predictor of academic achievement (Stankov, 2013; Stankov & Lee, 2014; Stankov et al., 2012; Stankov, Morony, & Lee, 2014). In this research, confidence has been compared to other psychological traits such as motivation and attitudes, and has been found to be more closely related to attainment using data from large international studies (Lee & Stankov 2013). This concept, similar to that of self-efficacy, shares some overlap with the mental toughness concept of confidence in abilities.

Motivation

Motivation is the study of why individuals think and behave as they do (Morrison-Gutman & Schoon, 2013). There are a number of different theories of motivation (e.g. see Eccles & Wigfield, 2002), including achievement goal theory, expectancy-value theory and self-determination theory. Achievement goal theory proposes that student's reasons for engaging in academic work relate to having a mastery goal orientation (focused on gaining competence in a subject area) or a performance goal orientation (focused on demonstrating competence). Mastery goals are associated with academic attainment (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Harackiewicz, Barron, Tauer, & Elliot, 2002), and adaptive behaviours such as task involvement, challenge seeking, and deep processing of course materials (e.g. Meece, Anderman, & Anderman, 2006). Morrison-Gutman and Schoon (2013) argue that a mastery goal orientation is equivalent to a growth mindset (Dweck, 2006), that is, a belief that you can increase your ability through your own efforts. This theory of motivation would therefore appear to align with the mental toughness subcomponents of life control and also commitment. Other theories of motivation, however, relate more to confidence in abilities. Expectancy-value theory suggests that motivation arises from expectations of success along with perceived value of a task. Both of these factors have been found to be important predictors of educational outcomes (Anmarkrud & Braten, 2009; Eccles & Wigfield, 2002; Wigfield & Eccles, 2000). Expectations of success aligns closely with confidence in abilities from the mental toughness framework.

Self-determination theory (Deci & Ryan, 1985) identifies differences between intrinsic and extrinsic motivation. Intrinsic motivation refers to the desire to engage in a task to develop skills or because it is inherently interesting and enjoyable, whereas extrinsic motivation refers to the desire to engage in a task to receive external rewards, such as recognition or grades. The former type of motivation is considered to be more autonomous and not controlled by external factors; as such, individuals feel they have a sense of power and control over their decisions. Intrinsic motivation has been found to be beneficial for academic success (Lepper, Corpus, & Iyengar,

2005; Soenens & Vansteenkiste, 2005; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). In contrast, some studies have revealed that extrinsic motivation is inversely related with attainment (Lepper et al., 2005; Ratelle, Guay, Grossi, & Simonsson- Sarnecki, 2007). Within this theory of motivation, intrinsic motivation aligns with the concepts of challenge (an internal desire to develop abilities) and commitment (setting of own goals) from the mental toughness framework. Intrinsic motivation may also be more common in individuals scoring high on life control (those who feel a sense of autonomy).

Personality

Mental toughness, as conceptualised by Clough et al. (2002), may also share some commonalities with aspects of personality. The dominant conceptualisation of personality within the field of education is the five-factor model (McCrae & Costa, 1997). This model proposes that personality comprises Neuroticism, Extraversion, Openness to experience, Agreeableness and Conscientiousness. Many studies have evidenced the importance of personality for academic success (e.g. Ackerman et al., 2011; O'Connor & Paunonen, 2007; Poropat, 2009). These studies have particularly emphasised the role of conscientiousness (e.g. O'Connor & Paunonen, 2007), for both general attainment as well as more narrow indicators of success such as single exam grades (e.g. Chamorro-Premuzic & Furnham, 2003). However, it is important to note that this theory proposes a personality hierarchy, with the five major components residing at the highest level. A different approach to the study of personality within education has been to investigate narrow traits, residing at a lower level of the model. For example, narrow traits that reside under the heading of conscientiousness include achievement-striving, competence, deliberation, dutifulness, order and self-discipline (O'Connor & Paunonen, 2007). An important issue is related to the relative predictive utility of the big five factors and their constituent narrow traits. Research has suggested that lower-level traits can be even more powerful predictors that the big five (Chamorro- Premuzic & Furnham, 2003; O'Connor & Paunonen, 2007; Paunonen & Ashton, 2001).

Horsburgh Schermer, Veselka, and Vernon (2009) examined relationships between mental toughness and the big five personality factors. Positive correlations were observed between each component of mental toughness and extraversion, openness, agreeableness, and conscientiousness. There were negative correlations between each aspect of mental toughness and neuroticism. More recently, it has been suggested that mental toughness may in fact be a narrow personality trait (e.g. St Clair-Thompson et al., 2014). In this way mental toughness may be similar to grit, proposed as a lower-level trait in the domain of conscientiousness (Duckworth et al., 2007). The aspects of mental toughness which would appear to be most closely related with conscientiousness are commitment and control of life. However, due to the multifaceted nature of mental toughness, it is perhaps better to view mental toughness as a set of independent but related traits (e.g. McGeown, St

Clair- Thompson & Clough, 2015). More work is therefore needed to develop a clear understanding of how the subcomponents of mental toughness relate to existing conceptualisations of both broad and narrow personality traits.

ADVANTAGES OF THIS FRAMEWORK

As discussed in the previous section, there is conceptual overlap between the mental toughness framework and other non-cognitive factors studied within educational settings. The mental toughness framework brings together quite different concepts, enabling a relatively comprehensive approach. McGeown et al. (2015) suggested a number of advantages of this mental toughness framework over some of the other mental toughness models. For example, it has been successfully used in sport, business, learning, mental health, and education, and both within research and applied settings. The mental toughness framework also allows the parallel study of several non-cognitive attributes and has a well validated and reliable measure of mental toughness – the MTQ48 (Perry et al., 2013). In addition, the use of sub-components (commitment, challenge, life control, emotional control, interpersonal confidence and confidence in abilities) affords the possibility to provide focused or targeted intervention and support as necessary. We discuss possibilities for designing interventions which aim to enhance children's and adolescents' mental toughness in a later section.

There may also be advantages in employing the mental toughness framework rather than other non-cognitive factors in educational settings. For example, Gerber et al. (2013) noted that mental toughness is a part of young people's daily speech. Its less academic terminology (i.e. compared to terms such as motivation, self-efficacy, perseverance, etc.) may make this concept more appealing to children and adolescents, particularly those who may be difficult to reach with intervention.

Research using the MTQ48 has also started to investigate possible mechanisms that underpin the "mental toughness advantage". For example Nicholls, Pollman, Levy and Backhouse (2008) found that mentally tough individuals used more problem focussed rather than emotion-focussed coping strategies, a finding supported by Kaiseler, Polman, and Nicholls (2009) in a later study. Problem-focussed strategies target the cause of stress in a practical way. In contrast, emotion-focussed strategies are aimed at emotional responses and may include reappraisal or avoidance. Students who engage in problem focused coping strategies have been found to be more motivated, and perform better than students who engage in emotion focused coping strategies (Struthers, Perry, & Menec,2000). In addition, Crust and Azadi (2010) reported that mentally tough individuals were more likely to use psychological strategies such as relaxation, positive self-talk and emotional control. These are all types of skills that can be taught and developed. Recent research has also explored potential cognitive underpinnings of the mental toughness advantage. Dewhurst, Anderson, Cotter, Crust and Clough (2012) showed that mentally tough individuals were better able to suppress irrelevant information when learning new

information. Therefore enhanced memory skills that allow for the better suppression of unwanted information may offer a way of building toughness through a cognitive process intervention.

McGeown et al. (2015) also noted that a potential reason for adopting the mental toughness framework in education is the fact that Clough et al. (2002) discuss degrees of mental toughness. The opposite of mental toughness is not mental weakness, but rather mental sensitivity. While mentally tough individuals may be better able to deal with high-pressure environments, which may confer advantages in sports, work or school, a balanced society needs both the sensitive and the tough (Clough & Strycharczyk, 2012). The challenge for education is to foster an environment that enables both the tough and the sensitive to fully meet their potential. For example, it would be expected that the mentally tough would prosper in an exam heavy system, such as that adopted increasingly in the UK. This may not necessarily be the case for other educational environments and systems.

RESEARCH FINDINGS

To date there are few studies in the peer review literature concerned with mental toughness in education. However, the number of studies is growing and thus we are starting to develop an understanding of the role of mental toughness within this domain. One published study examined mental toughness in relation to achievement and progression in first year undergraduate students in the UK. Crust, Earle, Perry and Earle et al. (2014) found significant correlations between each subcomponent of mental toughness, grades, and progression. In further analysis the subcomponents of life control and interpersonal confidence emerged as being particularly important. The authors suggested that a measure of mental toughness could be a useful tool for identifying students at risk of failing and dropping out of undergraduate study. Other published research examining mental toughness in undergraduate students has focussed on psychological well-being. Stamp, Crust, Swann, Perry, Clough, and Marchant (2015) revealed that each subcomponent of mental toughness was correlated to students' psychological well-being (see also Gerber et al., 2012). Further analyses then revealed particular roles for commitment and confidence in abilities.

In work carried out by our own research group, we have explored mental toughness in children and adolescents. In St Clair-Thompson et al. (2014) we reported a series of three separate studies. In the first we examined relationships between mental toughness, attainment and attendance in adolescents aged 13–15 years. Challenge, commitment and control of life were significantly related to attainment. Each subcomponent of mental toughness with the exception of interpersonal confidence was significantly related to attendance. Further analyses revealed a particular role for control of life in both attainment and attendance. Figure 1 (a and b) shows the attainment and attendance of individuals with high and low control of life, categorised on the basis of a median split. Study 2 examined the

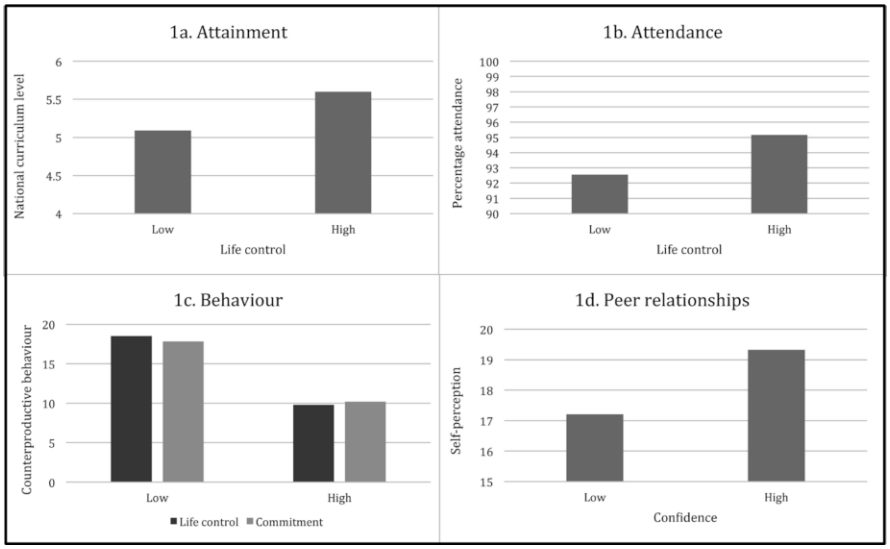

Figure 1. Educational outcomes and experiences of individuals with differing levels of mental toughness

associations between mental toughness and adolescents' counterproductive classroom behaviour. Adolescents aged 11–16 years completed the MTQ48, and their teachers completed a Conners' Teachers Rating Scale for each child. Each subcomponent of mental toughness, with the exception of confidence in abilities, was significantly negatively related to counterproductive behaviour. Regression analyses revealed particular roles for the subcomponents of commitment and control of life. Figure 1 (c) shows the levels of counterproductive behaviour in individuals with high and low levels of commitment and control of life respectively. Finally, in study 3 we explored the relationships between mental toughness and adolescents' peer relationships. Pupils aged 11–13 years completed the MTQ48, and provided ratings of their peer relationships, and the extent to which they liked to play and work with each of their classmates. Each subcomponent of mental toughness, with the exception of commitment, was related to self-perceptions of peer relationships. In further analyses both aspect of confidence were revealed as important predictors of peer relationships. Figure 1 (d) shows levels of self- perceptions of peer relationships in individuals with high and low levels of overall confidence. As a summary of the information provided thus far, the educational outcomes and experiences which have been linked to each subcomponent of mental toughness, along with the conceptual similarities of each component are summarised in Table 1.

In recent work, we have also explored the relationships between mental toughness and educational transitions (St Clair-Thompson, Giles, McGeown,

Putwain, & Clough, submitted). Moving from primary to secondary school is known to involve many changes, including to learning environments, academic expectations, and social interactions (e.g., Anderson, Jacobs, Schramm, & Splittgerber, 2000). Adjusting to these changes can be anxiety provoking and difficult to negotiate (e.g., Tobbell, 2003; Zeedyk et al., 2003). One hundred and five pupils aged 12–13 years, who were about to undergo the transition from middle to high school, completed the MTQ48 along with a measure of their concern about the upcoming school transition. There were significant correlations between each subcomponent of mental toughness and school concerns, but regression analysis revealed that the most important aspect of mental toughness was confidence in abilities. A second study examined the relationships between mental toughness and self-reported adjustment to undergraduate study. Each aspect of mental toughness with the exception of challenge was shown to be a predictor of adjustment.

These findings have important implications for educational practice. They suggest that interventions aimed at enhancing mental toughness have the potential to have widespread effects, perhaps benefitting attainment, attendance, behaviour, peer relationships, well-being, and successful educational transitions. The results suggest that interventions targeting control of life would be particularly beneficial for attainment, attendance, and behaviour of adolescents at school. Interventions targeting commitment may be most beneficial for behaviour, well-being, and successful transitions, and those targeting confidence may be helpful for well-being and peer relationships.

The research so far has therefore started to evidence the mental toughness advantage. Individuals higher in mental toughness are likely to attain higher grades during both school and undergraduate study, display less counterproductive behaviour, have better peer relationships, have higher levels of well-being, and deal better with educational transitions. As suggested earlier, research in domains other than education has also started to identify possible mechanisms that may underpin this mental toughness advantage, including coping (e.g. Nicholls et al., 2008) and the ability to inhibit irrelevant information (Dewhurst et al., 2012). However, there are several other areas of education in which evidencing a role for mental toughness could have some value, and further research is needed to explore potential mechanisms underlying the mental toughness advantage in the domain of education. Research is also needed to examine potential methods of developing mental toughness. These issues are discussed in the following sections.

AVENUES FOR FUTURE RESEARCH

McGeown et al. (2015) discussed four diverse areas in which mental toughness research may have some value, in order to illustrate its varied application. The study of mental toughness as it relates to academic attainment, test anxiety, academic stress, and peer relationships in a school context were considered. However,

numerous other areas are likely to provide fruitful for future study. Nevertheless, here we discuss these four potential avenues, as well as considering the need for future research into the mechanisms that may underpin the mental toughness advantage, thus allowing a better understanding of both the determinants and consequences of mental toughness.

Academic Attainment

As acknowledged in the introduction, there is a growing body of evidence demonstrating the importance of non-cognitive factors for academic attainment (e.g. Morrison Gutman & Schoon, 2013). Studies have evidenced the ability of mental toughness to predict attainment in secondary school (St Clair-Thompson et al. 2014) and during undergraduate study (Crust et al., 2014). These studies revealed important roles for control of life and interpersonal confidence in particular. However, other components of mental toughness could also be important. Challenge may be important, as those who seek out challenging activities will likely set higher academic goals and thus have greater opportunity to achieve more academically. Those scoring higher on commitment may also be more likely to persevere to achieve higher levels of academic attainment. In addition, confidence inabilities may be important, because those students who have higher perceptions of their competence are likely to engage more in challenging learning activities (e.g. Boggiano et al., 1988). In the published research, only broad measures of attainment were used; teacher ratings of children's progress according to the national curriculum in the UK, and average grade during the first year of University. A more detailed examination of the role of mental toughness in attainment may therefore be useful. This could, for example, differentiate between exam and coursework grades, as has been the case in research into personality (e.g. Chamorro-Premuzic & Furnham, 2003). Alternatively, it could examine attainment in different subject areas, perhaps along with perceived difficulty of those areas.

Test Anxiety

Several studies have demonstrated a relationship between test anxiety and lower test performance (e.g. Putwain, 2008; Putwain, Connors, & Symes, 2010). McGeown et al. (2015) discussed the potential for mental toughness to provide a buffer against the negative influence of test anxiety. In a recent study by Putwain et al. (2013), higher levels of resilience were found to predict lower test anxiety and higher test scores. Indeed, resilient students would be predicted to experience lower test anxiety, which may then enable them to perform under pressured situations, such as during tests. Several other non-cognitive factors have also been related to levels of test anxiety, including self-esteem (Croyle, Weimer, & Eisenman, 2012; Hembree, 1988), academic buoyancy (Putwain & Daly, 2013), motivation (Putwain & Symes,

2012), and personality (Chamorro- Premuzic, Ahmetoglu, & Furnham, 2008). Future research should therefore examine mental toughness in relation to test anxiety and test performance.

Academic Stress

Academic stress has been studied in secondary school pupils (e.g. Banks & Smyth, 2015; Liu, 2015; Liu & Lu, 2011) and within higher education (e.g. Del-Ben et al., 2013). Research shows that students in more academically challenging programmes tend to report higher levels of stress than other students (Suldo, Shaunessy, & Hardesty, 2008). In particular, a significant body of research has examined academic stress among medical students (e.g. Del-Ben et al., 2013; Park et al., 2012; Voltmer, Lotter, & Spahn, 2012). Academic stress can influence academic attainment (e.g. Kaplan, Liu, & Kaplan, 2005; Liu & Lu, 2011), and has also been found to be an important predictor of anxiety and depression (e.g. Del-Ben et al., 2013). Research has therefore examined factors which may be related to student stress levels. These include higher levels of self-esteem (e.g. Schraml, Perski, Grossi, & Simonsson- Sarnecki, 2011), academic self-image (Banks & Smyth, 2015), better academic motivation (e.g. Park et al., 2012), and a hardy personality (Hystad, Eid, Laberg, Johnsen, & Bartone, 2009). As mental toughness has been shown to act as a resilience resource when confronted with pressure or stress (e.g. Crust, 2008; Gerber et al., 2013), it may be a useful support within this context.

Peer Relationships and Bullying

Peer relationships are important for a number of aspects of children's development (e.g. Parker, Rubin, Price, & DeRosier, 1995). In recent years, the subject of bullying in school has also received increased attention (e.g. Hansen, Steenberg, Palic, & Elklit, 2012; Juvonen & Graham, 2014). As described earlier, St Clair-Thompson et al. (2014) found significant relationships between mental toughness and peer relationships. Specifically, there were relationships between a student's interpersonal confidence and the extent to which classmates reported wanting to play with them, and between both interpersonal confidence and confidence in abilities and self-perceptions of social acceptance. Research has not yet examined mental toughness in the context of bullying. Theoretically, the mental toughness sub-components most likely to predict the ability to deal successfully with bullies may be life control, emotional control, and interpersonal confidence. Children and adolescents with high levels of life control feel that they have the ability to shape their own life, so may attribute less importance to the actions of others, thus minimising the effects of peer victimisation. Children and adolescents high in emotional control

will be able to manage and regulate their emotions, which may well be advantageous if dealing with peer conflict. Those high in interpersonal confidence are likely to find it easier to get along with others, thus having successful peer relationships. Hansen et al. (2012) also suggested that an important factor in dealing with bullying is negative affectivity, a personality trait characterised by emotional reactivity and low self-confidence, which would appear to share some links with mental toughness. Therefore mentally tough individuals may be better able to deal with the effects of peer victimisation, and in fact may be less likely to perceive that they are being bullied, due to dismissing the behaviour or actions of others and not feeling bullied or threatened by that behaviour. Future research could therefore examine mental toughness in the context of bullying.

Mediating Factors

As suggested earlier, research in domains other than education has started to identify possible mechanisms that may underpin the mental toughness advantage. However, in order to further develop our understanding of mental toughness within an educational context, further research is needed to explore potential reasons for the mental toughness advantage within this domain. One potential factor that has already been discussed is that of test anxiety. It may be the case that students with higher levels of mental toughness experience less test anxiety, allowing them to perform well in examinations and thus gain higher grades. Another factor is that of motivation. It is well established that intrinsic motivation is beneficial for academic success (Lepper et al., 2005; Soenens & Vansteenkiste, 2005). It was suggested earlier that intrinsic motivation may align with the concepts of challenge, commitment, and life control. It may therefore be the case that individuals scoring highly in each of these domains are better able to maintain levels of intrinsic motivation, thus achieving higher grades. Another factor that could be explored in future research is learner autonomy. It is frequently suggested that educational success, particularly in higher education, requires students to become autonomous learners (e.g. Macaskill & Taylor, 2010). This is a described as the ability to acquire knowledge and skills independently, by processes that he/she determines (Chene, 1983). It could be the case that mentally tough individuals are more autonomous learners. For example, those scoring high on life control feel that they have the power to shape their own lives, perhaps resulting in taking more responsibility for their own learning. Other factors that could potentially contribute to the relatively good performance of those with high mental toughness include more adaptive approaches to learning (e.g. Entwistle & Peterson, 2004) and study skills (e.g. Jansen & Suhre, 2010). Therefore future research is needed to examine mental toughness in relation to important educational outcomes and experiences, but also to examine factors which may underlie the better performance of those who are mentally tough.

ENHANCING MENTAL TOUGHNESS

Within the mental toughness framework, challenge, commitment, control and confidence can be regarded as positive psychological traits which can be developed, given the right support, encouragement and environment (e.g. Crust & Clough, 2011; Gerber et al., 2013). Indeed, Horsburgh et al. (2009) revealed that nearly 50% of individual differences in mental toughness are attributable to unique environment effects. Crust and Clough (2011) suggested that in a sports setting, parents and coaches of young athletes are likely to be crucial in cultivating the correct environment for mental toughness to flourish. They also proposed that individuals must be exposed to (rather than sheltered from) challenging situations which allow personal resources such as coping skills to be developed through problem solving. Indeed, outdoor adventure programmes (sometimes termed wilderness programmes) which develop, among other things, mental toughness type characteristics, have been found to produce positive effects on a range of outcomes, for example self-esteem, locus of control and school attendance (Cason & Gillis, 1994).

Interventions targeting mental toughness have been employed with sports settings. For example, Sheard and Golby (2006) evaluated the effects of a program consisting of goal setting, visualisation, relaxation, concentration, and thought stopping skills. It was found to result in significant increases in mental toughness in a group of athletes. Other work has theorised about a number of strategies which may enhance components of the mental toughness framework in domains outside of sport. Strycharczyk and Clough (2014) suggested that interventions fall into broad categories: positive thinking, visualisation, anxiety control, attentional control and goal setting. Some of these interventions have been used to enhance other non-cognitive factors in education. For example, there is substantial evidence that domains of self-concept can be improved, particularly through the use of praise and positive feedback (e.g. Craven, Marsh, & Debus, 1991; O'Mara, Marsh, Craven, & Debus, 2006). There is also evidence that interventions can improve motivation and engagement. Martin (2008) reported a study in which participants took part in a self-complete program of activities, allowing them to reflect upon various aspects of their motivation. This included engaging in positive thinking, for example by identifying their strengths and talents in each area. Significant improvements in motivation and engagement were observed. Several types of strategies have also been used to reduce test anxiety, including engaging in positive thinking (Nelson, Webster, & Ashley, 2010), but also looking ahead in an exam (Mavilidi, Hoogerheide, & Paas, 2014), and practicing retrieval of items from memory (Agarwal et al., 2014).

As yet research has not explored mental toughness interventions within educational settings. However, given the relationships between mental toughness and various educational outcomes and experiences, interventions have the potential to have widespread effects. The use of the sub-components (commitment, challenge, life control, emotional control, interpersonal confidence and confidence in abilities)

affords the possibility to provide focused or targeted intervention, and the potential to enhance mental toughness is likely to be a topic that captures much attention in the near future.

CONCLUSION

In this chapter we discussed the concept of mental toughness, describing its definition, conceptual overlap with other non-cognitive attributes and correlates with educational outcomes. The study of mental toughness in education is still in its infancy; more research is necessary to fully understand the determinants and consequences of the attributes described within this framework. While experimental and intervention research will allow a better understanding of the transfer effects from mental toughness to educational outcomes, there is arguably still considerable merit in developing mental toughness attributes in their own right (i.e., as positive non-cognitive characteristics), regardless of their potential benefits to specific educational outcomes.

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