

Abstract

Research into mental toughness has largely been confined to elite sport but should theoretically be important across other performance domains. We examined mental toughness in 161 first year sport students at a UK University using a self-report questionnaire (MTQ48). A measure of achievement (year grade) and progression (pass, fail, or re-sit) was also obtained for each participant. Significant and positive correlations were found between total mental toughness, grades, and progression. Linear regression analysis found mental toughness subscales of life control and interpersonal confidence to be significant predictors of academic achievement. Significantly higher levels of total mental toughness, life control and interpersonal confidence were found in students that passed, as opposed to failed. Results suggest that the MTQ48 may be a useful screening device to identify students at risk of failing and dropping out of their program. Interventions that target life control and interpersonal confidence would appear to be most salient.

1.0 Introduction

Over the last ten years, substantial research has been directed towards understanding mental toughness within sport (Clough, Earle, & Sewell, 2002; Jones, Hanton, & Connaughton, 2002; Bull, Shambrook, James, & Brooks, 2005; Sheard, 2010). Gucciardi, Gordon, and Dimmock (2009a) propose that mental toughness is a collection of experientially developed and inherent values, attitudes, emotions, and cognitions that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressure, challenge, and adversity to consistently achieve his or her goals. While there are some differences of opinion concerning the conceptualization of mental toughness (see Crust, 2008), some have described it as a trait-like resistance resource that enables individuals to remain relatively unaffected by pressure or adversity, and even to flourish under such conditions (Clough et al.). Clough et al. (2002, p.38) suggested that mentally tough individuals possess “a high level of self-belief and an unshakeable faith that they can control their own destiny, these individuals can remain relatively unaffected by competition and adversity.” In addition, mental toughness is also characterized by competitiveness, high levels of persistence, and the ability to recover quickly following setbacks.

There is general agreement that mental toughness is a multidimensional construct comprised of a number of important positive psychological variables (Crust, 2008; Sheard, 2010). While several recent models of mental toughness have been proposed (Jones, Hanton, & Connaughton, 2007; Gucciardi, et al., 2009a) and tend to differ in regard to numbers of reported components (likely due to sampling from different sports and different performance levels), these are mostly based upon qualitative explorations and have failed to utilize existing psychological theory (Kaiseler, Polman, & Nicholls, 2009). One model of mental toughness that offers perhaps the most parsimonious and theory driven account of the construct (cf. Weinberg & Gould, 2007) was provided by Clough et al. In their 4C’s model,

these researchers developed a conceptualization of mental toughness that was based on existing theory from the health psychology domain. Clough and colleagues found that their own work on mental toughness revealed a construct that closely resembled hardiness, an important psychological variable that has been shown to differentiate those who become ill from those who remain healthy or flourish in stressful circumstances (Kobasa, 1979).

Clough et al. (2002) proposed that mental toughness is represented by: (1) control (emotional and life), which reflects a tendency to feel and act as if one is influential, (2) commitment, which concerns deep involvement with whatever one is doing, in contrast to alienation, (3) challenge, refers to the extent to which individuals see problems as opportunities for self-development rather than threats, and (4) confidence (in abilities and interpersonal), reflecting a high sense of self belief and an unshakeable faith in having the ability to achieve success while not being intimidated in dealings with other people. The fourth component, confidence, is one that has been consistently reported as the cornerstone of mental toughness (cf. Crust, 2008; Sheard, 2010), and was added by Clough et al. to differentiate mental toughness from hardiness. Clough et al. also developed a measure of mental toughness, the Mental Toughness Questionnaire (MTQ48) which measures each component of the 4C's model and has been found to have good reliability, as well as construct and criterion validity (Clough et al.; Crust & Clough, 2005). Furthermore, recent evidence has provided independent support for the factor structure of the MTQ48 using confirmatory factor analysis (Horsburgh, Schermer, Veselka, & Vernon, 2009). In a recent behavioral-genetic study using mono- and dizygotic twins, Horsburgh et al. (2009) found evidence that mental toughness was significantly related to the Big Five personality factors of extraversion, neuroticism (negatively), agreeableness, openness to experience, and conscientiousness. In addition, the phenotypic correlations reported, were largely attributed to

genetic factors, supporting the conceptualization of mental toughness as a personality trait. At present, the MTQ48 appears to be the most widely used measure of mental toughness.

The high pressure nature of elite sport has provided an ideal setting to examine mental toughness with research largely conducted using athletic samples. Among other things, sport-based research has reported mental toughness to be related to pain tolerance (Crust & Clough, 2005), injury rehabilitation (Levy, Polman, Clough, Marchant, & Earle, 2006), perceptions of exertion (Clough et al., 2002), coping effectiveness (Kaiseler, et al., 2009), use of psychological strategies (Crust & Azadi, 2010), and level of performance (cf. Sheard, 2010). In addition, recent qualitative work (MacNamara, Button, & Collins, 2010) concerning the psychological characteristics that enable athletes to translate potential into achievement (i.e., progress in elite sport), reported a profile that closely resembles the mental toughness model of Clough et al. (e.g., commitment, self-belief, competitiveness etc.). However, numerous other demanding performance and occupational domains exist (e.g., business, military, education) where theoretically mental toughness should be equally important.

One recent study that has examined mental toughness outside of sports settings, tested for differences between 522 managers (senior, middle, and junior levels) of UK-based organizations. Marchant et al. (2009) found that mental toughness was significantly higher in more senior positions. An additional and important finding that emerged was that mental toughness generally increased with age. This suggests that life experiences may have a significant and positive effect on the development of mental toughness, and opens up the possibility of targeted intervention strategies. In sport, there is already some evidence to suggest that interventions can result in performance increments and higher self-reported mental toughness (Sheard & Golby, 2006; Gucciardi, Gordon, & Dimmock, 2009b).

Another setting where mental toughness is likely to be important is higher education. For example, there is evidence (Fisher & Hood, 1987) that the transition to university life for both residential and home-based undergraduate students results in increased stress (most prominently through homesickness). Lazarus and Folkman (1984) defined stress as the negative feeling that occurs when an individual feels unable to cope with the demands placed upon them by their environment. Other sources of stress for undergraduate students include academic demands such as coursework deadlines or examinations, learning to manage one's time, financial problems, work / study balance, and loss of support networks (cf. Okopi, 2011). According to Wilson and Pritchard (2005) the cumulative effects of multiple stressors can negatively impact on student well-being and increase the likelihood of vulnerable students dropping out. While the learning environment and support mechanisms are external factors that can aid transition (Nelson, Kift, Humphreys, & Harper, 2006), it seems equally likely that individual resources will contribute significantly to this process. Current statistics (HESA, 2011) predict that over 76,000 UK students who started degree programs in higher education will not finish, amounting to a drop-out rate of over 20 percent. Two factors that have been shown to be related to student adjustment (Pritchard, Wilson, & Yamnitz, 2007) and to mental toughness (Nicholls, Polman, Levy, & Backhouse, 2008; Clough et al., 2002) are optimism and self-esteem.

Theoretically, there are a number of reasons to predict that mental toughness will be related to important markers of student progress in higher education. First, whilst research relating academic performance with personality measures has resulted in few significant relationships, there has been one consistent finding. Conscientiousness has been found to be strongly and consistently associated with scholastic achievement (e.g., Bauer & Liang, 2003; Chamorro-Premuzic & Furnham, 2003). Conscientiousness has a clear overlap with the commitment component of the MTQ48 model. Sheard and Golby (2007) reported that the

commitment component of Kobasa's Hardiness Scale (Kobasa, 1979) was positively associated with academic achievement. Given that mentally tough individuals are highly committed to whatever they are doing it is therefore likely that mentally tough students would have high levels of attendance, and exert great effort with respect to coursework and examination revision.

A second reason to expect a relationship between mental toughness and performance is related to Clough et al. (2002) definition of mental toughness. Another approach to the study of personality and academic achievement is to utilize narrow personality traits. These traits are far more specific in nature than the more generic and wide reaching global scales such as big 5 measures. O'Connor and Paunonen (2007) identify these as traits that reside at a lower level of the personality hierarchy. Narrow traits that have been linked to academic achievement include achievement orientation (e.g. Paunonen, 1998), risk taking (Wolfe & Johnson, 1995) and hardiness (Sheard & Golby, 2007). O'Connor and Paunonen (2007) concluded that these narrow traits are generally stronger predictors. Mental toughness as defined by Clough et al. (2002) can be defined as a narrow trait, and as such could be expected to have greater predictive power.

Third, the ability to cope with change and the simultaneous demands that occur during transitions, and to see this process as a challenge rather than a threat is indicative of mentally tough individuals who persist during adverse or difficult circumstances. As such, we predict a significant and positive relationship between mental toughness and student progression. One final reason to expect mental toughness to be related to academic success concerns the important characteristics of independence and responsibility. Various researchers have reported mentally tough athletes to be independent, able to solve their own problems, and to take responsibility for their own development (Bull et al., 2005; Crust & Clough, 2011;

Sheard, 2010). These same attributes appear highly valued in higher education (Cottrell, 2008) and reflect the objectives of most institutions (i.e., to create independent learners).

We aimed to examine the importance of mental toughness in higher education and predicted mentally tough students would be more likely to pass and achieve higher grades than less tough students. If the predicted relations do exist, and mental toughness is found to relate to academic drop-out (non- progression) and academic achievement, it may be possible to measure mental toughness to identify at-risk groups, and target support for such students to enable smoother transitions into university life.

2.0 Method

2.1 Participants

Participants were 161 first year university students (105 men, 56 women) enrolled on three different sports-related degree programs at a large UK university in the north of England. The sample consisted of sport and exercise science students ($n = 46$), sport coaching students ($n = 65$) and sport rehabilitation students ($n = 50$). Participants all provided basic demographic information and signed an informed consent form prior to completing a mental toughness questionnaire. This study was approved via a university research ethics committee. All collected data was coded in order to maintain the confidentiality of participants.

2.2 Measures

The MTQ48 consists of 48 items that require responses to statements on a 5-point Likert scale ranging from (1) *strongly disagree*, to (5) *strongly agree*. The MTQ48 provides a total mental toughness score and measures six subscales of challenge, commitment, emotional control, life control, confidence in abilities and interpersonal confidence. Example items include “*I generally feel that I am in control of what happens in my life*” (life control),

and “*I usually speak my mind when I have something to say*” (interpersonal confidence).

Independent researchers have provided support for the factor structure of the questionnaire using CFA (Horsburgh et al., 2009). Support for the validity and reliability of the MTQ48 has previously been reported (cf. Clough et al., 2002).

Measures concerning (a) academic progress (i.e., credits) and (b) academic achievement (i.e., end of year grade) were calculated. In relation to academic progress, students were awarded 20 credit points for passing a module of study with a minimum mark of 40% (six modules studied per year), and required 120 credit points to pass and proceed to the next academic year. Students who acquire 60 to 100 credit points are eligible for re-sits in coursework and examinations, and if successful will then pass and proceed to the next academic year. Students who achieve less than 60 credit points are not eligible for re-sit opportunities (without mitigating circumstances) and are classified as failing the year. Although whether students passed, required re-sits, or failed the academic year provides an important measure of progress (and attrition), it does not indicate the actual standard of academic achievement (students can pass with a minimum average grade of 40% but better student will achieve 70% or above). To measure achievement, mean grades for the year, as a percentage, were also calculated (mean of grades across six modules).

2.3 Procedure

At the end of taught sessions during the first 6 weeks of study (prior to completing any assessed work) students were made aware of the research project and asked to take part. Importantly, students were informed that participation was voluntary, that they were free to take part (or not) or to withdraw consent, and that any decision would have no bearing on their treatment as a student. Participants that agreed were seated at a desk and were provided with a copy of the MTQ48 (Clough et al., 2002). The questionnaire was completed under

controlled conditions where participants were not allowed to discuss their responses with others. Participants were reminded that the questionnaire did not constitute a test and that collected data would not be used for any other purpose than the present research study. In line with previous research (Crust & Clough, 2005), questionnaire completion took approximately 10 min.

2.4 Data analysis

Data was visually screened for outliers and checked for normality. Pairwise deletion was used for missing data items. Descriptive statistics were calculated on all study variables. Pearson correlations were used to examine relations between total mental toughness, mental toughness subscales, academic achievement (grade) and progression (credits). In addition, a linear regression analysis (enter method) was used to further examine significant relations between mental toughness subscales and grades. One-way ANOVA was used to test for significant differences in total mental toughness between groups (sport and exercise science, sport coaching, and sport rehabilitation) with Tukey HSD tests used for *post-hoc* analyses. MANOVA was used to test for differences between groups with respect to the mental toughness subscales. Additionally, total mental toughness scores were converted into sten scores in order to differentiate between participants with high (8-10), medium (4-7), and low (1-3) levels of mental toughness. Two-way ANOVA (3 x 2) was then used to test for differences between these three groups, and between men and women in relation to end of year grades. In relation to progression, students were divided into one of three groups (fails, 0-40 credits; re-sits, 60-100 credits; and passes, 120 credits) and compared using two-way ANOVA (also testing for gender differences) and MANOVA to test for differences in total mental toughness and mental toughness subscales respectively.

3.0 Results

Descriptive data for study variables in respect to gender, and participants who achieved pass, fail, or re-sit classifications are presented in Table 1. Internal reliability for MTQ48 subscales were found to be acceptable (0.7 or above) with the exception of emotional control (see Table 1). Table 2 presents Pearson correlations between study variables and shows that total mental toughness, and all of the mental toughness subscales (except emotional control) were found to be significantly and positively related to grades and credits. A linear regression analysis (enter method) was computed using the mental toughness subscales (except emotional control for which there was no significant correlation) as predictor variables and end of year grade as the dependent variable. Life control ($\beta = .21, p < .05$) and interpersonal confidence ($\beta = .19, p < .05$) were found to be significant predictors accounting for 12% of the variance in end of year grades. Results for the regression analysis can be viewed in Table 3. Because of large and significant correlations between mental toughness subscales, collinearity statistics were conducted since problems with collinearity can make it difficult to draw inferences about the relative contributions of predictor variables. O'Brien (2007) reports that a collinearity tolerance level of $< .10$ or a variance inflation factor (VIF) of above 5 are indicative of collinearity problems. All predictor variables were found to have collinearity tolerance of greater than $.10$ (.55 to .75) and VIF of less than 5 (1.3 to 1.8) indicating no collinearity problems.

A significant difference was found in total mental toughness between degree programs ($F_{2, 158} = 7.11, p < .01$). Using Tukey HSD *post-hoc* tests, sport and exercise science students, and sport coaching students were both found to have significantly higher mental toughness ($p < .01$) than sport rehabilitation students. While sport and exercise science students reported the highest levels of mental toughness, these were not significantly different when compared to sport coaching students ($p = .09$). Multivariate analyses of differences in mental toughness subscales (See Table 4) found significantly higher levels of life control ($F_2,$

$_{155} = 3.78, p < .05, d = 0.69$) and confidence in abilities ($F_{2, 155} = 3.85, p < .05, d = 0.65$) in the sport and exercise science students, than in sport rehabilitation students.

Using sten scores for the MTQ48, participants were classified as either high ($n = 24$), medium ($n = 102$), or low ($n = 33$) in mental toughness. With respect to end of year grades, two-way ANOVA indicated significant main effects for level of mental toughness ($F_{2, 158} = 4.28, p = .015$) but not for gender or interactions ($p > .05$). *Post-hoc* analysis found that mean grades for students with high ($M = 49.54, d = 0.71$) and medium ($M = 45.97, d = 0.51$) mental toughness were significantly higher ($p < .01$) than students with low mental toughness ($M = 37.01$).

Finally, students who failed ($n = 31$; 0-40 credits), who required re-sits ($n = 40$; 60-100 credits) and students who passed ($n = 88$; 120 credits) their first year of study were compared in relation to total mental toughness (along with men and women). Two-way ANOVA found significant main effects for credits ($F_{2, 158} = 3.11, p < .05$) and for gender ($F_{1, 158} = 6.19, p < .05$) but no significant interaction ($p > .05$). *Post-hoc* tests found those achieving pass grades had significantly higher total mental toughness than those who failed ($p < .01, d = 0.50$), and men reported significantly higher levels of total mental toughness than women ($p < .01, d = 0.59$). Multivariate analyses (see Table 5) found higher interpersonal confidence ($F_{2, 156} = 4.31, p < .05$) in students who passed, compared with students who failed ($d = 0.90$). In addition, students who passed, and students with re-sits were found to have significantly higher life control ($F_{2, 156} = 3.50, p < .05, d = 0.90$) than students that failed. Men were found to report significantly higher levels of challenge ($F_{1, 155} = 8.01, p < .01, d = 0.50$) and interpersonal confidence ($F_{1, 155} = 18.87, p < .01, d = 0.82$) than women.

4.0 Discussion

The results of the present study support predictions concerning the role of mental toughness in higher educational, as students who passed compared to those that failed their first year of study were found to have significantly higher levels of mental toughness. In addition, the actual academic performance of students with high mental toughness was found to be significantly higher (i.e., mean year grade) than those with low levels of mental toughness. In combination, these results indicate that students with high levels of mental toughness are more likely to pass and proceed (rather than fail and drop-out) and achieve higher grades than students with low mental toughness. This study is also important in terms of establishing the role of mental toughness in achievement domains other than sport. The present study is one of the first, alongside Marchant et al. (2009), to provide evidence that mental toughness is not just a sport-based construct, but an important trait that has much farther reaching implications. When compared to sport-based evidence (e.g., Crust, 2008; Sheard, 2010), present findings are consistent in terms of establishing the importance of MT with respect to outcome measures. Also consistent with previous evidence (Nicholls, Polman, Levy, & Backhouse, 2009) was that men reported significantly higher levels of mental toughness than women.

The results of this study show that commitment does relate to achievement as predicted. However, there was evidence to indicate that the mental toughness subscales of life control and interpersonal confidence may be the most important in relation to achievement and progression. Both of these subscales were found to be significant predictors of end of year grades, and were found to differentiate between students that passed, and those that failed their first year of study. The transition from further to higher education in the UK places multiple and simultaneous demands on students and requires a period of adjustment (Pritchard et al., 2007). In particular, in comparison to school or college, university students are likely to encounter less tutor support, and as such are required to become independent

learners with a high emphasis on study outside of the classroom or lecture theatre. It would seem reasonable to expect that students who had low levels of life control would also struggle to manage the additional demands posed by higher level study (e.g., deadlines, revision, reading etc.).

Feeling assured enough to interact with teaching staff and peers, to ask and answer questions in class discussions, and work with others in solving problems would seem to be natural outcomes for students with interpersonal confidence. Such activities are likely to lead to integration into the higher educational setting and to more learning through challenging others and supporting one's own positions. Previous research (Bennett, 2003) found that self-esteem played a crucial role in deciding to withdraw or continue with undergraduate study following receiving low grades. Given that mental toughness is widely recognized as being multidimensional, establishing the specific relationships between subscales and outcomes is very important in relating to developing appropriate and successful interventions. Present findings would suggest that interventions targeting life control and interpersonal confidence are most likely to benefit the participants in this study, although this may not be the case with all student samples.

Another finding was that significant differences in mental toughness were evident between students on differing degree programs. Students studying sport and exercise science were found to have significantly higher mental toughness than students studying sports rehabilitation. One possible interpretation of this finding concerns the different skill-sets and approaches needed to be successful in each of these areas. For example, the emphasis on practitioner-athlete relations (i.e., empathy, sensitivity) which has been described as bedside manner, and is integral to supporting injured athletes appears at odds with some of the reported characteristics of mentally tough individuals (e.g., insensitivity). The sport rehabilitation students have been pulled towards a vocational course which is both person-

centered and non-competitive. This latter point is perhaps crucially important. Mentally tough individuals are driven by achievement and competition. Further work is needed to ascertain the pre-cursors and consequences of these differences. It is also important that they are placed in the wider context of the caring professions which need an apparently contradictory skill set of resilience and compassion.

Present findings should be viewed as the beginning of understanding mental toughness in educational settings. While this work has examined mental toughness in students during their first year at university, more longitudinal research is needed to track student progress and achievement over the standard three-year duration of undergraduate study. Establishing distance travelled (i.e., between first year grades and final degree classification) could provide a basis for understanding how mental toughness influences long-term progress and learning. Another variable that was not included in the present research (because data was unavailable) but should be measured in relation to mental toughness is attendance. Given that mentally tough individuals characteristically have high levels of commitment and life control, it is likely that mentally tough students have better attendance records and manage their time more effectively in terms of meeting coursework submission deadlines. These additional markers can be measured by future researchers. Alongside further quantitative approaches, the use of qualitative methods such as interviews or focus groups could provide a more subtle understanding of differences between students with high and low mental toughness. For example, understanding differences in how students typically respond to negative feedback, manage time outside of taught sessions, cope with stress, perceive demands, or seek out support could help to provide greater insight into the statistical relationships that have been established. Additionally, a number of other educational settings provide the potential to learn more about the role of mental toughness. In terms of further understanding the relationship with outcome measures, this could include focus upon

examination performance in secondary education (11-16 year olds) or further education (16-19 year olds) and possibly a comparison between mental toughness in state and private educational establishments in terms of the development of mental toughness.

Another important factor that researchers have found to influence the development of mental toughness relates to the environment (i.e., challenging yet supportive learning environments that facilitate the independence of learners; see Crust & Clough, 2011). It is possible that the actual learning environment, where this encourages independence and personal responsibility, facilitates the development of mental toughness. As Knight (1996) highlights, independence in learners should be viewed as a goal rather than a start-point. Longitudinal studies that evaluate mental toughness over time are a priority if the malleability of the construct is to be better understood.

A number of limitations need to be acknowledged with respect to the present study. First, the use of a self-report measure of mental toughness means that socially desirable responses could have influenced the results, although instructions given to participants rendered this less likely. Second, this study is limited to sports students at one university and as such future studies should look to examine mental toughness across a broader spectrum of degree subjects and across a range of universities in the UK and elsewhere in order to understand if cultural and organizational differences are important. Given that only sports students were sampled (containing a large percentage of current or former athletes) these results should not be extrapolated to represent a general student population as mental toughness might play a very different role for athletic compared to non-athletic samples. The reliabilities of the scales used were acceptable, with the exception of the emotional control sub-scale. Removal of two items would allow the scale to reach an adequate reliability score, but it was felt to be most appropriate to leave it in its original form. This scale was therefore excluded from the final analysis. It is clear that mental toughness does explain a significant

proportion of the performance criteria. However, other factors may also be important. Mental toughness has been shown to relate to other variables, for example the Big Five personality factors (e.g. Horsburgh et al., 2009). Future research should adopt a multivariate approach to ascertain the relative contribution of mental toughness to the performance of students. Finally, only first year students were studied in the present research and as such longitudinal research that tracks mental toughness over the usual three-year period of undergraduate study is recommended to allow a broader understanding of the relationship between mental toughness and academic success.

5.0 Conclusion

Inevitably, learning environments provide opportunities for success and failure, meaning that all students will at some time face criticism. Mental toughness appears to be one resistance resource that is important in relation to responding to negative feedback and as shown here is related to progression and achievement. Both retention and achievement of students is a key priority for educational institutions especially given greater transparency of the sector through the publication of performance indicators and league tables which provide rank positions of Universities based upon statistics such as student satisfaction and graduate prospects. With increasing competition, greater available choice, and where funding is linked to such outcomes as retention and achievement, educational establishments view such performance indicators as high priority. Present findings suggest mental toughness is related to both retention and achievement. Low scores on the MTQ48 indicate a greater possibility of failing in the first year of study at university. As such the MTQ48 could be an important screening device that would allow the identification of at-risk groups. These groups are likely to benefit from additional support in terms of adjusting to the demands of higher education. Importantly, the MTQ48 includes subscales that can allow targeted interventions in relation to individual profiles and developing such interventions must be a key aim for future

researchers. For example, the support given to a student with low life control (e.g., managing one's time outside of class), would be considerably different to another student who has low levels of emotional control (i.e., gets anxious before exams). Crust and Clough (2011) provide examples of strategies that can be used to enhance different components of mental toughness within sport. Sport-related research has found mental toughness interventions to enhance both self-reported mental toughness and performance (Gucciardi et al., 2009b; Sheard & Golby, 2006). Recently, Okopi (2011) has proposed an important role for interventions (especially counseling) in terms of aiding student adjustment and avoiding student attrition.

6.0 References

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