

1 The Relationship between Mental Toughness and Affect Intensity

2 Lee Crust

3 The University of Hull

4

5 Lee Crust is with the Department of Sport, Health, and Exercise Sciences, The University
6 of Hull, Cottingham Road, Hull, East Yorkshire, HU6 7RX.

7 Tel. +44 (0) 1482 463052 or E-mail l.crust@hull.ac.uk

1 The Relationship between Mental Toughness and Affect Intensity

2

3 Abstract

4 Mentally tough athletes are conceptualized as being able to function effectively in stressful
5 situations and recent research has found small to moderate correlations between mental
6 toughness and coping. Despite this no research has thus far examined the possibility that
7 mentally tough athletes experience less intense emotions. This paper tested the relationship
8 between mental toughness and affect intensity to determine whether mentally tough athletes
9 generally experienced more or less intense emotions. A sample of 112 sport performers (55
10 men and 57 women) aged between 18 and 51 years ($M = 29.3$, $s = 10.3$) acted as
11 participants, and ranged from recreational to national level in a variety of sports. Mental
12 toughness and affect intensity were found to be unrelated. This is an important finding
13 because it suggests participants with high or low levels of mental toughness do not
14 characteristically experience more or less intense emotions. Thus there is no evidence to
15 suggest the ability of mentally tough athletes to remain relatively unaffected by pressure or
16 adversity is due to lower levels of affect intensity. More research is required to understand
17 how mentally tough athletes (in comparison to less tough athletes) maintain control and
18 high levels of performance in stressful circumstances.

1 Introduction

2 Until recently, the literature on mental toughness has suffered from a number of inherent
3 weaknesses, and was generally characterized by a lack of conceptual clarity (Crust, 2007;
4 Jones, Hanton, & Connaughton, 2002). Mental toughness has been described as one of the
5 most overused, but least understood terms in applied sport psychology (Jones et al., 2002).
6 However, a recent surge of interest, and more rigorous scientific investigations into what is
7 potentially one of the most important psychological attributes in sport, has led to somewhat
8 greater clarity (Crust, 2007). Emerging research suggests that mental toughness is multi-
9 faceted, and an important psychological construct that is related to successful sport
10 performance (Bull, Shambrook, James, & Brooks, 2005; Crust & Clough, 2005; Clough,
11 Earle, & Sewell, 2002; Gucciari, Gordon, & Dimmock, 2008; Jones, Hanton, &
12 Connaughton, 2007).

13 Despite researchers such as Jones et al. (2002, 2007) and Clough et al. (2002) using
14 different approaches (both qualitative and quantitative) to study mental toughness, Crust
15 (2008) highlights numerous similarities in the outcomes of these and other studies. For
16 example, Clough et al. proposed the 4C's model of mental toughness comprising of: (1)
17 control (emotional and life), which concerns a tendency to feel and act as if one is
18 influential, (2) commitment, which reflects deep involvement with whatever one is doing,
19 (3) challenge, the extent to which individuals seek out opportunities for personal
20 development, (4) confidence (in abilities and interpersonal), reflecting a high sense of self
21 belief and an unshakeable faith in having the ability to achieve success. Similarly, Jones et
22 al. (2007) reported attributes of mental toughness to include awareness and control of
23 thoughts and feelings, and staying focused (comparable to control), using long-term goals

1 as a source of motivation (analogous to commitment), pushing to the limit (similar to
2 challenge) and having an unshakeable self-belief (comparable to confidence). According to
3 Crust (2007), other important attributes that characterize mental toughness include coping
4 effectively with pressure and adversity, recovering or rebounding from set-backs and
5 failures, persisting or refusing to quit, being insensitive or resilient, thriving on pressure
6 and possession of superior mental skills. In support of their own model of mental
7 toughness, Clough et al. (2002, p.38) suggested:

8 Mentally tough individuals tend to be sociable and outgoing; as they are able to
9 remain calm and relaxed, they are competitive in many situations and have lower
10 anxiety levels than others. With a high sense of self-belief and an unshakeable faith
11 that they can control their own destiny, these individuals can remain relatively
12 unaffected by competition or adversity.

13 The definition of Clough et al. (2002) emphasizes mental toughness as a stress
14 buffer that is influential in pressurized and adverse situations. However, recent researchers
15 have suggested that defining mental toughness in terms of reactions or responses to
16 adversity is somewhat limiting as the construct appears to encompass enabling factors that
17 help to maintain focus and motivation when things are going well (Gucciari et al., 2008).
18 There is still much debate concerning whether mental toughness is more stable and trait-
19 like, or a set of context specific cognitive skills that can be manipulated through training
20 (cf. Crust, 2008). Jones et al. (2007, p. 247) suggest mental toughness may be ‘natural or
21 developed’ which appears to correspond with more recent understanding of the importance
22 of both nature and nurture (cf. Golby & Sheard, 2006). Recent research has shown
23 significant increases in the mental toughness of elite adolescent swimmers in response to a

1 7-week psychological skills training programme (Sheard & Golby, 2006) although it
2 remains likely that mental toughness is at least partially inherited. Recent research that
3 studied adult monogygotic and dizygotic twins (Horsburgh, Schermer, Vesleka, & Vernon,
4 2009) has revealed that individual differences in mental toughness were largely attributable
5 to genetic and non-shared environmental factors.

6 One of the most important attributes of mentally tough athletes appears to be the
7 avoidance of performance decrement due to damaging negative emotions and subsequent
8 loss of focus, through the maintenance of psychological control in adverse circumstances or
9 pressure situations (Bull et al., 2005; Clough et al., 2002; Crust, 2007; Golby, Sheard & van
10 Wersch, 2007; Jones et al., 2002). A number of researchers have specifically emphasized
11 the importance of emotional control (Clough et al., 2002; Loehr, 1995) which appears to
12 reflect self-regulation, keeping emotions such as anxiety in check, and not revealing ones
13 emotions to other people. Emotional control appeared to be what Clough et al. had in mind
14 when manipulating feedback given to participants with high and low levels of mental
15 toughness. These researchers evaluated mental toughness with their own inventory
16 (MTQ48) and gave either positive or negative feedback to participants following a battery
17 of physical tasks. These researchers reported a significant interaction between mental
18 toughness and feedback when testing the performance of participants on a follow-up
19 cognitive planning task. The performance of participants who scored high on the MTQ48
20 remained constant regardless of feedback, while participants with lower MTQ48 scores
21 showed more variable responses that appeared to correspond to the type of feedback given
22 (positive or negative). Specifically, participants with lower MTQ48 scores performed
23 significantly worse on a cognitive planning task following negative feedback.

1 One explanation of these findings concerns the typical reactions of participants to
2 emotion-provoking stimuli. In essence, the possibility remains that based on levels of
3 mental toughness, participants interpret the feedback differently, and this likely influenced
4 attention, and subsequent task performance. Other than recent research that found small but
5 significant positive correlations between mental toughness and approach coping strategies,
6 and negative correlations with avoidance coping (Nicholls, Polman, Levy & Backhouse,
7 2008), little is known about the specific cognitive processes that are related to mental
8 toughness, and whether differences exist between individuals with high or low levels of
9 mental toughness. However, Crust and Azadi (in press) recently examined the relationship
10 between mental toughness and athletes' use of psychological strategies, using the MTQ48
11 to measure mental toughness and the Test of Performance Strategies (TOPS; Thomas,
12 Murphy & Hardy, 1999) to evaluate use of psychological strategies. Crust and Azadi found
13 significant and positive correlations between mental toughness and use of a number of
14 psychological strategies including self-talk, relaxation and emotional control.

15 Outside of sport, Larsen and colleagues (Larsen, Diener & Emmons, 1986; Larsen,
16 Diener & Cropanzano, 1987) have studied individual differences in emotional responses to
17 identical emotion-provoking stimuli. These researchers found that some individuals
18 consistently manifest stronger or more intense emotional responses than do others, and
19 refer to this individual difference dimension as affect intensity. Larsen et al. (1986) had 62
20 undergraduate students report two events per day, and their affective responses to these
21 events over an 8-week period. A team of coders was used to objectively determine how
22 good or bad each event was. In a second study, the same researchers asked 187 participants
23 to describe how they would react to standardized life event descriptions. In both studies

1 participants completed the Affect Intensity Measure (AIM; Larsen, 1984) and were divided
2 into high and low affect intensity groups on the basis of their responses. In both studies,
3 participants with high levels of affect intensity responded to actual and hypothetical events
4 with significantly more intense affective reactions.

5 Larsen et al. (1987) provided empirical support to explain differences in affect
6 intensity based upon underlying cognitive operations. Undergraduate psychology students
7 ($n = 280$) were categorized as either high or low in affect intensity based on responses to
8 the AIM (Larsen, 1984). Participants viewed affect-relevant slides and were asked to
9 complete a questionnaire to assess the cognitive operations that were undertaken in
10 evaluating the positive and negative images. Specifically, individuals with high affect
11 intensity tended to engage in more personalizing (i.e., absorbed in personal meaning),
12 generalizing (i.e. blowing things out of proportion) and selective abstraction (i.e. focus on
13 emotional aspects of events).

14 Some researchers such as Cooper and McConville (1993) have questioned the
15 validity of the construct and suggested affect intensity actually reflects a mixture of trait
16 neuroticism and extraversion. However, such arguments are not convincing given that
17 neuroticism and extraversion together predict less than 30% of the variance in measures of
18 affect intensity (cf. Schimmack & Diener, 1997). Schimmack and Diener provided strong
19 evidence to suggest that affect intensity is a valid construct and cannot be reduced to
20 extraversion and neuroticism in a series of studies evaluating affective responses of
21 undergraduate psychology students to both real (via diaries detailing experienced emotions)
22 and hypothetical situations. Schimmack and Diener found extraversion to correlate with the
23 intensity of pleasant affect while neuroticism related to intensity of unpleasant affect.

1 Additionally, extraversion and neuroticism were negatively correlated and therefore could
2 not explain significant and positive correlations between intensity of pleasant and
3 unpleasant affect. These researchers suggested it was untenable to define individuals high
4 in affect intensity as neurotic extraverts. These findings support the supposition that
5 individuals who experience intense pleasant affect also tend to experience intense
6 unpleasant affect. Schimmack and Diener found that affect intensity and affect frequency
7 scores were largely unrelated and that affect intensity is best conceptualized as a disposition
8 to react strongly to emotion-eliciting events.

9 Bull et al. (2005) suggest that one important facet of mental toughness is tough
10 thinking, and propose that most applied sport psychology work focuses on developing this
11 aspect. To these researchers, tough thinking represents the translation of more general
12 character and attitudes into a competitive environment, with mentally tough performers
13 able to apply tough thinking at critical moments. Indeed, maintaining perspective which
14 appears central to tough thinking, seems to be diametrically opposite to the cognitive
15 operations of individuals with high affect intensity, who tend to over-react to emotional
16 stimuli by 'blowing things out of proportion'. Given this, it is possible that mental
17 toughness and affect intensity are negatively related, and this hypothesis was tested in the
18 following research.

19 The purpose of the present study was to determine the relationship between mental
20 toughness and affect intensity. It is possible that participants with low levels of mental
21 toughness have to deal with greater emotional disturbance due to characteristically
22 augmenting emotion-provoking stimuli. Thus, the ability of mentally tough individuals to
23 remain unaffected by competition or adversity could in part be explained by having less

1 intense emotional reactions (thus less cognitive disturbance), rather than (or as well as)
2 having developed or learned more effective coping strategies. If mental toughness and
3 affect intensity are found to be related, then future researchers will have an established
4 theoretical base from which to proceed in evaluating the cognitive operations of mentally
5 tough individuals.

6

7 Method

8 Participants

9 The sample consisted of 112 sport participants (55 men and 57 women) who regularly (at
10 least twice per week) attended various sports and fitness clubs / activities at a university in
11 the north of England. The heterogeneous sample included basketball, association football,
12 hockey, gymnastics, netball, badminton, golf, long distance running and triathlon
13 participants, who ranged from recreational sport participants to national level athletes.
14 Recently there have been calls to study mental toughness among cohorts of varying
15 sporting backgrounds and abilities (Crust, 2008; Gucciardi et al., 2008) rather than
16 continuing to focus upon elite athletes. A mixed sample was deemed appropriate in order to
17 more fully understand potential relationships within a broader population. The use of a
18 heterogeneous sample appears to be similar to the recent approach taken by Nicholls et al.
19 (2008). The mean age of men and women were found to be 30.1 years ($s = 11.6$) and 28.6
20 years ($s = 8.9$) respectively, with participants ages ranging from 18-51 years. The
21 participants had all been participating in a minimum of two sports sessions a week, for at
22 least six months.

23

1 Instruments

2 Mental Toughness

3 The MTQ48 (Clough et al., 2002), was used to measure mental toughness. Responses are
4 made to the 48-items on a 5-point Likert scale ranging from (1) strongly disagree, to (5)
5 strongly agree, with an average completion time between 10 and 15 minutes (Crust &
6 Clough, 2005). The MTQ48 has an overall test-retest coefficient of 0.9. In the present
7 study, overall Cronbach's Alpha for the MTQ48 (0.86) was found to be consistent with
8 previous research (Nicholls et al., 2008). More recently, researchers have reported the
9 MTQ48 to have adequate psychometric properties, and both exploratory and confirmatory
10 factor analysis has been found to support the proposed structure of the inventory
11 (Horsburgh, et al., 2009). Clough et al. (2002) have provided evidence for the construct
12 validity of the MTQ48 with significant relationships reported with optimism, self-image,
13 life satisfaction, self-efficacy, and trait anxiety. In respect of criterion validity, Clough et al.
14 found that participants with self-reported high, as opposed to low mental toughness gave
15 lower rating of exertion during a 30-minute physically demanding cycling task. The
16 MTQ48 has been found to correlate with pain tolerance (Crust & Clough, 2005) and a short
17 version of the questionnaire has been shown to relate to injury rehabilitation (Levy,
18 Polman, Clough, Marchant & Earle, 2006) with more positive threat appraisals, better
19 coping with pain, and greater attendance at rehabilitation clinics associated with higher
20 levels of mental toughness.

21

22 Affect Intensity

1 To determine levels of emotional reactivity, the Affect Intensity Measure (AIM-
2 Larsen, 1984) was completed by each participant. This 40-item inventory assesses the
3 characteristic intensity with which an individual typically experiences emotions. Items are
4 rated on a 6-point scale, with verbal anchors ranging from (1) never, to (6) always, with
5 scoring achieved by averaging the responses across the 40-items. Larsen (1984) reported
6 high coefficient alpha (Cronbach, 1951) for the AIM across four samples (0.9 – 0.94). In
7 respect of construct validity, Larsen also reported a significant correlation $r = 0.5$ ($p < 0.01$)
8 between Affect Intensity and reports of typical affect response intensity by the parents of
9 participants. The AIM has also been found to correlate significantly ($r = 0.52-0.61$) with the
10 average intensity of daily moods assessed over several months, and with measures of
11 peripheral physiological arousal ($r = -0.32$) which suggest high-AIM participants are
12 physiologically under aroused in quiet, stimulus reduced environments (cf. Larsen et al.,
13 1986). Tests of stability (test-retest correlations) after 1-, 2-, and 3 months were found to be
14 0.8, 0.81 and 0.81 respectively. Larsen et al. (1986) reports that across several samples, the
15 AIM has been found to correlate most consistently with sociability, arousability, and
16 emotionality.

17

18 Procedures

19 A variety of coaches and instructors at a north of England University were approached in
20 order to gain permission to solicit volunteers for the present research. The largest group of
21 participants was drawn from a circuit training class that included a wide variety of sport
22 and exercise participants, and a large number of sports participants who were using the
23 session to maintain or increase their sport-related fitness. Instructors gave permission for

1 participants to be sought, and allowed the author to address the group prior to training
2 classes. The aims and objectives of the research were briefly stated, and issues of
3 confidentiality were broached. This approach led to 112 volunteers agreeing to participate
4 in the present study. All participants read, and signed informed consent forms prior to
5 completing a booklet containing a copy of the MTQ48 (Clough et al., 2002) and the AIM
6 questionnaire (Larsen, 1984). Completed booklets were placed into envelopes, sealed, and
7 collected by the instructor or the author. Ethical clearance for this research was achieved
8 through a University research ethics committee.

9

10 Data Analysis

11 To test the relationship between mental toughness and affect intensity, Pearson Product
12 Moment Correlations were computed between affect intensity, overall mental toughness
13 and the six subscales of the MTQ48 questionnaire. Correlations were also computed to
14 assess any relationship between mental toughness, affect intensity and age. Finally,
15 independent *t*-tests were used to test for possible gender differences, and differences
16 relating to performance levels of the participants in mental toughness and affect intensity.
17 Data screening was used to ensure all dependent variables met the assumptions necessary
18 for the use of parametric statistics.

19

20 Results

21 Descriptive data for responses to the MTQ48 and AIM questionnaire can be viewed in
22 Table 1. Measures of skewness and kurtosis found the data to be normally distributed. A
23 series of Pearson correlations between affect intensity, overall mental toughness, and the

1 six subscales of mental toughness found no significant ($p > .05$) relationships (cf. Table 2).
2 Age was also found to be unrelated to mental toughness ($r = -.15, p > .05$) and affect
3 intensity ($r = -.11, p > .05$). Independent t -tests found no significant differences ($p > .05$) in
4 overall mental toughness, the mental toughness subscales or affect intensity between men
5 and women. Finally, a series of independent t -tests were used to test for differences in
6 mental toughness and affect intensity between recreational athletes ($n = 49$), and athletes
7 who had competed at club level or higher ($n = 63$). Bonferroni corrections were used to
8 adjust p values because of using multiple comparisons and no significant differences were
9 found between recreational or club level athletes.

10

11 Discussion

12 The aim of this research was to test the hypothesis that mental toughness and affect
13 intensity were significantly and negatively related. Previous research has not excluded the
14 possibility that mentally tough athletes are able to remain calm in pressurized situations due
15 to experiencing less intense emotions. Results suggest that mental toughness and affect
16 intensity are not linearly related. In the context of developing a greater understanding of
17 mental toughness, this is an important finding. If mental toughness and affect intensity were
18 found to negatively correlate, then the possibility would have remained that mentally tough
19 individuals experienced less intense emotions in response to a given level of emotion
20 provoking stimuli; which might have explained the ability of such individuals to remain
21 relatively unaffected by pressure or adversity. However, the present findings coupled with
22 previous evidence of a relationship between mental toughness and coping (Nicholls et al.,
23 2008), and mental toughness and use of psychological strategies (Crust & Azadi, in press)

1 appears to give some credence to those researchers and theorists (Clough et al., 2002;
2 Loehr, 1995) who contend that emotional control is a vital component of mental toughness.
3 If mentally tough athletes have similarly intense emotional experiences as other athletes, it
4 appears appropriate to examine if, and how mentally tough athletes differ in the way they
5 manage their emotions. However, given that the present study did not assess emotional
6 control or coping it is clear that further research will be necessary to confirm the
7 importance of such factors as other potential causal explanations remain possible.

8 If mentally tough individuals do not characteristically experience differences in
9 affect intensity, it is possible that such individuals are exerting more effective control over
10 experienced emotions. This could implicate a number of possible mechanisms such as
11 attention, differences in cognitive operations or more general coping strategies, although it
12 is possible that these explanations are not mutually exclusive. In relation to attention, Jones
13 et al. (2007) reported mentally tough athletes to totally focus on the task at hand, remain
14 committed to a self-absorbed focus, and focus on processes not solely outcomes. Directing
15 attention in such ways is likely to avoid being distracted by pleasant or unpleasant recent
16 experiences. Furthermore, the view that cognitive operations might be one explanation of
17 emotional control is supported in a recent study (Crust & Azadi, in press) that employed the
18 MTQ48 and the Test of Performance Strategies (TOPS; Thomas et al., 1999). Crust and
19 Azadi found significant correlations between mental toughness and use of a number of
20 psychological strategies including self-talk, relaxation and emotional control.
21 Unfortunately, the emotional control subscale of the TOPS does not reflect how
22 participants achieved control.

1 The recent work of Nicholls et al. (2008) appears to suggest some relationships
2 between mental toughness and the use of problem or approach coping strategies (mental
3 imagery, effort expenditure, thought control, and logical analysis), although only modest
4 correlations were reported (highest $r = 0.3$ between mental toughness and logical analysis).
5 In recent research concerning mental toughness in Australian Football, elite coaches with
6 significant playing experience highlighted the importance of ‘the ability to manage your
7 emotions to enhance performance’ (Gucciardi et al., 2008, p. 272). Furthermore, Crust,
8 Nesti and Bond (2008) reported that mentally tough long-distance walkers showed a
9 flexible approach to coping (using strategies interchangeably to suit the circumstances) and
10 employed strategies such as compartmentalizing the problem, objective thinking, and
11 maintaining perspective.

12 If the goal of the practitioner is to intervene and help individuals develop mental
13 toughness, then a greater understanding of the cognitive operations underlying the concept
14 is required. However, recent research concerning psychological resilience might offer an
15 appropriate framework and theoretical perspective in which to further understand mental
16 toughness and any relationship with emotions. Tugade, Fredrickson, and Feldman-Barrett
17 (2004) suggest that resilient individuals tend to be better at harnessing positive emotions in
18 times of stress and thus reap beneficial effects in relation to coping. These researchers
19 considered psychological resilience in context of the broaden-and-build theory of positive
20 emotions (Fredrickson, 1998), which suggests that positive (as opposed to negative)
21 emotions can momentarily allow broader thinking, flexible attention, and thus more varied
22 behavioral repertoires. Tugade et al. (2004) found that resilient individuals were not blind
23 to negativity and did experience high levels of anxiety and frustration yet were able to

1 experience positive emotions during stressful circumstances. It is suggested that with
2 repeatedly experiencing positive emotions, a broadened mindset becomes habitual and
3 helps to build an individual's personal resources. Efforts to consider mental toughness in
4 the context of the broaden-and-build theory are likely to complement existing work that has
5 explored the relationship between mental toughness and coping (Nicholls et al., 2008).

6 It is interesting to note that no significant differences were found between men and
7 women in regards to overall levels of mental toughness or affect intensity. This concurs
8 with Clough et al. (2002) who reported that the MTQ48 did not discriminate across gender.
9 Descriptive data for measures of mental toughness and affect intensity appear to be similar
10 to previously reported normative data. With respect to affect intensity, the reported mean in
11 the present research (3.7) is within the normal range reported by Larsen et al. (1987). The
12 mean mental toughness rating (173) is consistent with the findings of Nicholls et al. (2008).

13 Although some researchers or theorists might criticize the use of a heterogeneous
14 sample in this study, there is certainly a need to broaden out the study of mental toughness,
15 given past researcher's over-emphasis on studying elite performers (cf. Crust, 2008).
16 Indeed, while existing research has highlighted the characteristics of elite mentally tough
17 athletes, there have been few attempts to establish if such characteristics reliably
18 differentiate between athletes with high or low levels of mental toughness, or the
19 relationship with non-elite athletes. In essence, much of the existing work is primarily
20 descriptive, and does not allow for a thorough understanding of the concept.

21 While the findings of the present study suggest mentally tough athletes do not
22 characteristically experience less intense emotions when compared to less tough athletes,
23 further research is required to confirm this given a relatively small sample size and a

1 number of other limitations. For example, the present research employed self-report
2 measures that required participants to reflect on typical or general responses. However, it
3 remains possible that participant responses could be different when faced with real or
4 hypothetical scenarios that demand mental toughness. Future researchers might consider
5 assessing the intensity of emotional responses in athletes found to have higher and lower
6 levels of mental toughness using demanding imagined scenarios. Furthermore, given that
7 advances in understanding anxiety responses in sport have been facilitated by investigating
8 not only the intensity of response but also the direction (i.e. facilitative versus debilitating)
9 such an approach (cf. Hanton, Neil & Mellalieu, 2008) might be employed to further
10 understand the relationship between mental toughness and affective responses. It may be
11 that direction rather than intensity scores are better able to distinguish between individuals
12 with higher or lower levels of mental toughness.

13 This present research found no significant linear relationships between mental
14 toughness and affect intensity. This finding suggests individuals with high as opposed to
15 low levels of mental toughness do not experience emotions more or less intensely. At
16 present, there is no evidence to suggest the ability of mentally tough athletes to retain
17 control in adverse or pressurized situations is due to such athletes having less intense
18 emotional experiences. To further understand how mentally tough athletes remain relatively
19 unaffected by competition or adversity future researchers should test for differences
20 between individuals with high and low levels of mental toughness in areas such as focus,
21 cognitive processing, decision-making and coping strategies.

22

23 References

- 1 Bull, S., Shambrook, C., James, W., & Brooks, J. (2005). Towards an understanding of
2 mental toughness in elite English cricketers. *Journal of Applied Sport Psychology*,
3 17, 209-227.
- 4 Clough, P. J., Earle, K., & Sewell, D. (2002) Mental toughness: the concept and its
5 measurement. In *Solutions in Sport Psychology* (edited by I. Cockerill), pp. 32-43.
6 London: Thomson Publishing.
- 7 Cooper, C. & McConville, C. (1993). Affect intensity: Factor or artefact? *Personality and*
8 *Individual Differences*, 14, 135-143.
- 9 Cronbach, L. (1951). Coefficient alpha and internal structure of tests. *Psychometrika*, 16,
10 297-334.
- 11 Crust, L. (2008). A review and conceptual re-examination of mental toughness:
12 Implications for future researchers. *Personality and Individual Differences*, 45(7),
13 576-583.
- 14 Crust, L. (2007). Mental toughness in sport: A review. *International Journal of Sport &*
15 *Exercise Psychology*, 5(3), 270-290.
- 16 Crust, L. and Azadi, K. (in press). Mental toughness and athletes' use of psychological
17 strategies. *European Journal of Sport Science*.
- 18 Crust, L. & Clough, P. J. (2005). Relationship between mental toughness and physical
19 endurance. *Perceptual & Motor Skills*, 100, 192-194.
- 20 Crust, L., Nesti, M., & Bond, K. (2008). Mental toughness and coping in an ultra-
21 endurance event. Paper presented at the inaugural conference of the British
22 Psychological Society Division of Sport and Exercise Psychology, London,
23 England. December 11-12, 2008.

- 1 Fredrickson, B. L. (1998). What good are positive emotions? *Review of General*
2 *Psychology*, 2, 300-319.
- 3 Golby, J., & Sheard, M. (2006). The relationship between genotype and positive
4 psychological development in national-level swimmers. *European Psychologist*, 11
5 (2), 143-148.
- 6 Golby, J., Sheard, M., & van Wersch, A. (2007). Evaluating the factor structure of the
7 psychological performance inventory. *Perceptual and Motor Skills*, 105, 309-325.
- 8 Gucciardi, D., Gordon, S., & Dimmock, J. (2008). Towards and understanding of mental
9 toughness in Australian football. *Journal of Applied Sport Psychology*, 20, 261-281.
- 10 Hanton, S., Neil, R., & Mellalieu, S. (2008). Recent developments in competitive anxiety
11 direction and completion stress research. *International Review of Sport and*
12 *Exercise Psychology*, 1(1), 45-57.
- 13 Horsburgh, V., Schermer, J., Veselka, L., & Vernon, P. (2009). A behavioural genetic study
14 of mental toughness and personality. *Personality and Individual Differences*, 46(2),
15 100-105.
- 16 Jones, G., Hanton, S. & Connaughton, D. (2002). What is this thing called mental
17 toughness? An investigation of elite sport performers. *Journal of Applied Sport*
18 *Psychology*, 14, 205-218.
- 19 Jones, G., Hanton, S. & Connaughton, D. (2007). A framework of mental toughness in the
20 world's best performers. *The Sport Psychologist*, 21, 243-264.
- 21 Larsen, R.J. (1984). Theory and measurement of affect intensity as an individual difference
22 characteristic. *Dissertation Abstracts International*, 5, 2297B. (University
23 microfilms No. 84-22112).

- 1 Larsen, R. J., Diener, E., & Emmons, R. A. (1986) Affect intensity and reactions to daily
2 life events. *Journal of Personality and Social Psychology*, 51, 803-814.
- 3 Larsen, R. J., Diener, E., & Cropanzano., R. (1987). Cognitive operations associated with
4 individual differences in affect intensity. *Journal of Personality and Social
5 Psychology*, 53, 767-774.
- 6 Levy, A. R., Polman, R. C. J., Clough, P. J., Marchant, D. C., & Earle, K. (2006). Mental
7 toughness as a determinant of beliefs, pain, and adherence in sport injury
8 rehabilitation. *Journal of Sports Rehabilitation*, 15, 246-254.
- 9 Loehr, J. E. (1995). *The new mental toughness training for sports*. New York: Plume.
- 10 Nicholls, A. R., & Polman, R. C., Levy, A. R., & Backhouse, S. H. (2008). Mental
11 toughness, optimism, and coping among athletes. *Personality & Individual
12 Differences*, 44, 1182-1192.
- 13 Schimmack, U. & Diener, E. (1997). Affect Intensity: Separating intensity and frequency in
14 repeatedly measured affect. *Journal of Personality and Social Psychology*, 73,
15 1313-1329.
- 16 Sheard, M., & Golby, J. (2006). Effect of psychological skills training program on
17 swimming performance and positive psychological development. *International
18 Journal of Sport and Exercise Psychology*, 2, 7-24.
- 19 Thomas, P., Murphy, S., & Hardy, L. (1999). Test of performance strategies: Development
20 and preliminary validation of a comprehensive measure of athletes' psychological
21 skills. *Journal of Sports Sciences*, 17, 697-711.

- 1 Tugade, M., Fredrickson, B., & Feldman-Barrett, L. (2004). Psychological resilience and
- 2 positive emotional granularity: Examining the benefits of positive emotions on
- 3 coping and health. *Journal of Personality*, 72 (6), 1161-1190.

Mental Toughness and Affect Intensity

1 Table 2 – Pearson Product Moment Correlations between Mental Toughness and Affect Intensity

2

	Mental Toughness	Challenge	Commitment	Emotional Control	Life Control	Ability Confidence	Interpersonal Confidence	Affect Intensity
Mental Toughness		.76**	.72**	.67**	.74**	.79**	.58**	.06
Challenge			.45*	.54**	.44**	.48**	.33**	.10
Commitment				.36*	.45**	.42*	.29**	.06
Emotional Control					.45**	.43**	.15	-.03
Life Control						.50**	.37**	.10
Ability Confidence							.47**	-.03
Interpersonal Confidence								.07
Affect Intensity								

3 * $P < .05$; ** $P < .01$