Mental Toughness and Athletes' use of Psychological Strategies

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Abstract

This study tested the relationship between mental toughness and athletes' use of psychological performance strategies. A sample of 67 male (*M* age = 22.55 years, *SD* = 4.96) and 40 female athletes (*M* age = 21.08 years, *SD* = 2.81) acted as participants, and ranged from club / university to national level in a variety of sports. Participants completed the MTQ48 (Clough et al., 2002) to measure mental toughness, and the Test of Performance Strategies (TOPS; Thomas et al., 1999) to measure the use of psychological strategies in practice and competition. Results of Pearson correlations and linear regression analyses revealed that self-talk, emotional control and relaxation strategies were significantly and positively (r = 0.26 to 0.37, $P < 0.01$) related to mental toughness in both practice and competition. Of the MTQ48 subscales, commitment was found to most frequently load against performance strategies and as such it is possible that the results of this study reflect highly committed performers seeking out performance enhancement strategies. Consistent with theoretical predictions, athletes of county standard and above reported significantly higher levels of mental toughness than club / university athletes (t_{105} = -2.25, P = 0.03).

Introduction

The concept of mental toughness has recently attracted significant attention from sport psychology researchers attempting to understand how psychological factors can underpin success in sport (Bull, Shambrook, James, & Brooks, 2005; Gucciardi, Gordon, & Dimmock, 2008; Jones, Hanton, & Connaughton, 2007). From the emerging knowledge base, mental toughness is considered to be multi-dimensional (comprising of cognitive, affective and behavioural components) and an important psychological construct that is related to successful sport performance (Bull et al., 2005; Crust & Clough, 2005; Clough, Earle, & Sewell, 2002; Connaughton, Wadey, Hanton, & Jones, 2008; Jones et al., 2007). Unfortunately however, different perspectives on the construct are still apparent. For example, while some researchers suggest that mental toughness can explain how physically talented athletes become great athletes (Gucciardi et al., 2008), others have cautioned against over-emphasising the importance of psychological constructs when success in sports is most likely down to deliberate practice (Ericsson, 1996) and athletes possessing the appropriate blend of physiological, anatomical and psychological attributes (Crust, 2008).

Since Jones, Hanton, and Connaughton (2002) lamented the lack of conceptual clarity that has surrounded mental toughness, there appears to have been significant progress and some agreement concerning the key characteristics of this construct (Crust, 2007). Despite different approaches to research involving both qualitative and quantitative methods, a number of key components are consistently reported, and include self-belief, commitment, self-motivation, thriving on competition and challenges, retaining psychological control under pressure, resilience, perseverance, and focus or concentration (Crust, 2007; Gucciardi et al. 2008). Jones et al. (2007) claimed that mentally tough athletes were ‘better’ at psychologically coping with

demanding circumstances, but this is problematic given that these researchers made no comparisons with less tough or less successful athletes. Although it seems reasonable to assume that mentally tough athletes are better at coping with demanding circumstances, it is clear that the descriptive nature of most mental toughness research to date has not allowed this proposition to be satisfactorily tested.

Recent qualitative studies (Connaughton et al., 2008; Jones et al., 2007; Gucciardi et al., 2008) have attempted to develop the knowledge base in an emerging area, but this work has essentially replicated previous findings (cf. Fourie & Potgeiter, 2001; Jones et al., 2002). Also, an over-emphasis on studying the elite and assuming that the super-elite (i.e. gold medallists) are somehow more mentally tough than a silver medallist appears to be questionable when consideration is given to multiple other factors that determine success. In short, most of the research concerning mental toughness has not objectively evaluated relationships with performance, cognitions or cognitive strategies, behavioural tendencies or affective states. On this basis, the assumption of mental toughness being a key determinant of success, or the difference between good and great athletes remains speculative. However, if more objective, comparative studies are to emerge, as recently recommended (Crust, 2008; Gucciardi et al., 2008) researchers need to have confidence in psychometric properties of measurement instruments.

Some researchers have studied mental toughness using quantitative methods. For example, Golby and colleagues (Golby, Sheard, & Lavallee, 2003; Golby & Sheard, 2004; Sheard & Golby, 2006) used the Psychological Performance Inventory (PPI: Loehr, 1986) as a measure of mental toughness. However, Middleton et al. (2004) found little support for the psychometric properties of the PPI, while the conceptual and theoretical basis of the inventory appears weak. Despite a recent revision (cf. Golby, Sheard & Van Wersch, 2007) which resulted

in improved psychometric properties, the revised inventory did not include a measure of control, one of the most recurrent themes of mental toughness literature.

A more rigorous approach to studying mental toughness is evident in the work of Clough et al. (2002). These researchers conceptualised mental toughness as a personality trait, and grounded their work in the foundations of existing psychological theory. Specifically, Clough et al. developed a conceptualisation of mental toughness that proceeded from the similar yet distinct construct of hardiness, which has been the focus of much research in health psychology. Existential psychologists (Kobasa, 1979; Kobasa, Maddi, & Khan, 1982) found that some individuals, who possessed hardy personalities, were more resilient and able to remain healthy when faced with high levels of stress, than were others who faced similar stressors but lacked hardiness. Kobasa (1979) proposed that hardiness was characterised by the three inter-related components of control, commitment and challenge. Initial qualitative work by Clough et al. involved athletes, coaches and sport psychologists, and resulted in confidence being added to the three original components of hardiness to more fully represent the sport specific construct of mental toughness. According to Clough et al. (2002):

> Mentally tough individuals tend to be sociable and outgoing; as they are able to remain calm and relaxed, they are competitive in many situations and have lower anxiety levels than others. With a high sense of self-belief and an unshakeable faith that they can control their own destiny, these individuals can remain relatively unaffected by competition or adversity (p. 38).

Clough and colleagues (Clough et al., 2002; Crust & Clough, 2005; Levy, Polman, Clough, Marchant & Earle, 2006) have used their own MTQ48 (Clough et al., 2002) as a measure of mental toughness. There appears to be good evidence to support the construct validity (with

significant relations reported with constructs such as self-efficacy), criterion-validity (relationships with performance variables) and a test-retest coefficient of 0.9. Horsburgh, Schermer, Veselka, and Vernon (2009) have recently conducted both exploratory and confirmatory factor analysis on the MTQ48. This work revealed adequate psychometric properties and supported a factor structure that includes challenge, commitment, emotional control, life control, confidence in abilities and interpersonal confidence. Horsburgh et al. (2009) evaluated mental toughness in 219 pairs of adult monozygotic and dizygotic twins and found evidence that individual differences in mental toughness were largely attributable to genetic and non-shared environmental factors. These researchers also found the MTQ48 to be significantly correlated with the big five factors of personality, and supported the view that mental toughness is a trait construct. High scores on the inventory have been found to be related to lower rating of exertion during a demanding cycle task and the ability to bounce back after negative feedback (Clough et al., 2002) as well as increased pain tolerance (Crust and Clough, 2005), rehabilitation from injury (Levy et al., 2006) greater use of problem or approach coping strategies, and less use of avoidance coping strategies (Nicholls, Polman, Levy, & Backhouse, 2008). The results from Nicholls et al. (2008) provide further support for a trait view of mental toughness given the small to moderate relations reported with coping strategies. Given that coping is usually conceptualised as a dynamic process (changes from situation to situation), personality traits are considered to have a relatively small effect on coping strategies used.

There is still much debate concerning whether mental toughness is more stable and trait-like, or a set of context specific cognitive skills that can be manipulated through training (cf. Crust, 2008). The suggestion that mental toughness may be ‘natural or developed’ (Jones et al., 2007, p. 247) appears to correspond with more recent understanding of the importance of both

nature and nurture (cf. Golby & Sheard, 2006). In this regard, researchers have recently turned their attention to how mental toughness might develop. This would appear to be a question of paramount importance to applied sport psychologists who are working with athletes to enhance performance.

Evidence from two qualitative studies using elite athletes (Bull et al., 2005; Connaughton et al., 2008) implicates the crucial role of environmental influences such as motivational climate, parental influence, upbringing, and exposure to tough environments (competitive) in the development of mental toughness. However, while Bull et al. reported little evidence to support the importance of psychological skills training in the development of mental toughness, results from the Connaughton et al. investigation did suggest that psychological skills training had a salient role. Specifically, retrospective interviews of elite (mentally tough) athletes revealed that goal-setting, self-talk, and imagery were important strategies that were employed to cope with competitive anxiety and in helping to prepare for competition.

The role of mental skills training in the development of mental toughness has received some support through the work of Sheard and Golby (2006). These researchers found that a 7-week mental skills training programme (inc. goal-setting, visualisation, relaxation, concentration and thought stopping skills) led to significant increases in both the performance and self-rated mental toughness of high performing adolescent swimmers. However, it is not possible to determine the importance of individual skills such as goal-setting, with the use of a generic mental skills training programme. Also, the use of the Psychological Performance Inventory (PPI; Loehr, 1986) as a measure of mental toughness is questionable given that previous researchers have shown this instrument to have inadequate psychometric properties (Middleton et al., 2004).

While investigating the relationship between mental toughness and coping, Nicholls et al. (2008) found significant correlations between self-reported mental toughness (using the MTQ48) and the use of strategies which included thought control, relaxation and mental imagery. However, the Coping Inventory for Competitive Sports (Gaudreau & Blondin, 2002) which was used by Nicholls et al. does not measure a number of other common psychological strategies used by athletes such as goal-setting and self-talk, and does not differentiate between use in practice and competition. This is important following the work of Jones et al. (2007) whose mental toughness framework clearly identifies characteristics that were specific to training, competition and post-competition. Information concerning the use of such strategies by mentally tough athletes may provide important clues to how mental toughness develops, and the potential role of mental skills training in facilitating mental toughness.

One particular psychological inventory has attracted significant support in relation to assessing athletes' use of psychological strategies in both practice and competition. A number of researchers have recommended the Test of Performance Strategies (TOPS; Thomas, Murphy & Hardy, 1999) as an appropriate instrument for assessing use of psychological skills (Jackson, Thomas, Marsh, & Smethurst, 2000; Fletcher & Hanton, 2001; Gould, Dieffenbach, & Moffatt, 2002; Williams, Hardy & Mutrie, 2008). This instrument measures some of the most commonly used psychological strategies such as goal-setting, self-talk, imagery and relaxation. While TOPS appears to receive good support from sports psychologists, there is some evidence that the inventory might not be appropriate for use with adolescents, and that the factorial validity requires further development (Lane, Harwood, Terry, & Karageorghis, 2004).

This study aimed to evaluate the relationship between mental toughness and the use of psychological strategies in both practice and competition environments. On the basis of existing

evidence of a relationship between mental toughness and performance (cf. Crust, 2008), mental skills and performance (Gould et al., 2002) and evidence to suggest psychological skills training can lead to increases in self-reported mental toughness (Sheard & Golby, 2006), a positive relationship between mental toughness and use of psychological strategies in both practice and competition was hypothesised. The strength of relations between mental toughness and psychological strategies within the present research will enable further understanding of whether mental toughness is primarily a trait-like construct, or more of a developed set of psychological skills. Small to moderate relationships were predicted between mental toughness and use of psychological skills in line with the view of mental toughness as a personality trait (Clough et al., 2002).

Method

Participants

Participants were 107 athletes who all regularly participated in a variety of team and individual sports (e.g., football, rugby, netball, tennis, athletics etc.) in the north of England. The sample consisted of 67 men (*M* age = 22.55 years, *SD* = 4.96) and 40 women (*M* age = 21.08 years, *SD* = 2.81). Of the participants, 36 were club / university athletes while the remaining 71 participants were competing at county standard or higher (5 participants were competing at national level). All participants completed an informed consent form prior to data collection. Ethical clearance for this research was achieved through the research ethics committee of _____ University.

Instruments

The Test of Performance Strategies (TOPS; Thomas et al., 1999) was used to assess the psychological skills and strategies used by athletes in competition and during practice. This 64-item measure was designed to assess the 'psychological processes thought to underlie successful athletic performance as delineated by contemporary theory' (Thomas et al., 1999, p. 699). Each item on the TOPS inventory describes a specific situation that athletes may encounter in training or competition such as, 'During practice I visualise successful past performances'. Respondents are required to assess the frequency of such events on a five-point scale ranging from (1) never, to (5) always. Exploratory factor analysis revealed eight dimensions of psychological skills and strategies (Thomas et al., 1999). Seven of the subscales are measured across both practice and competition contexts, and include activation, automaticity, emotional control, goal-setting, imagery, relaxation and self-talk. Thomas et al. (1999) found that attentional control, which is measured in practice contexts, was not an appropriate solution in competition and as such was replaced by the negative thinking subscale. The internal consistency of the TOPS subscales was reported to range between 0.66 and 0.81 (Thomas et al., 1999). With regard to discriminant validity, Thomas et al. (1999) reported significant differences in psychological skills and strategies when subgroups were defined by age, sex and current level of performance in sport. When examining the factorial validity of the TOPS with adolescent athletes using confirmatory factor analysis, Lane et al. (2004) found partial support for the overall measurement model for competition items, but minimal support for training items. As such, the use of the TOPS inventory with adolescent athletes remains questionable, although the inventory retains good support as the instrument of choice in assessing athlete's psychological skills (Jackson et al., 2000; Fletcher & Hanton, 2001; Gould et al., 2002; Williams, Hardy & Mutrie, 2008).

Mental Toughness

The MTQ48 (Clough et al., 2002), was used to measure mental toughness. Responses are made to the 48-items on a 5-point Likert scale ranging from (1) strongly disagree, to (5) strongly agree, with an average completion time between 10 and 15 minutes (Crust & Clough, 2005). The MTQ48 has an overall test-retest coefficient of 0.9, and previous studies have found high alpha coefficients for the MTQ48 (Nicholls et al., 2008). The psychometric development of the MTQ48 (cf. Earle, 2006) involved principal components analysis with varimax rotation. The most satisfactory solution was found to be a six-factor structure (challenge, commitment, emotional control, life control, confidence in abilities and interpersonal confidence). Clough et al. (2002) provided evidence for the construct validity of the MTQ48 with significant relationships reported with optimism ($r = 0.48$), self-image ($r = 0.42$), life satisfaction ($r = 0.56$), self-efficacy ($r = 0.68$), and trait anxiety ($r = 0.57$). In respect of criterion validity, Clough et al. found participants with self-reported high, as opposed to low mental toughness gave lower rating of exertion during a 30-minute physically demanding cycling task. The MTQ48 has been found to correlate with pain tolerance (Crust & Clough, 2005) and a short-form version of the questionnaire has been shown to relate to injury rehabilitation (Levy et al., 2006).

Procedures

Participants were solicited through advertisements at a number of local sports facilities where sports clubs and teams were known to regularly train. Brief information concerning the nature of the study was given in the advertisements along with requests for athletes who regularly competed in competitive sports and were over the age of 16 years, to complete two questionnaires. Respondents who expressed an interest in taking part in the study were provided

with further, more detailed information via an online web address, while the second named author answered any additional questions prospective participants had. All participants were assured of confidentiality and informed of their right to withdraw consent. Questionnaires were completed in isolation and were administered via the second named author. Completion of the questionnaires occurred in a variety of settings that were convenient, comfortable and non-threatening for respondents.

Data Analysis

Descriptive statistics (means, standard deviations) were calculated for all measures. Data screening was used to ensure all dependent variables met the assumptions necessary for the use of parametric statistics prior to data analysis. Pearson Product Moment Correlations were also computed between all of the TOPS subscales, total mental toughness and the subscales of the MTQ48. Linear regression analysis was used to determine the relationship between athletes' use of psychological skills and strategies, and mental toughness. Each subscale of the TOPS inventory acted as a dependent variable, with each of the six subscales of the MTQ48 acting as independent variables. In addition, two independent t-tests were used to test for differences in total mental toughness between club / university athletes and athletes currently competing at county standard or above, and between men and women.

Results

Descriptive data for responses to the MTQ48 and TOPS questionnaires can be viewed in table 1 and table 2. Measures of skewness and kurtosis found the data to be normally distributed and as such use of parametric statistics was deemed appropriate. Results of the correlation analyses are

presented in table 3, whereas table 4 provides information concerning the regression analyses. Three of the performance strategies from the TOPS questionnaire were found to significantly and positively correlate with mental toughness in both practice and competition settings (self-talk, emotional control and relaxation). Additionally, automaticity was found to significantly correlate with mental toughness in practice, while in competition, activation and goal-setting were found to positively correlate with mental toughness. The largest correlation found in the analyses was a significant negative correlation with negative thinking in competition (r = -0.47, $P < 0.01$). When relationships between the subscales of the MTQ48 and the TOPS subscales were analysed via linear regression and Pearson correlations, it became evident that commitment was most often associated with the use of performance strategies in practice and competition. Significant Pearson correlations were found between commitment and 13 of the 16 subscales of the TOPS inventory ranging from 0.19 (imagery and attentional control in practice) to 0.40 (imagery in competition).

Results of the linear regression analyses showed a number of the MTQ48 subscales were found to significantly predict use of psychological strategies in both practice and competition. The R^2 values reported, reflect that the independent variables (mental toughness subscales) accounted for between 4 and 20% of the variance in use of psychological strategies. Cohen and Cohen (1983) describe procedures for estimating effect size in regression analyses which involved the transformation of R^2 values into an f^2 equation. According to the estimates provided by Cohen and Cohen, the amount of variance accounted for with respect to emotional control, imagery, and negative thinking in competition, and self-talk in practice was moderate. All remaining R^2 values are considered small, and where less than 10% of the variance is accounted for, the meaningfulness of these relationships should be viewed with caution.

An independent *t*-test found significant differences in total mental toughness between club / university athletes and county standard athletes and above (t_{105} = -2.25, P = 0.03, d = 0.45). Athletes of county standard and above were found to report significantly higher levels of mental toughness (M = 178.75, SD = 15.08) than club / university athletes (M = 171.53, SD = 16.83). Further analysis using the mental toughness subscales revealed this difference to be primarily due to differences in commitment. Men and women were not found to report significant differences in mental toughness ($P > 0.05$).

Discussion

The aim of this research was to evaluate the relationship between mental toughness and the use of psychological strategies. Results suggest that mental toughness was significantly related to the use of a number of performance strategies in both practice and competition. Although previous studies have highlighted low to moderate relationships between mental toughness and coping (Nicholls et al., 2008) the present study considered the strategies used by athletes in planning and preparing for competition. This is important given that recent researchers have highlighted the restrictive nature of much mental toughness research that has primarily conceptualised the construct in terms of how individuals cope, or react in adversity (Gucciardi et al., 2008). A further strength of the present research is the use of an inventory (TOPS) that has been frequently employed in previous research (Gould et al., 2002) and as such allows comparisons to be made to existing findings.

With respect to the use of performance strategies in competition, low to moderate significant positive correlations were found between total mental toughness and five of the eight strategies measured by the TOPS inventory: namely; activation, relaxation, self-talk, emotional

control, and goal-setting. These strategies are broadly consistent with those that Williams and Krane (2001) reported more successful athletes used to achieve peak performances. Of the positive relationships found between mental toughness and use of performance strategies in competition, the strongest were self-talk ($r = 0.37$, $P < 0.01$), emotional control ($r = 0.36$, $P < 0.01$) and relaxation ($r = 0.29$, $P < 0.01$). Overall, the strongest correlation found was the negative relationship between mental toughness and negative thinking ($r = -0.47$, $P < 0.01$) which is consistent with theoretical and empirical research that emphasise mental toughness as a positive psychological construct associated with optimism and self-belief (Crust, 2008; Jones et al., 2007; Nicholls et al., 2008).

When the data was analysed with respect to practice contexts, significant positive correlations were found between mental toughness and automaticity, the use of relaxation strategies, self-talk and emotional control. Thus, the latter three performance strategies previously highlighted are the only ones that showed significant and positive correlations with mental toughness in both practice and competition settings. Importantly, both qualitative and quantitative studies have previously reported the importance of self-talk and relaxation strategies in regards to mental toughness. Elite athletes emphasised self-talk, as well as goal-setting and imagery as important strategies that were used to cope with competitive anxiety and in helping to prepare for competition (Connaughton et al., 2008). In research outside of sports contexts, psychologists have found the use of relaxation strategies associated with psychological resilience (Wolin & Wolin, 1993). Furthermore, Nicholls et al. (2008) previously reported significant correlations between mental toughness and the use of relaxation, thought control and mental imagery.

When the data was considered with respect to the subscales of the MTQ48, it became apparent that the component of mental toughness most consistently correlated with the use of

psychological performance strategies was commitment. It is possible that being committed, and thus deeply involved in ones chosen sport, would lead mentally tough performers to seek out alternative ways of enhancing their performances. Of the sixteen subscales of the TOPS inventory, commitment was found to correlate with thirteen of these, and most significantly with the use of imagery in both practice and competition. Confidence in ones abilities was found to correlate with seven performance strategies, most notably with self-talk in practice ($r = 0.42$, $P < 0.01$), while consistent with theoretical predictions, emotional control on the MTQ48 was significantly related to the use of emotional control strategies in competition ($r = 0.42$, $P < 0.01$) and practice ($r = 0.30$, $P < 0.01$) . In recent research concerning mental toughness in Australian Football, elite coaches with significant playing experience highlighted the importance of managing emotions to enhance performance (Gucciardi et al., 2008). Interestingly, research concerning the related construct of psychological resilience has shown that resilient individuals tend to use positive emotions to bounce back from negative emotional experiences (Tugade & Fredrickson, 2004). These researchers showed that resilient individuals found positive meaning in stressful encounters and that efficient emotional regulation was achieved, in part, by experiencing positive emotions.

One of the major limitations of the present research is that the TOPS inventory only assesses the frequency with which participants use psychological performance strategies. Although the current findings highlight relationships between mental toughness and use of such strategies, how effectively such athletes employ these strategies remains unclear. Similarly, although the TOPS inventory allows the general strategies used by performers to be evaluated, more specific details of the types of strategies used would help to provide further clarity. For example, do mentally tough performers tend to employ certain types of self-talk? And in what

ways do such athletes achieve emotional control? It is possible that qualitative research employing in-depth interviews with mentally tough performers would help to produce a more 'fine grained' understanding.

While the present study has used a relatively small sample of athletes, and caution must be urged in interpreting research that employs multiple correlations, the small to moderate relationships found between use of performance strategies and mental toughness appears to be consistent with previous related work that also employed the MTQ48 (Nicholls et al., 2008). Furthermore, the magnitude of these relationships suggests that mental toughness does not simply represent psychological skills usage as measured by TOPS. While this finding alone does not warrant the conclusion that mental toughness is a trait-like construct, it appears reasonable to conclude that mental toughness is more than just a set of context specific psychological strategies. Other recent research suggests mental toughness has a strong genetic component (Horsburgh et al., 2009) and there is evidence that mental toughness does not vary from situation to situation (individual vs team sports; contact vs non-contact sports), and thus is acting like a personality trait (Nicholls, Polman, Levy, & Backhouse, 2009).

Further experimental research that builds upon the work of Sheard and Golby (2006) is necessary to evaluate if mental skills training can lead to increases in mental toughness. Some of the relationships that were found in the present study appear to warrant further investigation, and it remains possible that mental skills training has a role to play in the development of mental toughness although inherited qualities, or as Bull et al. (2005) suggest the role of environmental factors might be more significant. Given that the strategies of self-talk, emotional control and relaxation were found to be positively related to mental toughness in both practice and competition, it would seem necessary for future researchers to explore the independent impact of

these strategies on mental toughness through the use of intervention studies. With the noted relationships between use of performance strategies and commitment, it remains plausible that the results of this study reflect highly committed, mentally tough athletes being attracted to using psychological strategies that are likely to aid their performances.

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Table 1 - Means and standard deviations of MTQ48 data

Dependent Variables	(N = 107)
MT Total	176.32 ± 15.98
Challenge	31.82 ± 4.13
Commitment	40.97 ± 4.76
Emotional Control	22.82 ± 3.44
Life Control	25.64 ± 3.60
Confidence Ability	31.85 ± 4.77
Confidence Interpersonal	23.22 ± 2.46

Table 2 – Means and standard deviations of TOPS data

	Club / University (n = 36)		County Standard + (n = 71)		Total Sample (N = 107)	
	Competition	Practice	Competition	Practice	Competition	Practice
Activation	3.67 ± 0.59	3.02 ± 0.62	3.87 ± 0.57	3.28 ± 0.63	3.80 ± 0.56	3.19 ± 0.64
Automaticity	3.13 ± 0.77	3.31 ± 0.65	3.34 ± 0.85	3.51 ± 0.60	3.27 ± 0.83	3.44 ± 0.62
Emotional Cont.	3.40 ± 0.79	3.04 ± 0.71	3.52 ± 0.83	3.19 ± 0.74	3.48 ± 0.82	3.14 ± 0.73
Goal-setting	3.20 ± 0.74	3.22 ± 0.71	3.73 ± 0.76	3.34 ± 0.74	3.55 ± 0.79	3.30 ± 0.73
Imagery	3.06 ± 0.74	3.09 ± 0.59	3.37 ± 0.86	3.38 ± 0.81	3.27 ± 0.83	3.28 ± 0.75
Relaxation	3.31 ± 0.54	2.56 ± 0.82	3.33 ± 0.70	2.61 ± 0.72	3.32 ± 0.66	2.59 ± 0.75
Self-talk	3.15 ± 0.73	3.36 ± 0.74	3.29 ± 0.66	3.41 ± 0.93	3.24 ± 0.86	3.39 ± 0.74
Attentional Cont.	_	3.06 ± 0.38	_	3.08 ± 0.53	_	3.08 ± 0.28
Negative Thinking	2.62 ± 0.65	_	2.29 ± 0.74	_	2.41 ± 0.72	_

1 Table 3 – Results of Pearson Product Moment Correlation Analysis between use of Performance Strategies and Mental Toughness

	MT Total		Challenge		Commitment		Emotional Cont.		Life Control		Ability Conf.		Inter. Conf.	
	Pract.	Comp.	Pract.	Comp.	Pract.	Comp.	Pract.	Comp.	Pract.	Comp.	Pract.	Comp.	Pract.	Comp.
Activation	0.07	0.24*	-0.08	0.12	0.19*	0.22*	0.05	0.08	-0.05	0.16	0.11	0.21	-0.02	0.16
Automaticity	0.24*	0.17	0.10	0.11	0.07	0.18	0.15	0.21*	0.17	0.10	0.20*	0.09	0.12	-0.06
Emotional Cont.	0.30**	0.36**	0.19*	0.24*	0.20*	0.25**	0.31**	0.42**	0.29**	0.34**	0.22*	0.15	-0.05	0.02
Goal-setting	0.18	0.28**	0.18	0.15	0.27**	0.26**	0.10	0.10	0.15	0.24*	0.06	0.25*	0.06	0.12
Imagery	0.17	0.14	0.17	0.02	0.31**	0.40**	-0.04	-0.07	0.21*	0.02	0.14	0.09	0.05	0.02
Relaxation	0.26**	0.28**	0.22*	0.12	0.27**	0.17	0.15	0.30**	0.13	0.20*	0.19*	0.18	0.01	0.19*
Self-talk	0.35**	0.37**	0.20*	0.30**	0.29**	0.29**	0.17	0.29**	0.14	0.09	0.42**	0.29**	0.15	0.26**
Attentional Cont.	0.12	-	0.10	-	0.19*	-	0.15	-	0.15	-	-0.15	-	0.09	-
Neg. Thinking	-	-0.47**	-	-0.37**	-	-0.32**	-	-0.34**	-	-0.24*	-	-0.37**	-	-0.25*

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

Table 4 – Results of the linear regression analysis

Dependent Variable	R^2	ANOVA	Variables Loading Significantly and Beta Value
Activation (p)	0.04	3.99*	Commitment (ß = 0.19*)
Activation (c)	0.05	5.27*	Commitment (ß = 0.22*)
Automaticity (p)	0.04	4.55*	Confidence Ability (ß = 0.20*)
Automaticity (c)	0.04	4.87*	Emotional Control (ß = 0.21*)
Emotional Control (p)	0.10	11.07**	Emotional Control (ß = 0.31**)
Emotional Control (c)	0.18	22.57**	Emotional Control (ß = 0.42**)
Goal-setting (p)	0.07	7.99**	Commitment (ß = 0.27**)
Goal-setting (c)	0.06	7.38**	Commitment (ß = 0.26**)
Imagery (p)	0.10	11.11**	Commitment (ß = 0.31**)
Imagery (c)	0.20	12.75**	Commitment (ß = 0.46**); Emotional Control (ß = -0.21*)
Relaxation (p)	0.07	8.32**	Commitment (ß = 0.27**)
Relaxation (c)	0.09	10.58**	Emotional Control (ß = 0.30**)
Self-talk (p)	0.17	21.92**	Confidence Ability (ß = 0.42**)
Self-talk (c)	0.13	7.53**	Challenge (ß = 0.22*); Commitment (ß = 0.21*)
Attentional Control (p)	0.13	4.90**	Commitment (ß = 0.24**); Confidence Ability (ß = 0.32**); Emotional Control (ß = 0.21*)
Negative Thinking (c)	0.19	11.84**	Challenge (ß = -0.26**); Confidence Ability (ß = -0.24**)

(p) = practice; (c) = competition; * = P <.05, ** = P <.01