Mental toughness and hardiness at different levels of rugby league

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Abstract

The increasingly business-like environment of professional sport has resulted in greater scrutiny and analysis of players’ performance. The roles of physiological parameters in predicting success in the world of professional and amateur sport are well established. However, to date, evidence is sparse concerning the role of personality traits in predicting such success. The present study examined the potency of measures of personality style and mental skills in predicting success in the criterion sport of professional rugby league. Mental toughness was assessed by questionnaire using the Psychological Performance Inventory. Hardiness was assessed by questionnaire using the Personal Views Survey III-R. Subjects in this study were 115 professional rugby league footballers representing the top three playing levels in the game in Great Britain (International, Super League, and Division One). Findings demonstrated that performers playing at the highest standard (International players) scored significantly higher in all three hardiness subscales (commitment, control and challenge) and in two of the seven mental toughness subscales (negative energy control and attention control). Results are discussed relative to previous findings, in particular, of the efficacy of high levels of hardiness. Practical implications focus on the advocacy of mental toughness and hardiness training to improve sports performance.

Keywords: Mental toughness; Hardiness; Psychological performance inventory; Personal views survey III-R; Rugby league; Playing standard

1. Introduction

Sport is no longer a pastime, run and organised by amateurs. It is a multi-billion pound business that competes for scarce resources and uses, amongst other things, professional
management techniques (Robinson, 2003). In this push toward efficiency, effectiveness and value for money, it has become of even greater interest to players, coaches, administrators, spectators and owners to identify psychological attributes and mental skills associated with superior sport performance as a first stage in facilitating their development. A growing body of research has identified mental skills that distinguish between more and less successful performers across a number of sports, for example, golf (Thomas & Over, 1994), rodeo (Meyers, LeUnes, & Bourgeois, 1996) and equestrianism (Meyers, Bourgeois, LeUnes, & Murray, 1998). It is reasonable to expect that psychological attributes will distinguish between players operating at different levels of performance. However, to date, there is scant evidence of the effects of such features on high-impact collision sports, exemplified by rugby league.

The game of professional rugby league represents an interesting challenge from which to examine some of the psychological traits felt to underpin and/or predict sporting success. Rugby league is an international collision sport with over 1500 registered professional players in Great Britain alone, with many more in Australia, New Zealand and France, as well as many thousands of amateur players (Lavallee, Golby, & Lavallee, 2002). While studies have examined the heavy physiological requirements of the game (e.g. Baker & Nance, 1999; Coutts, Reaburn, & Abt, 2003; Meir, 1994) and the frequent incidence of injury in it (e.g. Gissane, Jennings, Cumine, Stephenson, & White, 1997; Gissane, Jennings, White, & Cumine, 1998), little scientific information exists on the psychological demands on its participants. This is somewhat surprising given that a performer’s psychological response to competition is thought to depend largely on the characteristics and requirements of the sport (Krane & Williams, 1987).

Often associated with peak sports performance is the psychological construct of mental toughness. Indeed, in a study of the psychological characteristics of Olympic champions, Gould, Dieffenbach, and Moffett (2002) identified mental toughness as the mental skill factor most frequently cited as a significant contributor to sports performance enhancement. The term mental toughness is intuitively appealing and used equally generously by players, coaches and the sports media, yet usually without adequate definition (Cashmore, 2002; Clough, Earle, & Sewell, 2002). Several proposed definitions have been proffered to address this lack of conceptual clarity, including an ability to cope with pressure (e.g. Goldberg, 1998), to rebound from failures (e.g. Woods, Hocton, & Desmond, 1995) and the possession of superior mental skills (e.g. Bull, Albinston, & Shambrook, 1996).

According to Loehr (1986), mentally tough performers are disciplined thinkers who respond to pressure in ways which enable them to remain feeling relaxed, calm and energised because they have the ability to increase their flow of positive energy in crisis and adversity. They also have the right attitudes regarding problems, pressure, mistakes and competition. For the purpose of the present research, mental toughness has been defined by Loehr (1986). Specifically, the attributes of mental toughness include: (a) self-confidence (i.e. knowing that one can perform well and be successful), (b) negative energy control (i.e. handling emotions such as fear, anger, and frustration and coping with externally-determined events), (c) attention control (i.e. focused), (d) visualisation and imagery control (i.e. thinking positively in pictures), (e) motivation (i.e. willing to persevere), (f) positive energy (i.e. having fun and enjoyment) and (g) attitude control (i.e. unyielding).

Whilst recent research supports Loehr’s (1986) propositions on mental toughness, these have not substantially added to the debate. Specifically, Jones, Hanton, and Connaughton (2002, p. 209) have suggested that mental toughness is “having the natural or developed psychological edge
that enables you to, generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer and, specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.” While Clough et al. (2002, p. 38), writing of mentally tough performers, stated that “with a high sense of self-belief and an unshakeable faith that they control their own destiny, these individuals can remain relatively unaffected by competition or adversity.” Consequently, his remains a useful blueprint for examining this important construct.

With its stress-buffering (Kobasa, 1979; Maddi, Kahn, & Maddi, 1998; Wiebe, 1991) and performance-enhancing (Atella, 1999; Khoshaba & Maddi, 1999; Westman, 1990) functions, the moderating effects of hardiness have become associated with those purported of mental toughness (Clough et al., 2002). This stable personality disposition is formed from three interrelated beliefs: (a) commitment (i.e. a tendency to involve oneself in whatever one is doing), (b) control (i.e. a tendency to feel and act as if one is influential), and (c) challenge (i.e. a belief that life is changeable and to view this as an opportunity rather than a threat) (Kobasa, 1979). Hardiness is assumed to decrease the likelihood of stress-related physical illnesses, mental illnesses, and decrements in performance, conduct, and morale. These improvements are achieved by motivating transformational coping (active, decisive) rather than regressive coping (denial, avoidance) with stressful circumstances (Maddi, 1999). Hardy individuals tend to interpret demanding situations, such as highly competitive sporting contests, in less stressful ways because they view them as desirable, controllable, and challenging (Maddi & Hess, 1992).

The benefits of high levels of hardiness have been demonstrated in a variety of contexts, including the business world (Maddi et al., 1998), the public sector (Rush, Schoel, & Barnard, 1995) and the military (Bartone, 1999). However, in spite of the availability of an acceptable measure of hardiness, as with the related concept of mental toughness, there remains a dearth of evidence demonstrating links between their characteristics and sporting achievement, with one notable exception (Golby, Sheard, & Lavallee, 2003).

By investigating the relationship between playing standard in rugby league, mental toughness and hardiness, this research intended to give empirical support to those studies whose efforts have been directed toward identifying psychological characteristics of elite-level performers (cf. Gould et al., 2002) and defining and conceptualising mental toughness (cf. Clough et al., 2002; Jones et al., 2002). Therefore, the present study aimed to examine whether mental toughness, hardiness and their respective subscales distinguish between professional rugby league players operating at different levels of performance.

2. Method

2.1. Subjects

The subjects in this study were 115 professional rugby league players (mean age = 25.5 years; range 18–35 years; SD = 3.3), from the three playing standards in the professional game: International (standard rank number 1) (n = 70), Super League (standard rank number 2) (n = 22), and Division One (standard rank number 3) (n = 23).
2.2. Measures

2.2.1. Mental toughness

The Psychological Performance Inventory (PPI; Loehr, 1986) was used to measure mental toughness. This 42-item scale yields an overall mental toughness score, as well as seven 6-item subscale scores: (a) self-confidence; (b) negative energy control; (c) attention control; (d) visualisation and imagery control; (e) motivation; (f) positive energy; and (g) attitude control. Subscale scores range from a low of 6 to a desirable high of 30 and total scores from 42 to 210. Scores were recorded on a five-point Likert scale anchored by ‘almost always’ and ‘almost never’. The PPI was found to be internally consistent, with Cronbach alphas for the seven subscales indicating high reliability (self-confidence—0.69; negative energy control—0.42; attention control—0.75; visualisation and imagery control—0.82; motivation—0.70; positive energy—0.71; attitude control—0.71).

2.2.2. Hardiness

This study employed the most recent measurement of hardiness developed by Maddi and Khoshaba (2001). The 18-item Personal Views Survey III-R (PVSIII-R) yields an overall hardiness score, as well as three 6-item subscale scores: (a) commitment, (b) control, and (c) challenge. Scores were recorded on a four-point Likert scale anchored by ‘not at all true’ and ‘very true’. Overall hardiness norms range from 19 to 49, with an average of 38–41, while studies have shown the PVS III-R to have acceptable validity and internal consistency (total hardiness—0.88; commitment—0.75; control—0.84; challenge—0.71) (Maddi & Khoshaba, 2001).

2.3. Procedure

Permission from the organising committee of the 2000 Rugby League World Cup, Super League, and Division One clubs, cooperation of coaches and consent of players were obtained prior to the administration of the inventories. International players were sampled from the eight quarter-finalists in the World Cup competition. Four teams responded, thus representing a convenient sample. To ensure that the three representative standards remained mutually exclusive, one Super League club and one Division One club were targeted whose squads were comprised wholly of players who had not previously played for their country. All players agreed to participate, and were currently operating at the highest standard they had achieved to date. The PPI and PVS III-R were completed in respective training camps having been administered in counterbalanced order.

2.4. Data analyses

Data were analysed using multivariate analysis of variance (MANOVA), with follow-up univariate analyses (ANOVA) to clarify the source of significant differences. To establish more specifically where differences existed, post hoc comparisons were made using Tukey’s HSD procedure, which already has built-in protection to type I error (Toothaker, 1991). For the MANOVA, playing standard (i.e. International, Super League or Division One) served as the independent variable, while all 10 categories of mental toughness and hardiness subscales served
as the multivariate dependent variables. Stepwise discriminant analysis was used to establish which variables best predicted membership of the three groups. Alpha was set at 0.05.

3. Results

Means and standard deviations of all variables are presented in Table 1. There was a significant multivariate effect for playing standard, Wilks’ $\lambda = 0.40, F(20,206) = 5.98, P < 0.001$, partial $\eta^2 = 0.37$, with significant differences observed in five of the dependent variables. Specifically, there were significant group differences in commitment, $F(2,112) = 46.91, P < 0.001$, partial $\eta^2 = 0.46$, where International players surpassed Super League and Division One players. A significant difference was also found in control, $F(2,112) = 13.36, P < 0.001$, partial $\eta^2 = 0.19$, where International players scored higher than Division One players. Significant group differences were also found in challenge, $F(2,112) = 29.82, P < 0.001$, partial $\eta^2 = 0.35$, where International players scored higher than either the Super League or Division One players. International players also scored significantly higher in negative energy control, $F(2,112) = 5.64, P < 0.01$, partial $\eta^2 = 0.09$, and attention control, $F(2,112) = 3.65, P < 0.05$, partial $\eta^2 = 0.06$, than their Division One counterparts. No significant differences were observed between Super League and Division One players.

Pearson product–moment correlations revealed weak to moderate correlations among the mental toughness and hardiness subscales (Table 2). Of particular note, commitment and control were most strongly correlated with challenge, while self-confidence was moderately, but significantly, associated with attention control, positive energy and attitude control. Overall, total scores on the PPI and total scores on the PVS III-R were significantly correlated ($r = 0.384; P < 0.001$).

Table 1
Means and standard deviations of PPI and PVS III-R subscales

<table>
<thead>
<tr>
<th></th>
<th>Standard Subscale</th>
<th>International</th>
<th>Super League</th>
<th>Division One</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPI</td>
<td>Self-confidence</td>
<td>26.26</td>
<td>25.82</td>
<td>25.35</td>
</tr>
<tr>
<td></td>
<td>Negative energy control</td>
<td>21.60</td>
<td>20.36</td>
<td>19.48</td>
</tr>
<tr>
<td></td>
<td>Attention control</td>
<td>23.81</td>
<td>22.86</td>
<td>21.39</td>
</tr>
<tr>
<td></td>
<td>Visualisation/imagery control</td>
<td>22.97</td>
<td>22.73</td>
<td>22.26</td>
</tr>
<tr>
<td></td>
<td>Motivation</td>
<td>25.73</td>
<td>24.73</td>
<td>24.48</td>
</tr>
<tr>
<td></td>
<td>Positive energy</td>
<td>25.44</td>
<td>24.91</td>
<td>24.26</td>
</tr>
<tr>
<td></td>
<td>Attitude control</td>
<td>25.36</td>
<td>25.27</td>
<td>23.87</td>
</tr>
<tr>
<td></td>
<td>Total mental toughness</td>
<td>171.17</td>
<td>166.68</td>
<td>161.09</td>
</tr>
<tr>
<td>PVS III-R</td>
<td>Commitment</td>
<td>13.56</td>
<td>9.59</td>
<td>9.61</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>13.87</td>
<td>12.64</td>
<td>11.35</td>
</tr>
<tr>
<td></td>
<td>Challenge</td>
<td>11.93</td>
<td>8.91</td>
<td>8.43</td>
</tr>
<tr>
<td></td>
<td>Total hardiness</td>
<td>39.50</td>
<td>31.14</td>
<td>29.39</td>
</tr>
</tbody>
</table>
The results of the stepwise discriminant function analysis are presented in Tables 3 and 4. The model predicted that a combination of two hardiness variables successfully discriminated 81% of subjects according to playing standard: International (89%), Super League (73%) and Division One (65%). These measures were selected in the following order of importance: commitment and challenge.

Table 2
Intercorrelations of PPI and PVS III-R subscales

<table>
<thead>
<tr>
<th></th>
<th>SC</th>
<th>NE</th>
<th>AT</th>
<th>VI</th>
<th>MO</th>
<th>PO</th>
<th>AD</th>
<th>CM</th>
<th>CT</th>
<th>CH</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>0.50***</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT</td>
<td>0.64***</td>
<td>0.57***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>0.35***</td>
<td>0.13</td>
<td>0.29*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>0.55***</td>
<td>0.28**</td>
<td>0.51***</td>
<td>0.50***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PO</td>
<td>0.66***</td>
<td>0.48***</td>
<td>0.55*</td>
<td>0.53*</td>
<td>0.62***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td>0.67***</td>
<td>0.43***</td>
<td>0.60*</td>
<td>0.54***</td>
<td>0.62***</td>
<td>0.71***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CM</td>
<td>0.30**</td>
<td>0.35***</td>
<td>0.38***</td>
<td>0.16</td>
<td>0.32*</td>
<td>0.39***</td>
<td>0.27**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT</td>
<td>0.24**</td>
<td>0.31**</td>
<td>0.23</td>
<td>0.09</td>
<td>0.17</td>
<td>0.22*</td>
<td>0.25*</td>
<td>0.50***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CH</td>
<td>0.16</td>
<td>0.15</td>
<td>0.29*</td>
<td>0.04</td>
<td>0.26**</td>
<td>0.21</td>
<td>0.12</td>
<td>0.55***</td>
<td>0.50***</td>
<td></td>
</tr>
</tbody>
</table>

SC = self-confidence; NE = negative energy control; AT = attention control; VI = visualisation and imagery control; MO = motivation; PO = positive energy; AD = attitude control; CM = commitment; CT = control; CH = challenge.

*P < 0.05.

**P < 0.01.

***P < 0.001.

Table 3
Summary of stepwise discriminant analysis: variables entered/removed

<table>
<thead>
<tr>
<th>Step</th>
<th>Entered</th>
<th>Wilks’ lambda</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Exact F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Statistic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>df1</td>
</tr>
<tr>
<td>1</td>
<td>Commitment</td>
<td>0.544</td>
</tr>
<tr>
<td>2</td>
<td>Challenge</td>
<td>0.476</td>
</tr>
</tbody>
</table>

At each step, the variable that minimises the overall Wilks’ lambda is entered.

*Maximum number of steps is 20; minimum partial F to enter is 3.84; maximum partial F to remove is 2.71; F level, tolerance or VIN is insufficient for further computation.

The results of the stepwise discriminant function analysis are presented in Tables 3 and 4. The model predicted that a combination of two hardiness variables successfully discriminated 81% of subjects according to playing standard: International (89%), Super League (73%) and Division One (65%). These measures were selected in the following order of importance: commitment and challenge.

Table 4
Summary of stepwise discriminant analysis: variables in the analysis

<table>
<thead>
<tr>
<th>Step</th>
<th>Tolerance</th>
<th>F to remove</th>
<th>Wilks’ lambda</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Commitment</td>
<td>1.00</td>
<td>46.91</td>
<td></td>
</tr>
<tr>
<td>2 Commitment</td>
<td>0.93</td>
<td>20.63</td>
<td>0.65</td>
</tr>
<tr>
<td>Challenge</td>
<td>0.93</td>
<td>7.99</td>
<td>0.54</td>
</tr>
</tbody>
</table>
4. Discussion

The aims of this study were to investigate whether mental toughness, hardiness and their respective subscales would distinguish between professional rugby league players operating at different standards. Results suggested a significantly positive relation between total scores on the PPI and PVS III-R. It seems that both inventories are measuring related but distinct attributes of mental skills, indicating both concurrent and convergent validity. The findings also suggested differences relative to the degree to which the mental attributes of commitment, control, challenge, negative energy control and attention control were present.

International players were characterised by the highest level of hardiness, as measured by commitment, control, and challenge. This group of players scored significantly higher than Division One players relative to control and significantly higher than both sub-elite groups relative to commitment and challenge. That International players scored significantly higher in control than Division One players may indicate that they felt more able to influence positively the outcome of matches. A further explanation may be that this feeling allowed them to view highly competitive contests in a less stressful manner (Maddi, 1999).

Relative to commitment, International players demonstrated higher levels of organisation and involvement in the sport. Their significantly higher challenge scores suggests that they were more able to view potentially difficult situations as opportunities for personal and professional growth, and not as a threat (Maddi & Khoshaba, 2001).

These present data support previous findings in non-sporting contexts regarding the functions of hardiness as a buffer to stress (Kobasa, 1979; Maddi et al., 1998; Wiebe, 1991) and as a performance enhancer (Atella, 1999; Khoshaba & Maddi, 1999; Westman, 1990). The results confirm the fact that International players are more able to cope with highly stressful sporting contests and maintain high levels of competitive performance.

The mental toughness subscales made a smaller contribution than hardiness to the variance in the players’ competitive standard. International players displayed significantly higher levels of negative energy control than their Division One counterparts. Two interpretations of the findings on negative energy control present themselves. First, players at the highest level of the game were more able to keep their emotions in control and remain calm and relaxed under pressure situations (cf. Côté, 2001). Second, if having momentarily lost composure, International players were better equipped to regain psychological control following unexpected, externally-determined events (cf. Jones et al., 2002).

International players also reported significantly higher levels of attention control than performers from Division One. A probable explanation is that players performing at the highest competitive level possess a greater capacity for long and intensive periods of total concentration. This interpretation is corroborated by Jones et al.’s (2002) identification that remaining fully-focused on the task at hand in the face of competition-specific distractions is a key mental toughness attribute for sports performers. Moreover, Gould et al. (2002) reported the ability to focus and block out distraction as an essential psychological characteristic in Olympic champions.

However, the relatively small contribution of both negative energy control and attention control in their ability to distinguish between the three levels of players is of interest. Previous research in the sports domain has more strongly identified negative thoughts (Van Raalte, Brewer,
Rivera, & Petitpas, 1994), concentration (Nideffer & Sagal, 2001) and a narrow focus of attention (Ravizza, 2001) as deciding factors in competition. Two possible explanations present themselves. First, the hardiness construct (46%, 35% and 19% of the variance in playing standard was explained by commitment, control and challenge, respectively), as opposed to mental toughness (9% and 6% of the variance in playing standard was explained by negative energy control and attention control, respectively), has greater explanatory prowess and, second, the mental toughness measure used possesses insufficient discriminative power (only two of the five mental toughness subscales revealed significant differences compared to all three hardiness subscales).

Of additional interest was the finding that all groups consistently had relatively lower mean scores on negative energy control and visualisation and imagery control than on the other mental toughness subscales. This was surprising given the importance placed on the ability to remain in psychological control following unexpected, uncontrollable events (cf. Côté, 2001; Jones et al., 2002), and the reported efficacy of imagery use in basketball (Kendall, Hrycaiko, Martin, & Kendall, 1990), tennis (Efran, Lesser, & Spiller, 1994), figure skating (Ming & Martin, 1996), golf putting (Beauchamp, Halliwell, Fournier, & Koestner, 1996) and track and field athletics (Abma, Fry, Li, & Relyea, 2002).

The current evidence in the elite-level performers of high levels of beneficial psychological attributes is consistent with previous research (e.g. Gould et al., 2002; Williams & Krane, 2001). In addition to the many physiological attributes requisite to outstanding sport performance, a psychological profile that includes high levels of mental toughness and, in particular, hardiness appeared to distinguish elite-level players.

That no significant differences were observed between Super League and Division One players was also of interest. This indicated that while the difference in levels of mental toughness and hardiness between these two sub-elite groups was minimal, there was an apparent gulf between them and the International players.

Of particular note was the identification of the hardiness subscales commitment and challenge that most successfully discriminated between the three playing standards. These measures were more strongly associated with playing status than those relating to mental toughness and, as such, may offer stronger discriminatory powers. Previous research not related to sport has demonstrated the efficacy of high levels of hardiness for many different categories of people, such as health care professionals (Rich & Rich, 1987; Topf, 1989), business managers (Kobasa, Maddi, & Kahn, 1982; Maddi et al., 1998), student teachers (Thomson & Wendt, 1995), public sector employees (Rush et al., 1995) and military personnel (Bartone, 1999; Westman, 1990). However, the literature on the relationship between hardiness and sport success is extremely limited (Maddi & Hess, 1992). Intervention work to increase hardiness levels should be considered to provide sub-elite players, in particular, with the skills to progress to a higher performance level.

While the present study moves the debate from the previously identified state of conceptual clarification to show links between hypothesised components of mental toughness, hardiness and performance, future research might concentrate on how psychological skills training, mental toughness and hardiness ameliorate sport performance. Consideration should be given to randomised-control studies with thought also given to the possibility of the confounding effects of a club’s culture and environment. Further, from an application viewpoint, such research would be useful in establishing baseline reference data for players being selected onto specialised development programmes.
References


