A CROSS-NATIONAL ANALYSIS OF MENTAL TOUGHNESS AND HARDINESS IN ELITE UNIVERSITY RUGBY LEAGUE TEAMS

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Summary.—The relation between nationality and selected indicators of psychological performance in rugby league football was examined. Mental toughness was assessed using the alternative Psychological Performance Inventory (PPI–A) and hardiness using the Personal Views Survey III–R (PVS III–R). Participants (N=49, M age = 21.7 yr., SD = 2.3) were male elite-level university rugby league footballers representing Australia and Great Britain. Participants completed the questionnaires in training camp in Sydney, Australia, one week prior to the commencement of an international tournament there in 2006. Multivariate analyses revealed that the Australian Universities players had significantly higher mean scores on Positive Cognition, Visualization, Total Mental Toughness, and Challenge than their opponents from Great Britain. The Australian Universities players were also the tournament winners. The findings concur with previous research indicating superior mental toughness and hardiness are related to successful sport performance. Practical implications focus on the potentiality of ameliorative cultural environments.

Since the First World Congress of Science and Football in 1987, there has emerged a growth in psychological research directly related to the various football codes. Researchers and practitioners have an increasingly eclectic body of knowledge from which to draw (Reilly & Gilbourne, 2003). Considerable research attention has been devoted to the psychological components of Australian Rules football (e.g., Berry, Abernethy, & Côté, 2004), rugby union (e.g., Sheard & Golby, 2009), and, in particular, soccer (e.g., Thelwell, Weston, & Greenlees, 2005). In comparison, little scientific information exists on the psychological demands made on players of rugby league football.

Rugby league has grown from its early beginnings in the north of England in the 1890s to being played in many countries worldwide (Coutts, Reaburn, & Abt, 2003). It is a well-established international high-impact collision sport played by many thousands of professional, semiprofessional, amateur, and student competitors (Gabbett, 2005). Particularly popular in Australia, the sport receives more media coverage than any other football code in New South Wales and Queensland (Fagan, 2007). Moreover, Australia dominates rugby league at all levels of competition. The professional national team won six consecutive World Cup tourna-

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ments between 1975 and 2000, with a similar dominance enjoyed by the Australian Universities team.

Previous research has not identified significant differences in physical and tactical preparation between teams from the northern hemisphere and their more successful Australian counterparts (Brewer & Davis, 1995). Thus, it would seem that, regardless of physical attributes, the tougher athlete often prevails, and the difference between success and failure is often more easily, and perhaps more appropriately, attributable to psychological factors. At the elite professional level, players competing at the 2000 Rugby League World Cup who had learnt to play the game and were playing club rugby league in Australia at the time of the study had the highest scores on mental toughness and hardness (Golby, Sheard, & Lalvallee, 2003). However, despite this cross-national comparison of specific psychological attributes at the elite professional level, to date, no study has investigated whether similar psychological differences exist among players presently competing in elite university student rugby league, but who may in the future progress to the professional level.

Mental toughness has been historically one of the most used but least understood terms in sport psychology (Moran, 2004). However, despite the apparent breadth of opinion, a general definitional consensus is emerging from the literature reflecting the cognitive-behavioural multivariate nature of the construct (cf. Fourie & Potgieter, 2001; Jones, Hanton, & Connaughton, 2002, 2007; Dorfman, 2003; Bull, Shambrook, James, & Brooks, 2005; Connaughton, Wadey, Hanton, & Jones, 2008). Moreover, this research has confirmed much of the mental toughness concept put forward originally by Loehr (1986).

According to Loehr (1986), individuals high in mental toughness are disciplined thinkers who respond to pressure in ways which enable them to remain relaxed, calm, and energised because they have the ability to increase their flow of positive energy in crisis and adversity. Recently, Golby, Sheard, and van Wersch (2007) captured the nature of the concept as described by Loehr: (a) determination (i.e., athletes’ resolve and sense of commitment and dedication to playing and practicing their sport), (b) self-belief (i.e., athletes’ confidence and the use of positive affirmations), (c) positive cognition (i.e., athletes’ self-regulatory feelings such as thought control, energy, and enjoyment), and (d) visualization (i.e., athletes’ ability to use positive visualisation skills in training and competition). Given that

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sport can be as stressful as it is rewarding, and stress among high-level sport performers can be a serious problem, Golby, et al. (2007) suggested operationalizing mental toughness in terms of psychological resilience—in effect, athletes’ positive responses to situations of stress and adversity (Tugade & Fredrickson, 2004).

This constellation of stress-buffering and performance-enhancing characteristics has become associated with the “hardy” personality style (Maddi & Khoshaba, 2001). Hardiness, with its roots in existential theory (e.g., Kierkegaard, 1843/1959; Frankl, 1959; Gendlin, 1966), emerged from individual differences research on stress reactions, and has been conceptualised as a combination of the three attitudes (3Cs) of commitment, control, and challenge (Kobasa, 1979). Athletes with a strong sense of commitment (vs alienation) believe in staying involved with events and people around them, even when stress mounts. Performers strong in control (vs passivity) want to keep trying to have an effect on outcomes, even if it is difficult. Those strong in the face of challenge (vs security) consider change to be normal and an opportunity in which to grow and develop (Maddi, 2005).

The three hardiness characteristics amount to the existential courage that motivates athletes to work hard at transforming potentially stressful situations into opportunities (Maddi, 2004). As such, hardiness is a pathway to resilience under stress, where performance is enhanced by active or decisive coping efforts in stressful situations (Maddi, 2006). In addition to evidence from rugby league (Golby, et al., 2003; Golby & Sheard, 2004), and sport in general (Sheard & Golby, 2006a, in press), the positive influence of hardiness on performance has been reported in such diverse samples as human resource consultants (Maddi, Harvey, Khoshaba, Lu, Persico, & Brow, 2006), military personnel (Bartone, 1999), and university undergraduate students (Sheard & Golby, 2007; Sheard, 2009).

The decision to consider both mental toughness and hardiness psychological constructs was based on past research (e.g., Hollander & Acevedo, 2000; Smith, 2006). Indeed, for some researchers (cf. Clough, Earle, & Sewell, 2002), the relationship between mental toughness and Kobasa’s model (1979) of hardiness has served as a theoretical frame of reference for the conceptualization of mental toughness. However, more recent studies have revealed only weak to moderate relationships between mental toughness and hardiness (e.g., Sheard & Golby, 2006a, 2006b), and that there are in fact conceptual distinctions between the two constructs (cf. Sheard, Golby, & van Wersch, 2009).

Previous studies have shown the discriminative power of mental toughness and hardiness in their ability to distinguish professional rugby league footballers relative to competitive performance standards (Gol-
by & Sheard, 2004) and nationality (Golby, et al., 2003). Given these findings, and the aforementioned historical dominance of Australian teams, it was hypothesized that the Australian Universities Rugby League football team would show the highest mental toughness and hardiness in comparison to their peers from Great Britain. A subsidiary aim of the study was to explore further the relationship between mental toughness and another similarly resilience-oriented personality attribute (viz., hardiness) to examine the divergent validity of a previously demonstrated psychometrically robust measure of mental toughness (cf. Golby, et al., 2007).

Method

Participants

With institutional ethics approval, 49 male elite university student rugby league footballers representing Australia (n = 25) or Great Britain (n = 24), ranging in age from 18 to 26 years (M = 21.7, SD = 2.3), took part.

Materials

Mental toughness.—The alternative Psychological Performance Inventory (PPI–A; Golby, et al., 2007) was used to measure mental toughness. This 14-item scale yields an overall mental toughness score, as well as scores for the four subscales: Determination, Self-belief, Positive Cognition, and Visualization. Item examples include: for Determination, “The goals I’ve set for myself as a player keep me working hard,” “I’m willing to give whatever it takes to reach my full potential as a player”; for Self-belief, “I lose my confidence very quickly,” “I can keep strong positive emotion flowing during competition”; for Positive Cognition, “I can change negative moods into positive ones by controlling my thinking,” “I can turn crisis into opportunity”; and for Visualization, “I mentally practice my physical skills,” “I visualise working through tough situations prior to competition.” Participants rated the items on a 5-point Likert scale anchored by 1: Almost always and 5: Almost never. Subscale scores range from a low of 3 (Determination, Visualization, each with 3 items) or 4 (Self-belief, Positive Cognition, each with 4 items) to a high of 15 or 20, respectively, and total scores from 14 to 70. Cronbach coefficients alpha for each of the factors were either “adequate” (α ≥ .70; Kline, 2005, p. 59), or “very good” (α ≥ .80; Kline, p. 59): Determination = .80; Self-belief = .75; Positive Cognition = .80; Visualization = .83. The PPI–A has shown encouraging psychometric integrity (cf. Golby, et al., 2007). Previous research has also shown the PPI–A to have acceptable internal consistency (.72 for Determination; .84 for Self-belief; .75 for Positive Cognition; and .78 for Visualization; Golby, et al., 2007).

Hardiness.—Hardiness was assessed using the Personal Views Survey III–R (PVS III–R; Maddi & Khoshaba, 2001). The PVS III–R is an 18-item
scale that yields a total Hardiness score (a composite of the scores of the three subscales), as well as scores for the three 6-item subscales: Commitment, Control, and Challenge. Item examples include: for Commitment, “I often wake up eager to take up life wherever it left off,” “It’s hard to imagine anyone getting excited about working”; for Control, “Trying your best at what you do usually pays off in the end,” “When I make plans, I’m certain I can make them work”; and for Challenge, “Changes in routine provoke me to learn,” “I am not equipped to handle the unexpected problems of life.” Scores were recorded on a 4-point Likert-type scale anchored by Not at all true and Very true. Higher scores indicate more hardiness. Total hardiness norms range from 19 to 49, with an average of 38 to 41 (Maddi & Khoshaba, 2001). Cronbach alphas showed for each of the 3Cs “adequate” internal consistency ($\alpha \geq .70$; Kline, 2005, p. 59): Commitment = .71; Control = .74; Challenge = .72. Previous research has also shown the PVS III–R to have acceptable internal consistency (.70 to .75 for Commitment; .61 to .84 for Control; .60 to .71 for Challenge; and .80 to .88 for Total Hardiness; Maddi & Khoshaba, 2001; Maddi, Khoshaba, Persico, Lu, Harvey, & Bleecker, 2002).

To date, little research has been published using the PPI–A; however, as part of the ongoing process of construct validation (Marsh, 2002), more studies of validation are required. Since the PPI–A has not been used extensively, and it has not been validated against any other personality measures, it would be important at this time to compare it to another, frequently used inventory. The hardiness PVS III–R was chosen as the divergent validity criterion on the basis of its conceptual relatedness to—and also its hypothesized distinction from—mental toughness, as mentioned previously.

Procedure

Permission from the competition organizing committee, cooperation of coaches, and consent of players were obtained prior to the administration of the inventories. Players were assured that participation was voluntary and were naïve to the research hypotheses. The questionnaires were completed during training camps in Sydney, Australia, 1 wk. prior to the commencement of the series there in 2006, having been administered in counterbalanced order. Adhering to British Psychological Society guidelines (2006), confidentiality regarding individual information was assured. All participants who completed the inventories participated in the actual tournament.

Statistical Analysis

Data were analysed using multivariate analysis of variance (MANOVA) tests, with follow-up analysis of variance (ANOVA) tests, using a
General Linear Model (Warner, 2008), to clarify the source and nature of significant differences. When necessary, post hoc comparisons were made using the Dunn-Sidak method, which controls for the probability of making a Type I error (Tabachnick & Fidell, 2007). For the MANOVA tests, the team represented in the competition (Team) served as the independent variable. The seven scores on Mental Toughness and Hardiness subscales served as the multivariate dependent variables. A separate MANOVA was conducted for Total Mental Toughness and Total Hardiness, because they are composites of the scores of the four PPI–A and three PVS III–R subscales, respectively. The partial eta-squared ($\eta^2_p$) statistic was used to estimate the effect size associated with each statistical difference (Tabachnick & Fidell, 2007). Alpha was set at .05. All statistical analyses were conducted using SPSS for Windows, Version 14.0 (SPSS Inc., Chicago, Illinois).

**Results**

Means and standard deviations of all variables are presented in Table 1. Relative to the PPI-A and PVS III-R subscales, there was a significant multivariate effect for Team (Wilks’ $\lambda = 0.23$; $F_{7,41} = 19.36, p < .001; \eta^2_p = .77$). ANOVA revealed significant effects on Self-belief, $F_{1,47} = 4.69, p = .04, \eta^2_p = .09$; Positive Cognition, $F_{1,47} = 49.43, p < .001, \eta^2_p = .51$; Visualization, $F_{1,47} = 23.99, p < .001, \eta^2_p = .34$; Control, $F_{1,47} = 55.92, p < .001, \eta^2_p = .54$; and Challenge, $F_{1,47} = 27.79, p < .001, \eta^2_p = .37$. Post hoc comparisons showed that British players scored significantly higher on Self-belief and Control than their Australian counterparts. However, Australian players scored significantly higher on Positive Cognition, Visualization, and Challenge than British players.

Relative to Total Mental Toughness and Total Hardiness, there was a

<table>
<thead>
<tr>
<th>Scale</th>
<th>Teams</th>
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<tbody>
<tr>
<td></td>
<td>Australia ($n = 25$)</td>
<td>Great Britain ($n = 24$)</td>
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<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
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<tr>
<td>PPI–A</td>
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<td></td>
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</tr>
<tr>
<td>Determination</td>
<td>13.56</td>
<td>0.96</td>
<td>13.08</td>
</tr>
<tr>
<td>Self-belief</td>
<td>16.32</td>
<td>2.66</td>
<td>17.67</td>
</tr>
<tr>
<td>Positive Cognition</td>
<td>17.48</td>
<td>0.59</td>
<td>15.83</td>
</tr>
<tr>
<td>Visualization</td>
<td>12.60</td>
<td>1.68</td>
<td>10.25</td>
</tr>
<tr>
<td>Total Mental Toughness</td>
<td>59.96</td>
<td>3.92</td>
<td>56.83</td>
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<tr>
<td>PVS III–R</td>
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<tr>
<td>Commitment</td>
<td>16.20</td>
<td>2.36</td>
<td>16.33</td>
</tr>
<tr>
<td>Control</td>
<td>8.56</td>
<td>1.53</td>
<td>11.42</td>
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<tr>
<td>Challenge</td>
<td>13.56</td>
<td>1.96</td>
<td>11.13</td>
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<tr>
<td>Total Hardiness</td>
<td>38.32</td>
<td>3.89</td>
<td>38.88</td>
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significant multivariate effect for team, Wilks’ $\lambda = 0.77$, $F_{4,140} = 6.73$, $p = .003$, $\eta^2_p = .23$. ANOVA revealed significant effects on Total Mental Toughness, $F_{1,47} = 9.44$, $p = .004$, $\eta^2_p = .17$. Australian players scored significantly higher. There was a nonsignificant effect on Total Hardiness, $F_{1,47} = 0.37$, $p = .55$, $\eta^2_p = .01$.

Pearson product-moment correlations revealed weak to moderate relations among the mental toughness and hardiness subscales (Table 2), thus demonstrating the divergent validity of the PPI–A.

**Table 2**

<table>
<thead>
<tr>
<th>Subscale</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determination</td>
<td>.03</td>
<td>.10</td>
<td>.02</td>
<td>.30*</td>
<td>.06</td>
<td>.06</td>
<td>.17</td>
<td>.10</td>
</tr>
<tr>
<td>2. Self-belief</td>
<td>.17</td>
<td>.12</td>
<td>.59†</td>
<td>.50†</td>
<td>.19</td>
<td>.07</td>
<td>.47†</td>
<td></td>
</tr>
<tr>
<td>3. Positive Cognition</td>
<td>.58†</td>
<td>.54†</td>
<td>.04</td>
<td>.57</td>
<td>.44†</td>
<td>.05</td>
<td></td>
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<tr>
<td>4. Visualization</td>
<td>.78†</td>
<td>.24</td>
<td>.55</td>
<td>.46†</td>
<td>.10</td>
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<td></td>
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<tr>
<td>5. Total Mental Toughness</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>.44†</td>
<td>.37†</td>
</tr>
<tr>
<td>6. Commitment</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>.46†</td>
<td>.34*</td>
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<tr>
<td>7. Control</td>
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<td></td>
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<td>.58†</td>
<td>.25</td>
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<td>8. Challenge</td>
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</table>

*Note.* — 9 represents Total Hardiness. *$p < .05$. †$p < .01$.

**Discussion**

The main aim of this study was to examine the potential national differences in mental toughness and hardiness between elite university international rugby league football teams. Analysis yielding significant differences emerged for both measures. Australian players reported significantly higher Positive Cognition, Visualization, Total Mental Toughness, and Challenge scores than their Great Britain opponents. Given the attributes of the mentally tough and hardy performer, these findings suggest that Australian international university players demonstrated a propensity to manage better the demands of international competition. It is noteworthy that, as well as displaying the most desirable mental toughness and hardiness profiles, the Australian Universities team was victorious overall in the competition. Thus, the present study provides some support for the suggestion that mental toughness and hardiness are positively related to individuals’ adaptive responses to stressors, and that these responses in turn positively affect performance (Sheard & Golby, 2006a).

The Great Britain team reported a significantly higher Control score than their Australian counterparts. A psychological profile high in this hardiness subscale indicates a predisposition to keep trying to influence the outcomes in which one is involved, rather than to give up (Maddi, 2006). In the context of the present study, the Great Britain team (ranked 2
before the competition) was not expected to win the tournament. It would appear, therefore, that their high mean Control score reflected their belief that, despite this, they could influence positively the outcome of the difficult, and potentially stressful, encounters with their supposedly better Australian opponents (ranked 1 before the competition).

It should be noted that the volunteer athletes in this study, though competing at international level, learnt and played rugby league in their respective countries. That the Australian Universities team was again victorious should not be overlooked. As mentioned earlier, Australia dominates international rugby league. With this in mind, consideration should be given to the possibility of the confounding effects of a country’s culture and environment. It is acknowledged that the Australian Universities team had home advantage. However, they have demonstrated their superiority repeatedly in overseas competition, particularly in Great Britain, with the same potential concomitant hurdles faced in the present study by the British team of jet lag, unfamiliar food, and weather.

Australia enjoys success, and even dominance, in a variety of international sports (Bierley, 2004; Anthony, 2007), a fact that has not gone unnoticed in the media: “They [the Australians] have overachieved for generations. If you look at cricket, rugby union, swimming, tennis or rugby league, they have been outstanding” (Lewsey, 2007, p. 18). Determining that performers’ cultural or national backgrounds may influence their perceptions and emotional responses to competitive sporting situations should result in greater sensitivity to group and cultural characteristics in coaching and in developing psychological interventions.

A subsidiary aim of the present study was to explore the relation of a little-used mental toughness inventory to another contemporary measure of resilient personality. Correlational findings from this research indicate that although mental toughness and hardiness may share the same conceptual space, they also show sufficient distinctiveness. Each of the scales has demonstrated its robust psychometric properties. As construct validation is an ongoing process (Marsh, 2002), meaningful comparisons should now be made on PPI–A and PVS III–R data collected over time. Such longitudinal data, collated with detailed records of training activities, would afford the opportunity to expand from correlative to causal results. It is recommended that practitioners use changes in PPI–A and PVS III–R scores as indices for evaluating the impact of psychological skills training. This would fulfill the ultimate construct validation criterion of application in research and practice (Marsh, 2002).

In conclusion, since previous research has not identified significant differences in physical and tactical preparation between successful and less successful teams (Brewer & Davis, 1995), the findings of this study
provide further empirical support to previous research (cf. Golby, et al., 2003; Golby & Sheard, 2004; Sheard & Golby, in press) that the mentally tougher and hardier athlete often prevails, and the difference between success and failure is often attributable to psychological factors.

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