Beyond Optimal Performance: Mental Toughness Profiles and Developmental Success in Adolescent Cricketers

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The purposes of the current study were to identify mental toughness profiles in adolescent cricketers and examine differences between these profiles on developmental assets and negative emotional states. A sample of 226 community cricketers (125 New Zealanders and 101 Australians; male $n = 210$) aged between 10 and 18 years ($M_{\text{age}} = 14.41$ years; $SD = 2.11$) completed a multisection, online survey containing measures of mental toughness, developmental assets, and negative emotional states. The results of hierarchical (Ward’s method) and nonhierarchical ($k$ means) cluster analyses revealed three mental toughness profiles characterized by low, moderate, and high levels of all five mental toughness assets (i.e., affective intelligence, desire to achieve, self-belief, attentional control, resilience). Those cricketers with high levels of mental toughness reported possession of more developmental assets and lower levels of negative emotional states when compared with cricketers with the moderate levels of mental toughness. No statistically significant differences existed between the moderate and low levels of mental toughness profiles. These findings provided preliminary evidence to suggest that mental toughness might be viewed not only from the traditional view of optimal performance but also from a stance that may represent a contextually salient representation of thriving in youth sport settings.

Keywords: DASS-21, person centered, positive youth development, young people, youth sport, thriving

Mental toughness is considered a multidimensional construct comprising a variety of values, attitudes, cognitions, and emotions that enable an individual to negotiate both positively and negatively construed challenges and adversities (e.g., Gucciardi, Gordon, & Dimmock, 2009a; Jones, Hanton, & Connaughton, 2007). While the key components will vary slightly according to the literature you read, there do appear to be several primary facets that do not vary by sport and therefore underpin mental toughness (e.g., self-belief, attentional control, resilience, success mindset, optimistic thinking, emotional awareness and regulation/affective intel-
Mental Toughness and Developmental Success

Mental Toughness Profiles

Qualitative investigations dominated much of the pioneering work on mental toughness, with researchers seeking the retrospective views of athletes, coaches, and sport psychologists (e.g., Bull, Shambrook, James, & Brooks, 2005; Jones, Hanton, & Connaughton, 2002; Jones et al., 2007). However, with the development of mental toughness inventories—both sport specific (e.g., Gucciardi & Gordon, 2009; Gucciardi, Gordon, & Dimmock, 2009b) and sport general (e.g., Clough, Earle, & Sewell, 2002)—quantitative investigations have recently taken precedence over qualitative methods. Although numerous studies have been conducted to explore the relationship between mental toughness and hypothesized key correlates such as optimism, coping (Nicholls, Polman, Levy, & Backhouse, 2008), psychological strategies (Crust & Azadi, 2010), burnout, flow, and hardiness (Gucciardi & Gordon, 2009) at the group level, little work has been done to understand individual profiles of mental toughness. An important area for future research, therefore, is to identify combinations of mental toughness that exist in various achievement contexts (e.g., sport, education, business), as well as understand how these profiles differ on external variables that are of substantive interest. For example, is it optimal for athletes to have high levels of all mental toughness facets, or patterns involving a combination of high, moderate, and/or low levels of key components? Understanding how different profiles of mental toughness may operate is a fundamental issue not only for theorists (e.g., number and types of clusters that differ qualitatively in their characteristics, clusters that differ in their degree of mental toughness) but also for practitioners who work with the complexities associated with individual athletes (e.g., tailoring intervention efforts to the needs of unique groups of athletes).

An alternative but complementary approach in this case might be to take a person-centered approach to understanding the adaptive aspects of mental toughness. Unlike variable-centered approaches, which focus on relations among variables within an assumed homogenous population, person-centered analyses address the relationships among constructs at the level of the individual by identifying subgroups of people based on their similarities on a set of variables (Bergman & Trost, 2006). Rather than imposing an a priori structure, person-centered analyses, such as cluster analysis, also allow for the comparison of multiple solutions according to statistical (e.g., variance explained, cluster distinctiveness) and theoretical relevance (e.g., cluster distinctiveness; Aldenderfer & Blashfield, 1984; Hair, Black, Babin, & Anderson, 2010). Recently, cluster analysis has gained increasing popularity among the sport psychology community with researchers employing this technique to examine participant profiles on important constructs such as motivation (e.g., Ullrich-French & Cox, 2009), relationship quality (e.g., Cox & Ullrich-French, 2010), perfectionism (e.g., Sapieja, Dunn, & Holt, 2011), and mindfulness (e.g., Kee & Wang, 2008).

Within the context of Australian football (i.e., “Aussie rules”), Gucciardi (2010) identified two clusters among a sample of 214 male nonelite footballers aged 16–18 years. Specifically, his analyses revealed a high mental toughness cluster,
represented by high scores (i.e., > 5.83 on a 7-point Likert scale) on all four key facets, and a moderate cluster, in which athletes reported scores ranging from 4.46 to 5.89. Additional analyses revealed that the high mental toughness cluster typically reported more adaptive forms of motivation (i.e., higher mastery approach goals, performance approach goals, intrinsic motivation, identified regulation) than the moderate cluster. Despite these encouraging findings regarding the validity of the mental toughness profiles, Gucciardi did not report any evidence to support the stability of the final cluster solution with his sample of Australian footballers. As profiles will be generated by cluster analyses regardless of whether genuine group structures exist (Aldenderfer & Blashfield, 1984), it is important that researchers perform additional analyses to alleviate concerns associated with the data-driven nature of this analytical technique. Replicating the methodological procedures and extending this line of investigation to other sport contexts and athletes from other nations may help ascertain the robustness of such mental toughness profiles. It is also important that additional concurrent validity criteria be considered to shed light on the adaptive value of the various mental toughness profiles evident among adolescent athletes. We explored the relationship between mental toughness and factors associated with developmental success, as many of the key mental toughness assets (e.g., self-belief, optimistic thinking, emotional regulation, handle challenge, resilience) appear analogous to accepted indicators of positive youth development (e.g., Larson, Hansen & Moneta, 2006, Lerner et al., 2006). In addition, unlike previous research that has focused solely on intrapersonal factors (Gucciardi, 2010), we considered both internal (e.g., positive identity, negative emotional states) and external assets (e.g., support, boundaries and expectations) in assessing the concurrent validity of the mental toughness profiles.

**Beyond Optimal Performance**

Researchers and practitioners have stated that mental toughness is an important component in determining athletic performance (e.g., Connaughton & Hanton, 2009; Gucciardi et al., 2009a) and have recently suggested that mental toughness may also be a life skill (Gould, Griffes & Carson, 2011). Gould and Carson (2008, p. 60) defined life skills as “those internal personal assets, characteristics, and skills, such as goal setting, emotional control, self-esteem, and hard work ethic, that can be facilitated or developed in sport and are transferred for use in non-sport settings.” In their review of both the mental toughness and life skills literature, Gould et al. (2011) concluded that considerable overlap exists between the two constructs. For example, both mental toughness and life skills researchers have identified the importance of learning emotional control, developing a belief in oneself and one’s capabilities, giving maximum effort, and effectively dealing with failure and adversity. Danish, Petitpas, and Hale (1993) also revealed a series of life skills that that might help individuals cope with the many demands that sport places on a performer (a key component of mental toughness). Specifically, they revealed that sport can help develop life skills for performance under pressure, handling success and failure, risk taking, commitment, confidence, and control (for reviews, see Connaughton & Hanton, 2009; Gucciardi & Gordon, 2011).

Although a body of literature exists that describes the development and evaluation of developing life skills through sport (e.g., Gould & Carson, 2008), a limitation that Gould and Carson identified was that existing studies lacked a
theoretical explanation for why sport developed life skills. A prominent theoretical framework developed outside of sport, but recently applied in sporting contexts (e.g., Strachan, Côté, & Deakin, 2009a), that provides an explanation for the development of positive outcomes in sport (e.g., life skills) is the 40 developmental assets (Benson, 1997). The 40 developmental assets provide a language for core elements of human development, and is intended to create a unified picture of positive youth development so that there can be a common consensus on what young people need to succeed (Benson, 2002). The 40 developmental assets promote thriving, foster resilience, and diminish high-risk negative behaviors by providing young people with exposure to relationships with caring and principled adults and community institutions, where young people are allowed to develop skills, competencies, and self-perceptions over time (Benson, 2002).

The 40 developmental assets represents a theoretical framework identifying 20 self-processes, labeled internal assets, and 20 ecological supports, labeled external assets, that researchers have used to understand and predict thriving in youth. Four subcategories are included as external assets: support, empowerment, boundaries and expectations, and constructive use of time. Four subcategories are included as internal assets: commitment to learning, positive values, social competencies, and positive identity. Benson (2002) indicated a cumulative or additive nature of the developmental assets. Namely, as assets rise there is an associated reduction in high-risk negative behaviors and an increase in thriving behaviors. Researchers (e.g., Scales, Benson, Leffert, & Blyth, 2000; Scales, Benson, Roehlkepartain, Sesma, & van Dulmen, 2006) have consistently revealed a positive relationship between the number of assets a youth possesses and indicators of thriving (e.g., leadership, school success, helping others, valuing diversity, overcoming obstacles, delay of gratification). In contrast, youth with a greater number of developmental assets report fewer risk behaviors (e.g., alcohol abuse, tobacco use, illicit drug use, depression and suicide, antisocial behavior, school problems).

Developmental scientists have recently suggested further discussion of the concept of thriving because positive youth development might touch on a great variety of social norms or personal and cultural values (Scales et al., 2000). Existing indicators of thriving (e.g., leadership, school success, helping others, valuing diversity, overcoming obstacles, delay of gratification) have captured some ways of conceptualizing a positive youth; however, specific organized activities may be better suited to particular outcomes (Larson et al., 2006) and therefore additional indicators of thriving need identifying (e.g., mental toughness). As a popular and accepted term in sport contexts, we argue that mental toughness can be considered a contextually salient indicator of thriving. Consistent with positive youth development research and theory (e.g., Lerner et al., 2005, 2006), mental toughness is comprised of the reduction of negative behaviors, cognitions, and emotions (if present) and the promotion of strengths, engagement, competencies, and thriving (i.e., exemplary positive development) (Gucciardi et al., 2009a; Jones et al., 2007). Similarly, researchers (e.g., Connaughton, Wadey, Hanton, & Jones, 2008) have suggested that mental toughness is developed when young people are aligned with particular external assets (e.g., coaches, peers, parents, grandparents, siblings, senior athletes, sport psychologists, teammates) and mental toughness is maintained when athletes use specific internal assets (e.g., setting process goals, internalizing motives to succeed, insatiable desire). It is possible that components of mental toughness are analogous to indicators of positive youth development
and could be associated with thriving (i.e., relatively stable, optimal development across life domains: see Bundick, Yeager, King, & Damon, 2010). However, to date, scholars and practitioners have not explored mental toughness and positive developmental success together.

In proposing mental toughness as a potential contextually salient indicator of thriving in sport contexts, it was considered important to examine the concurrent validity of the emergent mental toughness profiles in terms of differences in both protective and risk factors. Aligned with the developmental assets framework (Benson, 1997, 2002) and positive youth development theory (e.g., Lerner et al., 2005, 2006), we examined both internal (i.e., commitment to learning, positive values, social competencies, positive identity) and external protective factors (i.e., support, empowerment, boundaries and expectations, constructive use of time). In terms of risk factors, we elected to focus on negative emotional states in the current study for both conceptual and practical reasons. Conceptually, negative emotional states such as depression, anxiety, and stress are associated with impaired biological and psychosocial functioning across multiple contexts and domains including interpersonal relationships, work productivity, educational outcomes, romantic involvement, life satisfaction, and self-esteem (for reviews, see Contrada & Baum, 2011; Kasper, den Boer, & Ad Sitsen, 2003). In addition, emotional problems are prevalent in children and adolescents with estimates ranging from 5 to 10% (e.g., Costello, Erkanli, & Angold, 2006; Costello, Mustillo, Erkanli, Keller, & Angold, 2003; Ford, Goodman, & Meltzer, 2003; Sawyer et al., 2001). Thus, reducing and/or preventing such emotional states have important consequences for the positive development of young people. With emotional regulation consistently reported as a key facet of mental toughness (e.g., Gucciardi et al., 2009a), it is conceivable that higher levels of mental toughness should be associated lower levels of negative emotional states.

**Purposes of the Current Study**

The majority of research in the area has focused exclusively on the importance of mental toughness for achieving optimal competitive performance in sport thereby emphasizing retrospective studies involving elite athletes and coaches. Although exceptions with adolescents do exist (e.g., Gucciardi, 2009, 2010), mental toughness research has not yet been taken beyond an optimal performance perspective to explore associations between mental toughness and positive youth development. Yet, it is possible that mental toughness represents a construct that is potentially related to indicators of thriving and developmental success. Accordingly, the purposes of the current study were to identify mental toughness profiles in adolescent cricketers and examine differences between these clusters on variables associated with thriving, namely developmental asset possession and frequency of negative emotional states. Regarding the first aim of the study, we hypothesized that two heterogeneous mental toughness clusters in which cricketers report either high or moderate levels of all key facets would emerge (cf. Gucciardi, 2010). In terms of the concurrent validity of the mental toughness clusters with regard to indicators of developmental success, we hypothesized that high levels of mental toughness would be associated with a greater number of developmental assets and lower frequency of occurrence of negative emotional states when compared with cricketers who reported moderate levels of mental toughness. Specifically, we hypothesized that
a higher mental toughness group will report more internal and external assets, and fewer negative emotional states than a moderate (or lower) mental toughness group. Given the cross-sectional nature of the methodological design, no hypotheses were made regarding a causal or directional relationship.

**Method**

**Participants**

The sample consisted of 226 cricketers (125 New Zealanders and 101 Australians; male \( n = 210 \)) aged between 10 and 18 years (\( M_{\text{age}} = 14.41 \) years; \( SD = 2.11 \)). Participants were primarily (94%) involved in district or “grass roots” competitions (i.e., not selected based on their abilities), although some (6%) had played representative cricket (i.e., selected based on their skill level). At the time of completing the survey, participants had been playing competitive cricket for between 1 and 14 years (\( M = 7.14; SD = 3.09 \)) and dedicated between 3 and 25 hr per week to cricket participation (\( M = 12.88; SD = 4.91 \)).

**Instrumentation**

**Cricket Mental Toughness Inventory.** The Cricket Mental Toughness Inventory (CMTI; Gucciardi et al., 2009a) consists of five 3-item subscales designed to assess the key mental toughness assets within the cricket context: affective intelligence (e.g., “have high emotional stress tolerance”), self-belief (e.g., “have an unshakeable self-belief in my cricket ability”), desire to achieve (e.g., “am willing to go the extra mile to succeed”), resilience (e.g., “have the ability to bounce back from setbacks”), and attentional control (e.g., “remain focused despite cricket-related distractions”). Respondents evaluate the extent to which each item is a true reflection of their current self as a cricketer on a Likert scale (1 = false, 100% of the time and 7 = true, 100% of the time). There is preliminary evidence to support the factorial and construct validity of the CMTI both with adult (Gucciardi & Gordon, 2009) and adolescent cricketers aged 13–18 years of age (Gucciardi, 2011).

**Developmental Assets Profile.** The Developmental Assets Profile (DAP; Search Institute, 2005) is grounded in the developmental assets framework (Benson, 1997), which includes 40 “building blocks” for human development. The DAP contains 58 items designed to measure four internal (commitment to learning, positive values, social competencies, and positive identity) and four external assets (support, empowerment, boundaries and expectations, and constructive use of time). Example items include “I have support from adults other than my parents,” “I am given useful roles and responsibilities,” “I take responsibility for what I do,” and “I am actively engaged in learning new things.” Respondents evaluate the extent to which each item is a true indication of their experiences in the previous three months on a Likert scale (1 = not at all or rarely to 4 = extremely or almost always). These eight developmental assets encompass the relationships, opportunities, and personal qualities that young people need to avoid risks (e.g., alcohol or drug use) and thrive (e.g., achieve school success). An emerging body of research supports the reliability and validity of the DAP, as a measure of developmental assets in young people, aged 11–18 years (Strachan et al., 2009a, 2009b). Alpha coefficients range from
.69 to .81, although the constructive use of time subscale has evidenced inadequate estimates of .34 and .42. Research with youth sport participants has revealed positive relations between the DAP and enjoyment \((r = .09 \text{ to } .37)\), and negative relations between the DAP and burnout \((r = -.22 \text{ to } -.63; \text{Strachan et al., 2009a})\).

**Depression, Anxiety, and Stress Scales-21.** The DASS-21 (Lovibond & Lovibond, 1995) consists of three 7-item scales designed to measure the negative emotional states of depression (e.g., “I felt that I had nothing to look forward to”), anxiety (e.g., “I was worried about situations in which I might panic and make a fool of myself”), and general stress (e.g., “I felt that I was using a lot of nervous energy”). Respondents evaluate the severity/frequency with which they have experienced each symptom during the previous week on a 4-point Likert scale \((0 = \text{did not apply to me at all} \text{ to } 3 = \text{applied to me very much of the time})\). In addition to its brevity and coverage of a broad range of depressive and anxiogenic content, previous research supports the within-network properties use of the DASS-21 with adolescent populations. For example, confirmatory factor analyses and internal reliability analyses with younger (aged 12–14 years; alpha coefficients .79–.87) and older adolescents (aged 15–18; alpha coefficients .80–.89) support the within-network properties of the DASS-21 (Tully, Zajac, & Venning, 2009). Preliminary evidence also supports the utility of this measure with adolescents as young as 10 years of age (Szabó, 2010).

**Procedure**

Following institutional ethics approval, we recruited participants via state, territory, and district development managers. We provided development managers with information regarding the nature of the study, which included a copy of the research proposal and a participant information sheet. Managers then distributed an e-mail containing the information sheet describing the aims and procedures of the research as well as a Web link containing the online, multisection survey containing questionnaires detailed in the methods section to coaches and cricketers within their district. The psychometric integrity of questionnaires are stable across online and paper-and-pencil formats for both adults (e.g., Lonsdale, Hodge, & Rose, 2006; Meade, Michels, & Lautenschlager, 2007) adolescents as young as 10 years of age (e.g., Park & Peterson, 2006). We assured all participants of confidentiality and informed them of their right to withdraw consent at anytime. We provided participants with instructions for completing each section of the questionnaire package.

**Data Analysis**

We conducted all analyses using SPSS 18.0. Before conducting the main analyses, we screened the data (i.e., univariate and multivariate normality and outliers) and assessed internal reliability estimates (i.e., Cronbach’s alpha). We next calculated descriptive statistics (i.e., means, standard deviations, bivariate correlations) to provide a description of the sample. After performing these preliminary screening analyses, we conducted a one-way MANOVA for each study variable to ascertain whether mental toughness, developmental assets, and negative emotional states varied as a function of nationality.
In terms of the main analyses, we first performed cluster analyses to classify cricketers into groups with similar patterns across the five mental toughness assets. We adopted two clustering approaches to increase our confidence in the stability of the emergent profiles (Hair et al., 2010). The first stage involved a hierarchical cluster analysis using Ward’s linkage method with the squared Euclidian distance measure to provide guidance as to the number of clusters represented in the data. We used standardized $z$ scores of the mental toughness assets in the clustering analyses. In the second stage, we conducted a $k$ means (nonhierarchical) cluster analysis using simple Euclidean distance as the similarity measure, specifying the solution identified using the Ward’s method. Euclidean distance is probably the most commonly applied measure (Hair et al., 2010). Finally, we assessed the stability of the final cluster solution with a discriminant function analysis (Hair et al., 2010) and a comparison of the solution across Australian and New Zealand cricketers. After identifying mental toughness profiles, we performed a series of MANOVAs using cluster group as the independent variable and demographic variables (i.e., age, years playing experience, hours per week playing cricket), developmental assets and negative emotional states as the dependant variables. We employed an alpha level of 0.05 with partial eta squared ($\eta^2_p$) providing an index of effect size. Post hoc ANOVA was employed to examine a significant multivariate effect between the clusters. Significant follow-up ANOVAs were examined with post hoc tests involving a Bonferroni adjustment on the $p$ value (i.e., $p < .017$) to guard against inflation of Type I error rates because of multiple comparisons.

**Results**

**Preliminary Analyses**

Both the skewness ($< \pm 1$) and kurtosis ($< \pm 1$) values of all five CMTI subscales indicated the data were approximately normally distributed (Hair et al., 2010). However, we identified three univariate ($z > \pm 3.0$) and four multivariate outliers (i.e., using a $p < .001$ criterion for Mahalanobis $D^2$). We deleted these seven cases because outliers can have a significant impact on the outcomes of a cluster analysis (Hair et al., 2010) thereby leaving 219 cricketers for the main analyses. Descriptive statistics, reliability estimates, and correlations between all study variables are presented in Table 1. Correlations are interpreted using Cohen’s (1988) criteria (i.e., small = $<.30$; medium = $.30$ to $.50$; large = $>.50$). A small relationship existed between affective intelligence and desire to achieve ($r = .28$); moderate relationships existed between self-belief and affective intelligence, desire to achieve, and attentional control ($r = .36$ to $.48$); and large correlations existed among all other mental toughness subscales. Moderate-to-large correlations were observed among all eight development assets ($r = .36$ to $.82$), and large correlations among all three emotional states ($r = .76$ to $.81$). Mental toughness subscales evidenced small-to-moderate positive correlations with the developmental assets ($r = .04$ to $.40$), and negative correlations with emotional states ($r = -.10$ to $-.30$). Developmental assets evidenced small-to-moderate negative correlations with emotional states ($r = -.09$ to $-.35$). Seven subscales (i.e., affective intelligence, attentional control, empowerment, commitment to learning, constructive use of time, social competencies, positive identity) evidenced inadequate levels of internal
Table 1  Descriptive Statistics, Internal Reliability Estimates, and Correlations for All Study Variables for the Total Sample (n = 219)

<table>
<thead>
<tr>
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<th>Mental Toughness Assets</th>
<th>Developmental Assets</th>
<th>Emotional States</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Affective intelligence</td>
<td>(.67)</td>
<td></td>
<td></td>
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<tr>
<td>Desire to achieve</td>
<td>.28</td>
<td>(.73)</td>
<td></td>
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<tr>
<td>Resilience</td>
<td>.59</td>
<td>.53</td>
<td>(.74)</td>
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<tr>
<td>Attentional control</td>
<td>.50</td>
<td>.56</td>
<td>.53</td>
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<tr>
<td>Self-belief</td>
<td>.48</td>
<td>.36</td>
<td>.61</td>
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<tr>
<td>Support</td>
<td>.34</td>
<td>.36</td>
<td>.32</td>
</tr>
<tr>
<td>Empowerment</td>
<td>.19</td>
<td>.26</td>
<td>.23</td>
</tr>
<tr>
<td>Boundaries and expectations</td>
<td>.32</td>
<td>.27</td>
<td>.29</td>
</tr>
<tr>
<td>Constructive use of time</td>
<td>.04</td>
<td>.16</td>
<td>.17</td>
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<tr>
<td>Commitment to learning</td>
<td>.21</td>
<td>.24</td>
<td>.25</td>
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<tr>
<td>Positive values</td>
<td>.17</td>
<td>.26</td>
<td>.22</td>
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<tr>
<td>Social competencies</td>
<td>.18</td>
<td>.29</td>
<td>.22</td>
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<tr>
<td>Positive identity</td>
<td>.32</td>
<td>.36</td>
<td>.34</td>
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<tr>
<td>Stress</td>
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<td>-.14</td>
<td>-.23</td>
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<tr>
<td>Anxiety</td>
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<td>-.17</td>
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<td>Depression</td>
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<tr>
<td>Min</td>
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<tr>
<td>Max</td>
<td>7.00</td>
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<td>7.00</td>
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<tr>
<td>M</td>
<td>5.46</td>
<td>6.18</td>
<td>5.63</td>
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<tr>
<td>SD</td>
<td>.86</td>
<td>.73</td>
<td>.84</td>
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Note. Underlined correlations were not statistically significant. *Correlation significant at p < .05; all other correlations significant at p < .01; internal reliability estimates are presented on the diagonal in parentheses.
reliability recommended for exploratory research (i.e., Cronbach’s α ≥ .70; Nunally & Bernstein, 1994). However, all of these scales except for constructive use of time, which evidenced an extremely poor internal reliability estimate (α = .45), were retained in the analyses as they were just the below minimum recommended level for exploratory research (Robinson, Shaver, & Wrightsman, 1991). All other constructs demonstrated adequate reliability.

Cross-National Differences on Mental Toughness, Developmental Assets, and Negative Emotional States

A MANOVA showed a significant multivariate effect of nationality on mental toughness, $F(5, 213) = 3.11, p = .01, \eta^2_p = .07$. Follow-up ANOVAs revealed a significant effect of nationality on affective intelligence, $F(1, 217) = 11.68, p = .001, \eta^2_p = .05$; desire to achieve, $F(1, 217) = 4.34, p = .038, \eta^2_p = .02$; and attentional control, $F(1, 217) = 5.23, p = .023, \eta^2_p = .02$, but not resilience $F(1, 217) = 2.54, p = .112$, and self-belief, $F(1, 217) = .61, p = .435$. Specifically, Australian cricketers reported higher levels of affective intelligence ($M = 5.68, SD = .76$), desire to achieve ($M = 6.30, SD = .64$), and attentional control ($M = 5.80, SD = .65$) than New Zealand cricketers ($M = 5.28, SD = .91; M = 6.10, SD = .79; M = 5.57, SD = .83$, respectively).

A MANOVA showed a significant multivariate effect of nationality on developmental assets, $F(7, 211) = 3.83, p = .001, \eta^2_p = .11$. Follow-up ANOVAs revealed a significant effect of nationality on support, $F(1, 217) = 10.37, p = .001, \eta^2_p = .05$ only. Specifically, Australian cricketers reported higher levels of support ($M = 3.34, SD = .40$) than New Zealand cricketers ($M = 3.14, SD = .48$). No significant differences existed between the Australian and New Zealand cricketers on the multivariate combination of negative emotional states, $F(3, 215) = 1.89, p = .13, \eta^2_p = .03$.

Mental Toughness Profiles and Differences in Demographic Variables, Asset Possession, and Negative Emotional States

In light of the cross-national differences in mental toughness, we decided to explore clusters within Australian and New Zealand cricketers separately. This process also allowed us to assess the stability of the cluster solution across different samples (Hair et al., 2010). However, because the results from the two samples were consistent in both magnitude and pattern of final clusters, the full sample results are reported. The agglomeration coefficient and dendrograms generated from the Ward’s hierarchical method identified three solutions (two, three, and four clusters) as candidates for the nonhierarchical analysis. Thus, we used the cluster centroids from the hierarchical Ward’s analysis as the initial seed points in subsequent nonhierarchical $k$ means analyses. A three-cluster solution was deemed the best fit according to empirical (i.e., fewest participants changing clusters from the hierarchical to nonhierarchical analysis, number of participants in each group) and conceptual (i.e., inclusion of a low mental toughness cluster, as retrospective reports support a small amount of mental toughness early in one’s career; Connaughton, Hanton, & Jones, 2010) considerations. Results of the stability analyses indicated that 98% of participants were correctly classified using a discriminant function analysis (Hair et al., 2010). Figure 1 depicts each cluster using standardized scores of each mental toughness asset.
We next employed MANOVA to examine differences in mental toughness across the three clusters. A MANOVA showed a significant multivariate effect of cluster membership on the five mental toughness subscales, $F(10, 424) = 67.03$, $p < .001$, $\lambda = .15$, $\eta^2_p = .61$. Follow-up ANOVAs revealed a significant effect of cluster membership on all five mental toughness assets (see Table 2). In addition to these post hoc analyses, we examined both relative (i.e., standardized scores) and absolute (i.e., raw scores) to interpret and label the emergent profiles. Aligned with previous research employing cluster analyses (e.g., Harwood, Cumming, & Fletcher, 2004; Hodge, Allen, & Smellie, 2008), we employed a standardized score of ± 50 to indicate high and low levels of each asset, with scores in between (i.e., +.50 to −.50) to indicate moderate levels. The first cluster was labeled “high mental toughness” as participants reported standardized scores greater than .72. The second cluster was labeled “moderate mental toughness” as participants reported scores between −.07 and −.37. Finally, the third cluster was labeled “low mental toughness” as participants reported scores less than −.87.

There was no significant difference between the three mental toughness clusters on the multivariate combination of the three demographic variables, namely, age, years playing cricket, and hours per week training ($p = .34$). However, a significant multivariate effect for mental toughness cluster on developmental assets possession, $F(14, 420) = 4.41$, $p < .001$, $\lambda = .76$, $\eta^2_p = .13$, was evidenced with all seven subscales contributing to the significant multivariate effect (see Table 2). Post hoc

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**Figure 1** — Results of $k$ means cluster analysis of mental toughness ($n = 219$).
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<tr>
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<th>Cluster 1 (n = 77)</th>
<th>Cluster 2 (n = 108)</th>
<th>Cluster 3 (n = 34)</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$ (SD)</td>
<td>$z$</td>
<td>$M$ (SD)</td>
<td>$z$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective intelligence</td>
<td>6.13 (.57)</td>
<td>.76</td>
<td>5.29 (.70)</td>
<td>-.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desire to achieve</td>
<td>6.73 (.36)</td>
<td>.72</td>
<td>6.13 (.51)</td>
<td>-.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resilience</td>
<td>6.34 (.47)</td>
<td>.84</td>
<td>5.50 (.55)</td>
<td>-.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attentional control</td>
<td>6.30 (.47)</td>
<td>.81</td>
<td>5.57 (.51)</td>
<td>-.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-belief</td>
<td>5.84 (.70)</td>
<td>.90</td>
<td>4.45 (.84)</td>
<td>-.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>14.39 (2.27)</td>
<td>—</td>
<td>14.39 (1.91)</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years playing experience</td>
<td>7.55 (2.95)</td>
<td>—</td>
<td>6.64 (3.40)</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours per week cricket</td>
<td>13.63 (4.81)</td>
<td>—</td>
<td>12.03 (4.51)</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support</td>
<td>3.47 (.41)</td>
<td>.53</td>
<td>3.12 (.41)</td>
<td>-.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empowerment</td>
<td>3.51 (.32)</td>
<td>.36</td>
<td>3.32 (.36)</td>
<td>-.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boundaries and expectations</td>
<td>3.52 (.37)</td>
<td>.43</td>
<td>3.29 (.36)</td>
<td>-.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commitment to learning</td>
<td>3.17 (.46)</td>
<td>.29</td>
<td>3.00 (.40)</td>
<td>-.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive values</td>
<td>3.31 (.38)</td>
<td>.40</td>
<td>3.06 (.37)</td>
<td>-.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social competencies</td>
<td>3.27 (.39)</td>
<td>.31</td>
<td>3.10 (.39)</td>
<td>-.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive identity</td>
<td>3.35 (.37)</td>
<td>.53</td>
<td>3.01 (.44)</td>
<td>-.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>.29 (.38)</td>
<td>-.32</td>
<td>.50 (.50)</td>
<td>.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>.22 (.32)</td>
<td>-.26</td>
<td>.34 (.40)</td>
<td>.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>.13 (.27)</td>
<td>-.29</td>
<td>.30 (.46)</td>
<td>.09</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^a$Difference between Clusters 1 and 2; $^b$difference between Clusters 1 and 3; $^c$difference between Clusters 2 and 3.
analyses revealed that the “high mental toughness” cluster reported significantly higher levels of all seven developmental assets than the “low mental toughness” cluster, as well as higher levels on all seven assets with the exception of commitment to learning than the “moderate mental toughness” cluster. A third MANOVA revealed a significant multivariate effect of mental toughness cluster membership on the three negative emotional states, $F(6, 428) = 3.03, p < .007, \lambda = .92, \eta^2_p = .04$, with all three subscales contributing to the significant multivariate effect (see Table 2). Post hoc analyses revealed that the “high mental toughness” cluster reported significantly lower levels of all three negative emotional states than the “low mental toughness” cluster, as well as lower levels of stress than the “moderate mental toughness” cluster.

**Discussion**

The purposes of the current study were to identify mental toughness profiles in adolescent cricketers and examine differences between these clusters on developmental asset possession and frequency of negative emotional states. Contrary to expectations, the results of the cluster analyses revealed three distinct profiles corresponding to high, moderate, or low levels of all five key facets. Results revealed differences between cricketers with high and moderate, and high and low levels of mental toughness in terms of external and internal developmental asset possession, while differences in the frequency of occurrence of negative emotional states were primarily observed between the high and low mental toughness clusters. However, no statistically significant differences existed between the moderate and low levels of mental toughness profiles on the concurrent validity criteria. Consistent with expectations, adolescent cricketers with high levels of mental toughness reported possession of more developmental assets and lower levels of negative emotional states when compared with cricketers with moderate levels of mental toughness.

**Mental Toughness Profiles**

Given the multidimensional nature of mental toughness (e.g., Gucciardi et al., 2009a; Jones et al., 2002, 2007), it seemed appropriate to conceptualize individuals as having different profiles of CMTI scores. We identified three heterogeneous clusters within the adolescent cricketers corresponding to high, moderate, or low levels of all five key mental toughness facets. Our confidence in the parsimony and stability of the three-cluster solution was enhanced by the fact that a similar tripartite profile of mental toughness emerged across both Australian and New Zealand cricketers and different methodological approaches (i.e., discriminant function analyses; Hair et al., 2010). Nevertheless, the tripartite classification profile of mental toughness revealed here contrasts with the bipartite profile revealed in the only previous cluster analytic study of mental toughness (Gucciardi, 2010). Of course, comparisons across studies must be made cautiously given the different population ages (i.e., aged between 10 and 18 years in the current study, whereas Gucciardi focused on footballers aged 16–18 years), sport contexts (i.e., cricket versus Australian football), mental toughness measures involved, and analytical procedures (i.e., we employed standardized $z$ scores, whereas Gucciardi adopted raw scores).
The emergence of a cluster in which participants reported a low level across all mental toughness facets in the current study is a unique finding. Although this finding contradicts the only other previous cluster analytical investigation (Gucciardi, 2010), a low mental toughness cluster aligns well with previous qualitative research in which super elite performers (i.e., Olympic champions) have retrospectively reported that they were not mentally tough in the first 6–10 years of their sporting careers (Connaughton et al., 2010). However, it is important to note that we labeled the cluster groups according to relative differences based on standardized scores in self-reported mental toughness that existed between the cluster groups. Absolute difference scores must be considered if we are to judge the strength of differences between the mental toughness clusters. While the standardized scores lend themselves nicely to an interpretation of a low profile, for example, the absolute scores ($M = 3.92–5.14$) supported an interpretation of moderate levels of mental toughness. Our focus on adolescents currently involved in the development process (i.e., still engaged in participating in youth sports) alleviated previous concerns associated with the retrospective recall of athletes who have reached a mature level of performance in previous research (e.g., Connaughton et al., 2010). Nevertheless, as with the assessment of other positive psychology constructs (e.g., emotional intelligence, hope), some adolescent cricketers may have responded in a socially desirable manner as reflected in the overall moderate-to-high absolute scores. The contamination of social desirability in self-reported mental toughness is an important avenue of future research.

From a conceptual perspective, the identification of three clusters in which athletes were categorized as having either low, moderate, or high levels of all five facets has provided preliminary evidence to support the view that the essential differences in mental toughness are primarily dimensional in nature. In other words, cricketers differed in their degrees of mental toughness, rather than in their type or kind (e.g., a cluster than maintains a high desire to achieve but reports low levels of the remaining four facets). Given the relatively early stage of mental toughness research, it is not surprising that little attention has been devoted to issue of dimensional (i.e., continuous variable) versus categorical (i.e., distinct forms) conceptualizations (see Stoeber & Otto, 2006 for a discussion in relation to perfectionism). The current findings add important evidence (albeit preliminary and requiring replication in different samples) to support a dimensional view in which mental toughness clusters are linked along a continuum; that is, three clusters with each successive cluster having lower and lower scores on each facet of mental toughness. If mental toughness is indeed dimensional, conceptualizations will need to move beyond factors associated with the presence or absence of the key facets, but rather focus on factors associated with varying levels of mental toughness. A dimensional viewpoint of mental toughness also holds practical importance for practitioners working with young athletes. For example, practitioners can develop generalized interventions targeting each of the five facets for athletes with differing levels of mental toughness within the dimensional perspective. Alternatively, a categorical perspective would provide justification for specialized interventions that might focus on specific facets of mental toughness (e.g., attentional control, self-belief) over other dimensions (e.g., desire to achieve, resilience, affective intelligence) depending on the level of each characteristic in each profile.
Contrary to previous reports of differences in playing experience between bipartite profiles of mental toughness (Gucciardi, 2010), no statistically significant differences existed between the three clusters on the multivariate combination of quantity of experiences. The lack of differences between the tripartite clusters on a multivariate combination of the three demographic variables, namely age, years playing cricket, and hours per week training could provide indirect support for the influence of the quality of context (cf. Gucciardi, 2011). Specifically, it is conceivable that the quality of one’s experiences is more important for mental toughness in adolescent athletes than the quantity of experiences. For example, variable-centered research involving structural equation modeling with adolescent cricketers supported the utility of a variety of developmental experiences, particularly initiative experiences (e.g., goal setting, effort, problem solving, time management), peer influences and relationships (e.g., diverse relationships, prosocial norms), and adult networks and social capital (e.g., integration with family, linkages to community) (Gucciardi, 2011). Retrospective research with elite athletes (e.g., Connaughton, Wadey, Hanton, & Jones, 2008) has also supported the utility of a variety of influential sources and mechanisms such as coach leadership, social support, vicarious experiences, critical incidents, and competitive rivalry.

Mental Toughness Profiles and Developmental Success

This study attempted to further our understanding of the adaptive nature of mental toughness by examining differences between cricketers with differing profiles of the key facets on concurrent validity criteria commonly associated with positive youth development. Correlational data revealed small-to-moderate positive associations between mental toughness and all eight developmental assets. Similarly, we observed small-to-moderate negative associations between mental toughness and the frequency of negative emotional states. With the 40 developmental assets supported as indicators of positive youth development and thriving (e.g., Scales et al., 2000, 2006), it was also encouraging to find that the mental toughness facets evidenced associations of a similar direction and strength with negative emotional states as did the developmental assets. Collectively, these findings provided preliminary (albeit correlational) evidence to support our contention that mental toughness may represent a contextually salient representation of thriving in youth sport settings.

Cluster differences on the concurrent validity criteria between the three mental toughness profiles provided additional support for our contention of mental toughness as contextually salient representation of thriving in youth sport settings. Consistent with our expectations, the high mental toughness cluster reported significantly higher levels of all internal and external developmental assets than the moderate mental toughness cluster, with the exception of commitment to learning. Similarly, the high mental toughness cluster reported significantly higher levels of all internal and external developmental assets than the low mental toughness cluster. It is possible that the development of affective intelligence, self-belief, desire to achieve, resilience, and attentional control (i.e., mental toughness) could provide foundational skills for the subsequent development of other variables associated with positive youth development (e.g., the 40 developmental assets), or that exposure to internal and external developmental assets provide the conditions for developing mental toughness. It may also be that internal and external developmental
assets exert their influence via mental toughness processes. For example, school engagement has been shown to mediate the relationship between developmental assets and academic competence (Li, Lerner, & Lerner, 2010). Much like school engagement (e.g., Fredricks, Blumenfeld, & Paris, 2004), mental toughness has been conceptualized as a bidirectional construct (i.e., person context relational) that encapsulates important processes by which an individual cognitively, emotionally, and behaviorally interacts with his or her sport context (e.g., Gucciardi et al., 2009a). These cross-sectional results provided preliminary evidence to support the need for both longitudinal and experimental research in this area. From an applied perspective, program developers need more research to explore this potential causal relationship before they can begin to adapt programs accordingly.

Beyond the differences observed in developmental asset possession, the mental toughness groups also differed considerably in their self-reported frequency of negative emotional states. Unexpectedly, with the exception of stress, the high mental toughness cluster did not report significantly lower levels of depression and anxiety than the moderate mental toughness cluster, although the descriptive data were aligned with this expectation. However, the high mental toughness cluster reported significantly lower levels of all three negative emotional states than the low mental toughness cluster. Athletes with high levels of mental toughness are optimistic thinkers who adopt positive coping strategies (Connaughton & Hanton, 2009, Gucciardi et al., 2009b) thereby likely having a protective effect against negative life experiences that contribute to the onset of depressive symptoms (Sawyer, Pfeiffer, & Spence, 2009). Similarly, as mentally tough athletes are confident in their ability to cope with stress and anxiety, and are able to regulate their emotions (e.g., Jones et al., 2002, 2007), it is conceivable that they should report a lower frequency of negative emotional states than less mentally tough individuals. Again, the correlational nature of this study means that longitudinal and experimental research is required to ascertain the causal relationship between mental toughness and frequency of negative emotional states.

Practical Implications, Limitations, and Future Research

From an applied perspective, it is important to gain insight into the types of mental toughness clusters inherent within sport contexts. For example, with a better appreciation of the types and athlete proportions of mental toughness profiles evident in youth sport contexts, practitioners can tailor intervention efforts to the needs of unique groups of individuals and clusters. While recognizing the correlational nature of the current study, the concurrent validity data regarding the tripartite profile of mental toughness provided preliminary evidence for the potential usefulness of recruiting and retaining sport organizations in developmental programs that might both facilitate optimal performance and develop positive youth.

A key methodological strength of this study was its focus on individuals currently involved in the development process (i.e., still engaged in participating in youth sports) rather than relying on the retrospective recall of athletes who have reached a mature level of performance. Nevertheless, this study is not without its limitations and these issues should be considered in future research. First, issues associated with having a common rater (e.g., social desirability, consistency effect, negative affectivity) and the measurement context (i.e., simultaneous measurement
of all study variables) in the current study and the broader mental toughness literature give rise to concerns associated with common method bias (for a review, see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Methodologically, researchers should consider the feasibility of collecting data on study variables from different sources (e.g., coaches, parents, performance data, biological markers of health) as well as separating the measurement of independent and dependent variables (e.g., temporally, psychologically, methodologically). Particularly for the measurement of mental toughness, researchers must consider alternative processes such as implicit methods and experimental manipulation, as self-reports of such a highly desirable construct may not always produce the most accurate assessment (e.g., narcissism). Statistical remedies are also available (for a review, see Podsakoff et al., 2003) to researchers if these methodological procedures cannot be implemented, with the most sophisticated techniques involving hypothesis-testing procedures such as confirmatory factor analysis in which a variety of models can be tested and compared for their adequacy. Second, the cross-sectional and noneperimental nature of this study does not permit an inference on causality from the current findings. Longitudinal examinations and studies involving experimental manipulation of the study variables would assist interpretations on the causal nature of these relations. Third, data based on associations between variables with less than adequate internal reliability must be interpreted with caution (i.e., a low internal reliability might underestimate the effects observed). The relatively low estimate for constructive use of time perhaps reflects the variety of activities assessed in this subscale (i.e., sport, creative activities, family life, and religious or spiritual activity). The same can be said of empowerment (i.e., home, school neighbor), commitment to learning (i.e., school and broadly), and social competencies (i.e., personal, social, and community level). In contrast, the relatively low number of items (i.e., three) for subscales of the CMTI may account for the mediocre internal reliability of attentional control and affective intelligence. Finally, the inclusion of participants from both late childhood (i.e., aged 10–11 years) and early-to-late adolescence may bear some influence of the findings, as more sophisticated cognitive capacities (e.g., self-awareness, self-monitoring) are typically forged in the mid-to-late adolescence years (Harter, 2003). While no significant age differences existed between the three mental toughness clusters, we were unable to provide equivocal evidence regarding the impact of these potential cognitive differences that are likely required to self-report the study variables in a reliable manner.

**Conclusion**

In this study, we used a person-centered approach to capture distinct mental toughness clusters among adolescent cricketers and associated differences between the tripartite profiles on indicators of developmental success (i.e., assets possession, negative emotional states). Overall, the current findings underscore that mental toughness and constructs associated with developmental success warrant further exploration as key constructs in the positive youth development process within youth sport settings. This study extends previous mental toughness research beyond an “optimal performance” perspective to suggest that scholars and practitioners may also understand mental toughness from a positive youth development perspective. Researchers have yet to investigate these issues, and we anticipate that empirical
evidence in this area will have important implications for developmental theories, research, and interventions designed to promote positive psychosocial development while minimizing negative developmental outcomes.

**Notes**

1. Although we have provided a succinct definition and conceptualization of mental toughness, we acknowledge that a number of conceptual and rhetoric debates still exist as to what mental toughness is and what it is made up of; however, these issues are beyond the scope of this article. Interested readers are encouraged to consult recent reviews (e.g., Gucciardi & Gordon, 2011) that discuss these conceptual and measurement issues in detail.

2. We tested the factorial validity of the CMTI in the current sample, as the validity of this measure with adolescents aged 10–12 years has not yet been established. A confirmatory factor analysis of the five-factor correlated model revealed a good fit with the data: $\chi^2(80) = 159.74$, $p = .000$, Bollen Stine $p = .015$, CFI = .926, IFI = .928, TLI = .903, SRMR = .053, RMSEA = .068 (90% CI = .052 to .083).

3. Interested readers can contact Gucciardi for a detailed summary of these analyses.

4. A Harmon one-factor test for common method variance revealed that only 18.55% of the variance of the total item pool was explained by a single factor. Nevertheless, while these findings indicated that common method variance might not be a problem in the current data, they do not provide evidence that the data are free of this potential violation nor do they statistically control for or partial out potential method effects (cf. Podsakoff et al., 2003).

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**References**


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