

Psychological capital and authentic leadership: Measurement structure, gender comparison, and cultural extension

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Abstract:

Purpose: The purpose of this paper is to test the measurement properties of the psychological capital questionnaire (PCQ) and the authentic leadership questionnaire (ALQ). Both scales' properties are tested in a diverse sample of working adults, compared across genders, and assessed for their performance in a new national culture. **Design/methodology/approach:** This paper uses survey data from a random, nationally representative sample of working New Zealand adults. Structural equation modeling is used to conduct confirmatory factor analysis and to test for measurement invariance in both scales. **Findings:** The results confirm the hypothesized second-order factor structure of both scales, with psychometric properties comparable to those in samples from other cultures. The results further suggest that the PCQ and ALQ exhibit measure equivalence for men and women. **Originality/value:** This paper provides the first test of both scales in a diverse representative sample. It demonstrates that the PCQ and ALQ are useful for diverse samples and equally valid for both genders, as well as performing as expected in other cultures.

Keywords: business administration | human resource management | leadership | New Zealand | behaviourally-anchored rating scales

Article:

This paper examines, the measurement properties of scales for two recently developed constructs: psychological capital and authentic leadership. Both constructs are associated with “positive organizational behavior (POB),” which is a research program focused on performance-related human resources that are amenable to scientific measurement and to management intervention (Luthans, 2002; Luthans and Avolio, 2009). POB is part of a more general emphasis on studying “positive” phenomena in organizations (Cameron *et al.*, 2003; Caza and Cameron, 2008; Luthans, 2002). The analysis described here contributes to POB in three ways. It provides the first confirmatory test of both scales' factor structures in a nationally representative sample of working adults. It also provides evidence of measurement invariance across gender for both

scales, suggesting that they are equally valid for men and women. Additionally, this paper provides the first test of both scales in the cultural context of New Zealand, contributing to evidence of the cross-cultural meaningfulness of the psychological capital and authentic leadership constructs.

Psychological capital

The construct of psychological capital is a recent extension of the economic notion of capital (Luthans and Youssef, 2004). In classical economics, capital refers to durable goods that serve as factors of production (e.g. land, labor, and equipment). In some formulations, these goods are presumed to also include non-tangible factors such as management and organization (Varian, 1990). The idea of non-tangible capital led to familiar variations including human capital (Goldsmith *et al.*, 1997) and social capital (Cohen and Prusak, 2001). Psychological capital is similar to these, being a non-tangible factor that can provide competitive advantage to an organization. In the same way that natural resources, cash, and machinery can benefit organizational performance, employees' psychological states represent a potential resource that can contribute to performance (Luthans *et al.*, 2007b).

Psychological capital refers to an individual's "positive psychological state of development" (Luthans *et al.*, 2007b, p. 3). It is a constellation of motivational and behavioral tendencies derived from four components: optimism, which is defined as the tendency to make stable, internal attributions for positive events and unstable, and external attributions for negative ones (Seligman, 1998); hope, which is the motivation to achieve goals and the ability to recognize ways of doing so (Snyder *et al.*, 1996); self-efficacy, which is one's belief in their own ability to succeed in a given task or domain (Bandura, 1997); and resilience, which refers to positive adaptation to setbacks or negative events (Masten and Reed, 2002). Psychological capital is defined as a second-order factor composed of these four components, and therefore refers to individuals' tendencies to be motivated toward goal achievement, to recognize paths for achieving those goals, to believe they can succeed in reaching the goals, and to recover from the inevitable setbacks of goal pursuit (Luthans *et al.*, 2007a).

From an organizational point of view, one of the most important aspects of psychological capital is its "state-like" nature (Luthans and Avolio, 2009). Psychological capital has an intermediate level of durability. It is more enduring than volatile states (e.g. mood), but more changeable than fixed traits (e.g. personality; see Conley, 1984 for discussion of varying degrees of construct changeability). Psychological capital is durable enough to influence long-term behavior and performance, while remaining amenable to intervention and change (Luthans *et al.*, 2008b, 2007a). This quality of intermediate durability is part of all four sub-components of psychological capital, and of the whole; evidence has shown that optimism, hope, self-efficacy, resilience, and psychological capital are each relatively stable over time, but nonetheless subject to focused intervention (Bandura, 1997; Luthans *et al.*, 2008b; Masten and Reed, 2002; Seligman, 1998; Snyder *et al.*, 1996).

Psychological capital's semi-permanence makes it a potentially important, and developable, resource for increased organizational performance. Employees with high levels of psychological capital will be inclined to pursue better goals more effectively, with concomitant benefits in their

work. This is supported by a growing body of research, which has linked psychological capital to improvements in many important workplace attitudes and behaviors, including job satisfaction, commitment, reduced absenteeism, leadership, and work performance (Avey *et al.*, 2006; Jensen and Luthans, 2006b; Larson and Luthans, 2006; Luthans *et al.*, 2007a, 2005, 2008c; Woolley *et al.*, 2007). Psychological capital is a reliable resource that makes employees more effective, and its responsiveness to intervention makes it an exciting potential target for human resource development.

Authentic leadership

The second focal construct in this paper concerns an issue that has been gaining in popular and academic attention: leaders' authenticity. As a result of rapid change and growing diversity, the need for effective leaders may be as great now as at any time in history (Luthans and Avolio, 2003; Caza *et al.*, 2004). However, in the wake of numerous high-profile scandals (e.g. Worldcom, Enron) and other questionable actions (e.g. Hurricane Katrina response, and subprime lending crisis), there is growing skepticism about modern norms of leadership behavior (Brown and Trevino, 2006; Rosenthal *et al.*, 2007; Avolio and Luthans, 2006). This has led to increasing demand for authentic leaders (Dashborough and Ashkanasy, 2005; George, 2006). In the popular imagination, authentic leaders are presumed to prevent the deceit and disappointment attributed to so many recent leaders, and to foster more committed followers and better results (Shelton, 2008; Goffee and Jones, 2005). Authentic leadership has similarly begun to attract attention from organizational researchers (Cooper *et al.*, 2005; Gardner *et al.*, 2005c).

While many important issues have been raised in the nascent literature on authentic leadership, one of the most fundamental concerns the proper definition of authentic leadership. At its root, authenticity refers to knowing oneself and acting in a fashion consistent with that knowledge (Harter, 2002), and all treatments of authentic leadership start from this premise. However, there have been multiple conceptualizations of the term, and these vary in how far they expand the definition beyond a basic consistency between beliefs and actions. Some have argued for a narrow definition, one that requires nothing more than self-consistency and is therefore implicitly value-neutral, as it allows for one to be authentic to good, bad, or indifferent morals (Sparrowe, 2005; Zhang *et al.*, 2008; Shamir and Eilam, 2005). Others have argued for a more encompassing definition, one that goes beyond self-consistency to include ethically and morally prescriptive elements (Avolio and Gardner, 2005; Walumbwa *et al.*, 2008; May *et al.*, 2003). The more encompassing position argues that self-consistency is sufficient for simple authenticity (Kernis, 2003), but that authentic leadership requires more (Eigel and Kuhnert, 2005; Gardner *et al.*, 2005b), because of the morally charged nature of leadership (Bass and Steidlmeier, 1999). In other words, this argument claims that because of the power and responsibility inherent in leadership, more than internal consistency is required to deserve the label "authentic leader."

At present, there seems to be a consensus emerging based on the consolidation of two previous definitions, one associated with Gardner *et al.* (2005a) and the other with Ilies *et al.* (2005). Available empirical evidence suggests that authentic leadership consists of four components (Walumbwa *et al.*, 2008): self-awareness, which is accurate knowledge of one's strengths, weaknesses, and idiosyncratic qualities (Kernis, 2003); relational transparency, which involves genuine representation of the self to others (Gergen, 1991); balanced processing, which

is the collection and use of relevant, objective information, particularly that which challenges one's prior beliefs (Gardner *et al.*, 2005a); and internalized moral perspective, which refers to self-regulation and self-determination, rather than acting solely in accordance with situational demands (Worline and Quinn, 2003). There is growing agreement that behavior must exhibit all four of these components to be called authentic leadership, in large part because these four behavioral components incline followers to perceive an individual as an authentic leader (Dashborough and Ashkanasy, 2005; Avolio *et al.*, 2004). Therefore, authentic leadership is defined as a consistent behavioral pattern of internally-guided moral action and genuine interaction with others, based on accurate self-knowledge and objective use of relevant information (Walumbwa *et al.*, 2008).

As with psychological capital, authentic leadership is argued to be a semi-permanent individual attribute, potentially subject to focused intervention, but otherwise relatively stable over time (Luthans and Avolio, 2003; May *et al.*, 2003). Consistent with this, the proposed antecedents of authentic leadership consist of a mix of fixed traits, developmental experiences, and environmental cues (Avolio, 2005; Luthans and Avolio, 2003; Avolio and Luthans, 2006). An emerging body of evidence links authentic leadership to numerous important organizational attitudes and outcomes among followers, including satisfaction, commitment, citizenship behavior, and job performance (Walumbwa *et al.*, 2008; Jensen and Luthans, 2006a). These findings, combined with the growing popular demand for authenticity, make authentic leadership an important construct for further analysis.

Aims of this paper

The analysis presented here had three aims. The first was to examine the convergent validity of the psychological capital questionnaire (PCQ) (Luthans *et al.*, 2007a) and the authentic leadership questionnaire (ALQ) (Walumbwa *et al.*, 2008) in a representative sample of working adults. Convergent validity is the extent of agreement among measures of a construct (i.e. all items appear to referring to the same underlying phenomenon). It is the most basic element of construct validity, and should be established before other aspects of construct validity are investigated (Campbell and Fiske, 1959). While previous testing has shown that both the PCQ and ALQ have satisfactory convergent validity, this testing has been confined to student populations (Luthans *et al.*, 2007a), members of individual firms (Luthans *et al.*, 2007a, 2008c), or convenience samples (Luthans *et al.*, 2008b). The data in this paper are the first to use a national sample of working adults, allowing confirmatory replication in a broadly representative sample. Moreover, assessing both questionnaires at the same time also allowed for a preliminary test of the prediction that authentic leaders will contribute to increased psychological capital among followers (Gardner and Schermerhorn, 2004). Thus, far, the interrelation between psychological capital and authentic leadership has received no empirical investigation, and examining this link has been advanced as a priority for POB research (Luthans and Avolio, 2009).

The second aim was to compare the measurement properties of both questionnaires across gender. Although no authors have predicted male-female differences in psychological capital or authentic leadership, related research findings offer at least suggestive evidence that there may be important gender differences. For example, previous studies reveal male-female differences in

levels of resilience. A meta-analysis of clinical studies found female gender to be a significant risk factor for post-traumatic stress disorder (Brewin *et al.*, 2000), which has led some to conclude that men are more resilient (Bonanno, 2004). As yet, no explanation has been advanced for this difference (Bonanno *et al.*, 2006), but if it exists it could have implications for the PCQ. If women consistently vary from men on some components of psychological capita, there may be differences in the factor structure by gender.

Similarly, there is evidence that suggests an observer's gender could influence perceptions of another's authentic leadership. Some experimental data suggest that women respond more positively to leaders than do men (Butler and Geis, 1990). If one judges authenticity as a positive trait, which popular opinion seems to do (Shelton, 2008), then it could be that female followers' more positive responses to a given leader will lead them to attribute greater authenticity. Moreover, when asked to describe good leaders, men and women give reliably different answers, with women more likely to describe leaders who are interactional, sharing, and transformational in their behavior (Rosener, 1990; Alimo-Metcalfe, 1995). Since authentic leadership is defined in part by its relational transparency, and it is highly correlated with transformational leadership (Walumbwa *et al.*, 2008), one might expect that the modal woman's archetype of leadership is more authentic than the equivalent man's. For these reasons, it seemed important to examine possible gender differences in responses to the PCQ and ALQ.

Finally, this paper sought to test and extend the international utility of the PCQ and ALQ. To date, the PCQ has only been tested with American samples. While the construct of psychological capital has proved useful in other nations, prior studies have used less developed measures or failed to test the full second-order factor structure of the PCQ (Luthans *et al.*, 2008a, 2005). In contrast, the full ALQ scale has been tested in American and Chinese samples (Walumbwa *et al.*, 2008). Based on Hofstede's (1980) characterization of national cultures, Walumbwa and colleagues' findings suggest that the ALQ works equally well in cultures that differ greatly in individualism, uncertainty avoidance, and long-term orientation (i.e. USA vs China). However, New Zealand represents an important additional culture to consider because of its low power distance. Power distance refers to the extent to which members of a culture will tolerate inequality, and New Zealand's culture is famously low on power distance, with one of the lowest national scores in the world (Hofstede, 1980). Given the inevitable elements of power and influence involved in leadership, power distance seems a particularly important cultural dimension, making New Zealand's low power distance an informative contrast with China's high levels and America's moderate ones. Therefore, this paper examined the performance of both scales in New Zealand, extending the international application of the PCQ and ALQ.

Method

Sample and procedure

The analysis reported here was based on archival survey data collected by the New Zealand Leadership Institute of the University of Auckland Business School in a study of that nation's authentic leadership (Levy and Bentley, 2007). For that study, 3,000 surveys were distributed to a stratified random sample of employed New Zealand adults with an anonymous envelope for their reply. In total of 960 usable responses were received (32 percent response rate).

Slightly more than half (55 percent) of the respondents were female. The respondents ranged in age from 18 to over 55 years, with a median of 35-39 years. Most respondents were full-time employees (91 percent) of Caucasian European descent (84 percent) with at least some post-secondary education (64 percent). The median work experience was ten to 15 years, including a median of three to seven years tenure with the current employer. These characteristics, as well as the relative proportions from various industries, occupations, and organization types were consistent with New Zealand's national statistics (Statistics New Zealand, 2006), suggesting that the data were representative and did not contain significant response bias.

Measures

Psychological capital was measured with a 12-item, shortened version of the PCQ that was developed in consultation with one of the authors of the original questionnaire (Luthans *et al.*, 2007a). The PCQ contained descriptive, first-person statements that the respondents rated on a six-point scale of agreement (e.g. "I always look on the bright side of things regarding my job"). Authentic leadership was measured using the 16-item ALQ (Walumbwa *et al.*, 2008). The ALQ contained items describing behaviors that leaders could engage in, and respondents used a five-point scale to rate the frequency with which leaders actually engaged in the behavior (e.g. "Leaders in my organization say exactly what they mean").

The focal actor was straightforward and specific for the PCQ: respondents reported their own attitudes. The focus of the ALQ was less specific. The ALQ instructions directed participants to assess the "leadership style of individuals in your organization." The decision to focus on this general category was made in the original study to allow the same questionnaire to be used in the diverse national sample. For the purposes of this paper, it was helpful that the original investigation placed emphasis on subordinates' perceptions of their leaders, because the ALQ is a psychological instrument, primarily concerned with follower perceptions, rather than directly measuring objective leader behaviors (Walumbwa *et al.*, 2008). However, the original study's instructions traded off specificity for wide applicability.

To address this tradeoff, we conducted six focus groups with staff from multiple organizations in New Zealand. In each focus group, participants completed the ALQ independently, using the same instructions as in the original study (i.e. to rate the leadership style of individuals in the organization). The focus group scores were not notably different from those in the survey sample, and all of the focus group participants indicated in subsequent discussion that their answers were based on assessments of their immediate supervisor. We therefore believe that the ALQ responses from the national sample were primarily focused on the respondent's immediate supervisor, and are therefore comparable to those in previous studies (Walumbwa *et al.*, 2008).

Analysis

Confirmatory factor analysis (CFA) was used to investigate convergent and discriminant validity, as well male-female generalizability at both first- and second-order factor levels. In all cases, we employed a total disaggregation model, using each item in each questionnaire as an indicator of its hypothesized factor (Bagozzi and Edwards, 1998; Bagozzi and Heatherton,

1994). This approach provides the most detailed and rigorous examination of construct validity and possible differences between men and women's responses. Figures 1 and 2 show the CFA models investigated.

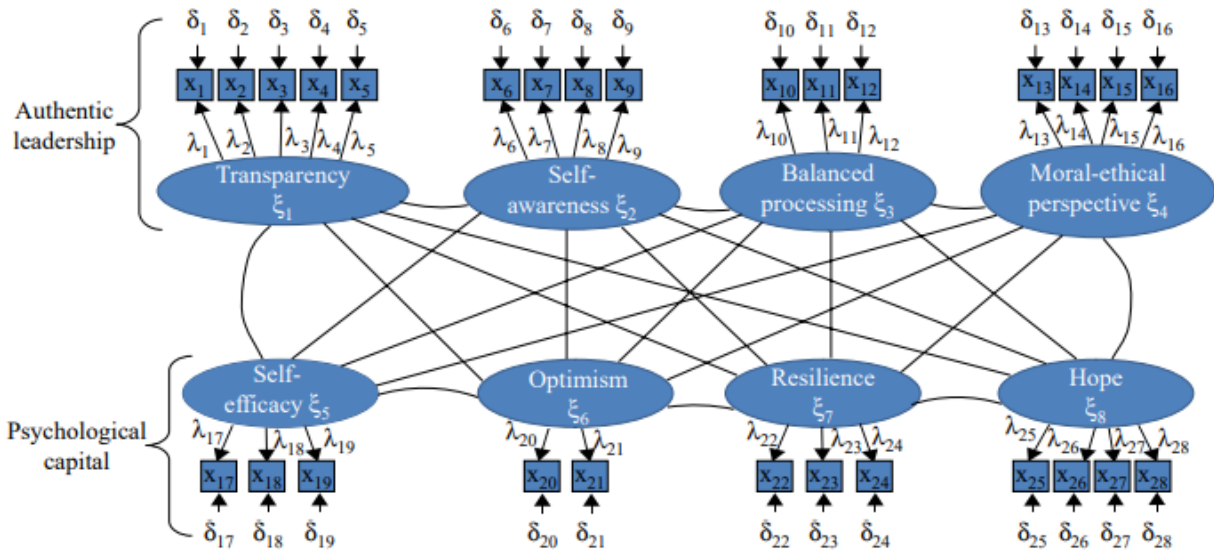


Figure 1. First-order confirmatory factor analysis model for examining convergent and discriminant validity

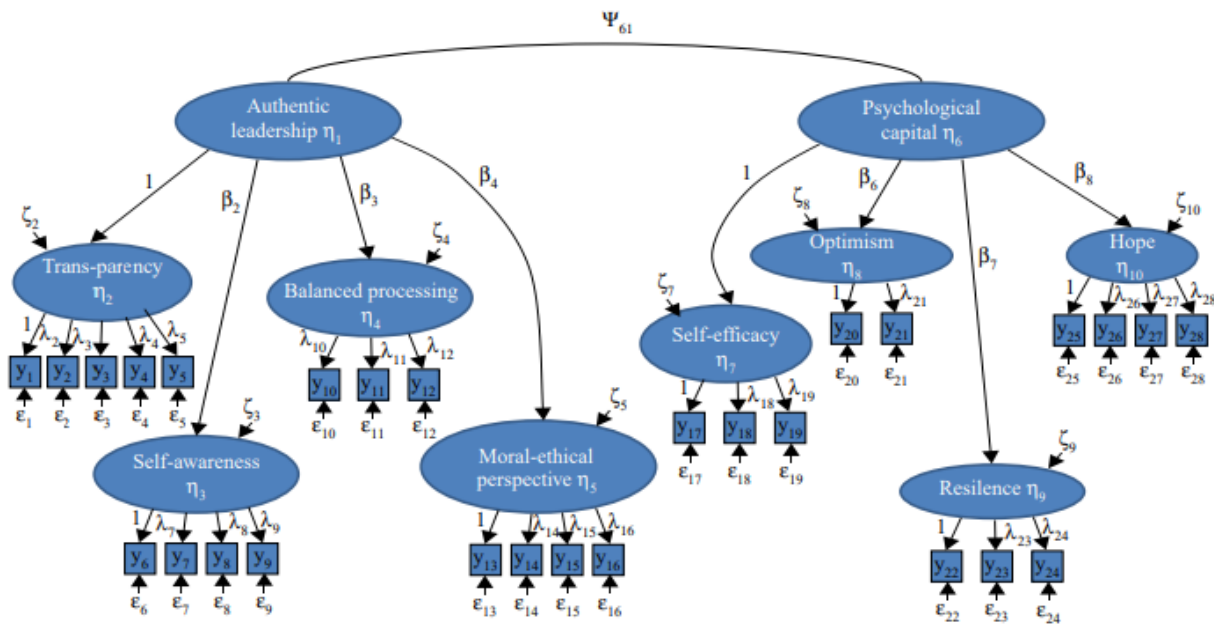


Figure 2. Second-order confirmatory factor analysis

Table I. Findings for first-order CFA model: men

Factor loadings								
Transparency	Self-awareness	Balanced processing	Moral-ethical perspective	Self-efficacy	Optimism	Resilience	Hope	
0.66	0.70	0.62	0.77	0.71	0.55	0.59	0.59	
0.70	0.68	0.64	0.77	0.79	0.70	0.59	0.70	
0.75	0.73	0.75	0.76	0.68		0.65	0.75	
0.54	0.75		0.75				0.70	
0.72								
Factor correlations								
	1	2	3	4	5	6	7	8
1. Transparency	1.00							
2. Self-awareness	0.95	1.00						
3. Balanced processing	0.94	1.00	1.00					
4. Moral-ethical perspective	0.94	0.92	0.95	1.00				
5. Self-efficacy	0.58	0.47	0.47	0.51	1.00			
6. Optimism	0.72	0.66	0.68	0.67	0.96	1.00		
7. Resilience	0.49	0.41	0.38	0.44	0.72	0.83	1.00	
8. Hope	0.47	0.45	0.45	0.42	0.71	0.89	0.96	1.00
Goodness-of-fit								
$\chi^2(322) = 737.62$								
RMSEA = 0.059								
NNFI = 0.97								
CFI = 0.98								
SRMR = 0.046								

Table II. Findings for first-order confirmatory factor analysis model: women

Factor loadings									
Transparency	Self-awareness	Balanced processing	Moral-ethical perspective	Self-efficacy	Optimism	Resilience	Hope		
0.71	0.71	0.59	0.81	0.77	0.69	0.53	0.62		
0.77	0.71	0.75	0.76	0.81	0.73	0.67	0.61		
0.78	0.78	0.79	0.77	0.71		0.51	0.73		
0.55	0.80		0.72				0.62		
0.67									
Factor correlations									
	1	2	3	4	5	6	7	8	9
1. Transparency	1.00								
2. Self-awareness	0.94	1.00							
3. Balanced processing	0.91	1.00	1.00						
4. Moral-ethical perspective	0.94	0.94	0.99	1.00					
5. Self-efficacy	0.39	0.40	0.36	0.38	1.00				
6. Optimism	0.53	0.58	0.52	0.49	0.83	1.00			
7. Resilience	0.35	0.33	0.30	0.28	0.64	0.84	1.00		
8. Hope	0.34	0.34	0.25	0.28	0.68	0.84	1.00	1.00	
Goodness-of-fit									
$\chi^2(322) = 893.10$ RMSEA = 0.061 NNFI = 0.96 CFI = 0.97 SRMR = 0.048									

Results

First-order CFA

Convergent validity

Men's and women's responses were each modeled with the eight-factor CFA in Figure 1, and both models fit well (Hu and Bentler, 1999): for men, $\chi^2(322)=737.62$, RMSEA=0.059, NNFI=0.97, CFI=0.98, and SRMR=0.046; for women, $\chi^2(322)=893.10$, RMSEA=0.061, NNFI=0.96, CFI=0.97, and SRMR=0.048 (Tables I and II). Factor loadings ranged from 0.54 to 0.79 for men, and 0.51 to 0.81 for women, which constituted satisfactory values for data analyzed at the item level. Correlations among the four psychological capital factors and among the four authentic leadership factors were large, while those between psychological capital and authentic leadership factors were moderate. These results provide evidence of satisfactory convergent validity.

Discriminant validity

To test for discriminant validity among the factors, we examined the confidence interval for each correlation, where analyses were performed on the covariance matrixes of input data, with variances fixed to 1.00. For men, six of 28 possible correlations were not significantly different from 1.00 (i.e. they were not discriminant), and these were between pairs of psychological capital factors ($\phi_{65}=0.97\pm 0.10$, $\phi_{86}=0.90\pm 0.10$, $\phi_{87}=0.95\pm 0.06$; Table I) or pairs of authentic leadership factors ($\phi_{31}=0.94\pm 0.06$, $\phi_{32}=1.00$, $\phi_{43}=0.95\pm 0.06$). For women, three of 28 correlations were not significantly different from 1.00, likewise between psychological capital factors ($\phi_{87}=1.00$; Table II) or authentic leadership factors ($\phi_{32}=1.00$, $\phi_{43}=0.99\pm 0.04$). Note that these correlations reflect corrections for attenuation due to the unreliability of item measures, so that the Pearson product moment correlations among measures are smaller in magnitude. These results challenge the discriminant validity of some of the first-order components of psychological capital and authentic leadership, and suggest that predictions of an over-arching second-order factor may be appropriate (as in Figure 2).

Gender invariance

To test the generalizability of the model, we tested for invariance at several levels between men and women. A test for identical factor patterns yielded a good fitting model ($\chi^2(644)=1630.72$, RMSEA=0.06, NNFI=0.97, CFI=0.98, and SRMR=0.048). This means that men and women exhibit the same factor structures for psychological capital and authentic leadership. All items load significantly on the same eight factors for men and women, with all items loading as predicted by theory, and no items significantly cross-loading on non-hypothesized factors.

Next, we tested for invariance of factor loadings between men and women. We allowed the variance-covariance matrix of factors to consist of free, unconstrained parameters, with one loading per factor constrained to 1.00, and the remaining factor loadings specified as free, but equivalent for men and women. This yielded $\chi^2(644)=1,674.35$, which was significantly larger compared to the model with only invariant factor patterns ($\chi^2(20)=43.63$, $p<0.01$), and required

rejection of the hypothesis that all factor loadings were equal. We therefore tested, a partial measurement invariance model, where one factor loading per factor was constrained to be free and equal for men and women (Byrne *et al.*, 1989). This resulted in $\chi^2(652)=1,642.80$, which was a non-significant difference from the invariant factor pattern model ($\chi^2(8)=12.08$, $p>0.15$). This result established partial measurement invariance, meaning that the degree of correspondence between each item measure and its hypothesized construct is the same for men and women.

A model constraining each of the variances of the eight factors to be equal for men and women showed $\chi^2(660)=1,649.32$, which was not significantly different from the partial measurement invariance model ($\chi^2(8)=6.52$, $p>0.60$). This supported the conclusion that the eight factor variances for the model in Figure 1 did not vary by gender. Together, with the partial measurement invariance findings, this indicates measure equivalence for men and women. It also means that observed parameter differences between men and women (e.g. covariance among factors) are not due to differential reliability of the measures.

We then performed a test of equality for each covariance between factors across gender. This was done by constraining each covariance, one at a time, to be equal for men and women, and then comparing the χ^2 goodness-of-fit to the χ^2 goodness-of-fit for the model with partial measurement invariance and invariant factor variance. Of the 28 covariances, all but one were found to be invariant. The lone exception was the covariance between hope from the PCQ and balanced processing from the ALQ ($\chi^2(1)=4.51$, $p < 0.05$), which indicated that men reported a significantly greater association between their own hope and their leader's balanced processing than did women ($\phi_{83}^{\text{Men}}=0.45$ in Table I is statistically greater than $\phi_{83}^{\text{Women}}=0.25$ in Table II).

Finally, we investigated the factor means and tested for invariance between men and women. All factor means were equal for men and women, with the exception of self-efficacy, where men had a significantly higher mean than women ($M_d=-0.24$, $t=-4.42$, $p<0.01$).

Second-order CFA

On the strength of the first-order CFA results, we examined the prediction that the four psychological capital factors were indicators of a single, more abstract psychological capital construct, and that the four authentic leadership factors were indicators of a single, more abstract authentic leadership construct (Figure 2). This model fit well: $\chi^2(682)=1,833.89$, RMSEA=0.065, NNFI=0.97, CFI=0.97, and SRMR=0.06.

We then tested for invariance between men and women in the paths linking the second-order factors to their respective first-order factors (e.g. path from second-order authentic leadership to first-order balanced processing; see β 's in Figure 2). This model fit well ($\chi^2(688)=1,841.13$), and was not significantly different from the model without invariance ($\chi^2(6)=7.24$, $p>0.29$). Therefore, we found evidence that the loadings of first-order factors on the second-order factors of psychological capital and authentic leadership are equivalent for men and women.

The results were similar in testing for invariant second-order factor variance. The model constraining the variance of psychological capital and authentic leadership to be equal in men and women fit well ($\chi^2(690)=1,844.69$), and was not significantly different from the invariant

loading model ($\chi^2(2)=3.56, p>0.17$). This provided evidence that the variances of second-order psychological capital and second-order authentic leadership are the same for men and women. As such, we concluded that the indicators of authentic leadership and psychological capital achieved measure equivalence, and were equally reliable for men and women.

This means that differential reliability was not a rival hypothesis for the final equivalence test, which examined gender differences in the covariance between psychological capital and authentic leadership (Ψ_{61} in Figure 2). We found that the covariance, and therefore the correlation, between psychological capital and authentic leadership was significantly larger ($\chi^2(1)=9.83, p<0.01$) for men ($\psi_{61}^{\text{Men}}=0.60$) than for women ($\psi_{61}^{\text{Women}}=0.41$).

In summary, the data provided evidence of a satisfactory second-order model, with convergent validity and measurement equivalence for men and women, although discriminant validity at the level of first-order factors was not always observed. The PCQ and ALQ worked as predicted with this representative samples of working New Zealand adults, and both questionnaires were equally reliable measures for men and women. Overall, the validity and generality of the two scales was established. Substantively, women reported a lower mean self-efficacy, and a weaker association between hope and leader balanced processing, as well as between psychological capital and authentic leadership, relative to men. All other responses were equivalent across gender.

Discussion

In this study, we used a nationally representative sample of working New Zealand adults to test the properties of recently developed scales to measure psychological capital (the PCQ) and authentic leadership (the ALQ). The results indicate that both measures are sound and perform as hypothesized. These findings offer several contributions to our knowledge of the questionnaires themselves, and also suggest some interesting directions for future investigation.

For one, the results reported here indicate that the scales function as predicted when used with typical New Zealand workers. This success in a representative national sample is important, as the PCQ and ALQ were developed to understand working adults (Little *et al.*, 2007), but had previously been tested only with students or limited samples (Luthans *et al.*, 2007a; Walumbwa *et al.*, 2008). The results presented here suggest that both questionnaires are appropriate for use in the majority of work and organizational contexts.

Moreover, since the results here are comparable to those of previous tests in other national cultures (Luthans *et al.*, 2007a; Walumbwa *et al.*, 2008), it appears that the PCQ and ALQ work the same in New Zealand as elsewhere. For the PCQ, this was the first test with any population outside the USA, and represents an important advance. For the ALQ, the success in New Zealand is added to previous work in the USA and China, and suggests that cultural differences in power distance (in addition to individualism, uncertainty avoidance, and long-term orientation) do not influence the measurement properties of the ALQ. However, one limitation of this paper is its single-culture data, making it impossible to demonstrate full measurement equivalence across cultures. Nonetheless, the results are consistent with theoretical predictions and comparable to those in previous studies, suggesting cultural equivalence. While there is a clear need for future

research to confirm and extend cultural equivalence, the data thus far suggest that both the PCQ and ALQ are internationally useful.

With regard to gender, the data did allow testing for measurement equivalence, and confirmed that it exists. Although there were some differences in the specific values provided by each gender (as discussed below), the underlying factor structures, loadings, and factor variances of psychological capital and authentic leadership were the same. This demonstrates that the PCQ and ALQ are equally valid and reliable for use with men and women, and that observed differences in their scores are not artifacts of instrument deficiencies.

Another contribution of these findings is to indicate the value of psychological capital and authentic leadership as inclusive, comprehensive constructs. We found a substantial number of pairwise tests between first-order factors that failed to show discriminant validity (e.g. the correlation between resilience and hope was not significantly different from 1.00 in men or women). While previous analyses of the PCQ have demonstrated discriminant validity among first-order factors (Luthans *et al.*, 2007a), our results are more consistent with the warning from Walumbwa *et al.* (2008, p. 101), who felt that their results with the ALQ suggested “that it might not be reasonable to conceptualize the measures (of the four first-order factors) as assessing entirely separate and distinct constructs.” In fact, given their warning, our findings, and prior evidence that the second-order constructs may be better predictors than their sub-components (Luthans *et al.*, 2007a), it seems prudent for future research to treat psychological capital and authentic leadership as second-order aggregates, rather analyzing each of their sub-components individually. Doing so offers the additional advantage of reducing the number of constructs under consideration from eight to two, which is important given that one of the key criticisms of POB research concerns the risk of construct proliferation (Cooper *et al.*, 2005; Fineman, 2006; Hackman, 2009).

More generally, the lack of first-order discriminant validity highlights potential considerations in the formatting of these questionnaires. In the present study, the survey instrument presented the PCQ and ALQ items in fully randomized order (i.e. not grouped by first-order factor). Although there is a long history of using both random intermingling (e.g. SWV; Wollack *et al.*, 1971) and grouping of similar items (JDI; Smith *et al.*, 1969), arguments have been made that intermingling reduces demand characteristics and other potential biases (Schriesheim *et al.*, 1989). In the present data, intermingling items across first-order factors may have contributed to lack of discriminant validity at that level. Consistent with this explanation, Walumbwa *et al.* (2008) also used cross-factor intermingling of items in their analysis of the ALQ, and reached the similar conclusion that the first-order factors may not be distinct, whereas Luthans *et al.* (2007a, b) grouped PCQ items by factor and reported distinct first-order factors. However, it should be noted that in personal communication with the first author, Luthans indicated that other studies of the PCQ have used cross-factor intermingling of items and shown first-order discriminant validity. Either way, informative comparison could be made in future work by having subjects complete both intermingled and factor-grouped versions of the questionnaires.

Another contribution of these findings lies in the successful use of a shortened version of the PCQ, one with 12-items, rather than the standard 24 (Luthans *et al.*, 2007a). Although other work has successfully used a shortened version of the PCQ (Luthans *et al.*, 2008a), this paper is

the first test of the short version's full factor structure. In stating this, it should be noted that our use of a shortened version may have contributed to the lack of first-order discriminant validity found in the PCQ (Harrison and McLaughlin, 1993). Nonetheless, the short version produced results consistent with theory and comparable to those of the full-length questionnaire. It is a limitation of the present study that both forms were not used to allow direct comparison, but the results suggest that the short version may be an equally valid, and more efficient, measure of psychological capital.

This paper's findings also highlight issues with implications for theory about authentic leadership and psychological capital. For one, despite a longstanding prediction that authentic leaders will increase their followers' psychological capital (Gardner and Schermerhorn, 2004), prior to this analysis, there has been no empirical test of the relationship (Luthans and Avolio, 2009). The findings here reveal a sizable positive correlation between the two constructs, which is consistent with the predicted effect. Our data do not allow conclusions about causality or the mechanisms involved in this relationship, but they do provide preliminary support for the hypothesized relationship. This suggests that fruitful work could be done examining when and how authentic leaders foster psychological capital among followers.

As well, comparing scores between genders raised interesting questions. In contrast to suggestions that men may be more resilient than women (Bonanno, 2004), the present data showed no systematic gender difference in reported resilience. However, there was one noteworthy gender difference. While women's lower reported self-efficacy seems consistent with related previous findings (Kling *et al.*, 1999), to our knowledge, there have been no predictions about a gender difference in the relationship between psychological capital and authentic leadership. Nonetheless, the results here show that while psychological capital and authentic leadership have the same fundamental structure for men and women, the relationship between the two constructs is weaker for women. If these findings are replicated, and it is shown that authentic leadership has a different relationship with women's psychological capital than with men's, it will be important to the development of theories about both constructs to understand the mechanisms behind this difference.

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