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Psychological Capital: Convergent and discriminant validity of a reconfigured measure

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Background: Although attention has been given to the importance of positivity in the workplace, it has only recently been proposed as a new way in which to focus on organisational behaviour. The psychological resources which meet the criteria for positive organisational behaviour best are hope, self-efficacy, optimism and resilience.

Aim: The purpose of this study was to investigate the construct validity of the Psychological Capital Questionnaire (PCQ), with specific reference to its psychometric properties.

Setting: The sample included a total of 1749 respondents, 60 each from 30 organisations in South Africa.

Methods: A multi-factorial model was statistically explored and confirmed (with exploratory factor analysis and confirmatory factor analysis, respectively).

Results: The results support the original conceptualisation and empirically-confirmed factorial composition of Psychological Capital (PsyCap) by four elements, namely *Hope*, *Optimism*, *Resilience* and *Self-efficacy*. However, the study yielded a three-factor solution, with *Hope* and *Optimism* as a combined factor and *Resilience* and *Self-efficacy* made up of a reconfigured set of substantively justifiable items (three of the original 24 items were found not to be suitable). The three reconfigured factors showed good psychometric properties, good fit (in support of construct validity) and acceptable levels of convergent and discriminant validity. Recommendations were made for further studies.

Conclusion: Based on the results obtained, it seems that the PCQ is a suitable (valid and reliable) instrument for measuring PsyCap. This study could thus serve as a reference for the accurate measurement of PsyCap.

Introduction

Human resources play a crucial role in the success of organisations and help them to achieve a sustainable competitive advantage. A number of studies have been conducted seeking to find effective ways to attract and manage talented employees (or human capital) and the part played by compensation, job design, work-life balance and growth opportunities, among others, have been examined (Barnett & Hall 2001; Johnson 2004; Olson 2003). However, nowadays, stimulated through positive psychology movements, there is a need to search beyond the human capital and to move the focus to positive Psychological Capital (PsyCap) (Luthans & Youssef 2004; Luthans, Youssef & Avolio 2007). PsyCap focuses not only on human capital ('who you are') but also on developing the 'who you want to become' or 'your best self' senses (Luthans et al. 2010). According to Luthans (2002), the positive psychology resources for PsyCap are self-efficacy, optimism, hope and resilience. To date, researchers support these four components of PsyCap (Dawkins et al. 2013; Du Plessis & Barkhuizen 2012; Görgens-Ekermans & Herbert 2013).

The purpose of this study is to build on work previously done by Luthans et al. (2007) through an examination of the instrument (psychometric) properties of the Psychological Capital Questionnaire (PCQ). Dawkins et al. (2013) found 29 studies (in English) concerning the PCQ in 2013. The studies reported by Dawkins et al. (2013) ranged in sample size from 80 to 1526 and took place mostly in homogeneous settings. These studies included sample populations such as employees in a specific organisation, students, marching band members, financial advisors and managers. Dawkins et al. (2013) suggested that, as part of this meta-study on previous research on the PCQ, further research should be conducted (outside of the founding PsyCap research team) and in more diverse settings. The authors could retrieve only three South African studies on PCQ (outside of those by the founding PsyCap research team). However, all three of these studies involved a homogeneous setting and had small sample sizes. The South African studies were

conducted by Du Plessis and Barkhuizen (2012), who reported on the properties of PCQs using a sample of 131 human resource practitioners; Görgens-Ekermans and Herbert (2013), using a sample consisting of 209 employees drawn from a mid-sized construction company and consisting of a race and gender distribution which is not representative of the South African population and workforce; and Pillay, Buitendach and Kanengoni (2014), sampling 11 call centre employees.

This study is intended to contribute by establishing a valid measure of PsyCap. Such a measure has been set by Luthans (2002), as well as Luthans et al. (2007). In contrast with the initial developmental work and studies on the PCQ (both locally and internationally) – which was based on relatively homogeneous samples – this study made use of a representative sample of the South African work force, with the sample including employees in both the private and public sectors.

The objectives of this study were, first, to determine the construct (factorial) validity of the original factorial composition of the PsyCap (Luthans et al. 2007) and second, if necessary, to develop a reconfigured factor structure should the original configuration yield unsatisfactory results. Finally, it was also the intention to support the notion of factorial validity through the application of discriminant and convergent validity.

Literature review

Meaning of Psychological Capital: Background

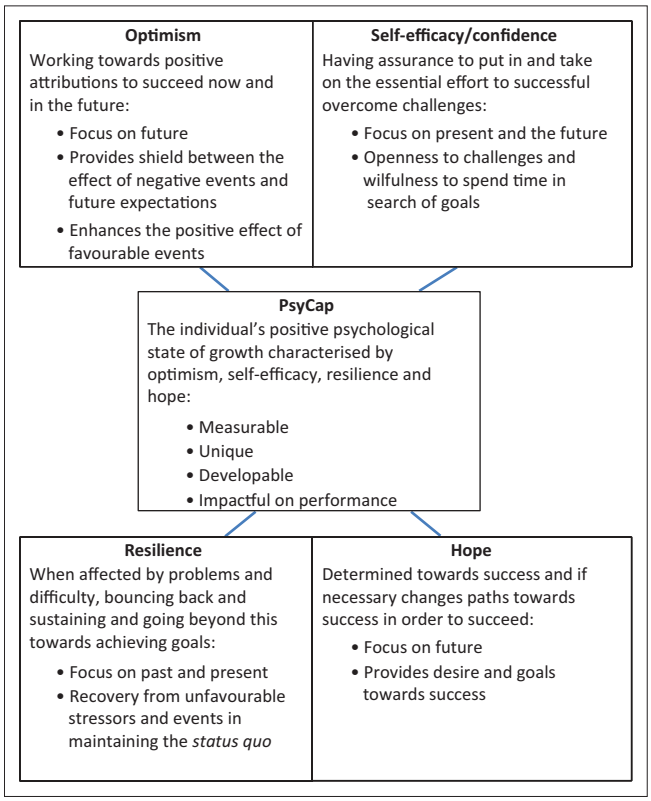
Although attention has been given to the importance of positivity in the workplace, it has only recently been proposed as a new way in which to focus on organisational behaviour (Cameron, Dutton & Quinn 2003; Luthans & Youssef 2007). Motivated by the new positive psychological movement, positive organisational behaviour can be defined as the application and study of positively-oriented human resource psychological capacities and strengths that can be developed, managed and measured for improved performance in the workplace (Luthans 2002). This newly-emerging, positive organisational behaviour recognises early history such as Herzberg's (1966) two-factor theory of job satisfaction, Maslow's (1954) hierarchy of needs and McGregor's (1960) Theories X and Y, as well as other contemporary research and theories which are positively-oriented. These include, among others, organisational commitment, job satisfaction, positive affectivity, organisational citizenship, core self-evaluations, organisational justice, intrinsic motivation, self-determination and humour (Luthans, Avolio et al. 2007).

The psychological resources which meet the criteria for positive organisational behaviour best are hope, self-efficacy, optimism and resilience (Luthans 2002; Luthans et al. 2007; Luthans, Avey & Patera 2008). Researchers such as Luthans and Youssef (2004, 2007) and Luthans et al. (2007) developed the term 'Psychological Capital'. According to these authors, Psychological Capital (or PsyCap) is a term used for positive organisational behaviour and can be defined as an individual's positive psychological state of development which is characterised by optimism (making positive attributions), self-efficacy (having confidence), resilience (to attaining success) and hope (redirecting paths to goals) (Luthans et al. 2007). According to Dawkins (2014), PsyCap can be defined as an individual's state of psychological development comprising resources such as optimism, self-efficacy, resilience and hope. According to Sapyaprapa, Tuicomepee and Watakakosol (2013), PsyCap has been developed to attain a supporting unity between the organisation and its employees and to put the organisation at a competitive advantage.

Dimensions of Psychological Capital

Authors such as Luthans and Youssef (2004), Luthans et al. (2007), Sapyaprapa et al. (2013), Dawkins (2014) and Pillay et al. (2014) agree that Psychological Capital has four dimensions, namely optimism, self-efficacy, resilience and hope, as reflected in Figure 1 below:

Optimism can be conceptualised in two dimensional constructs, namely (1) the degree of permanence (i.e. when positive events are seen as permanent and negative events are seen as temporary), and (2) pervasiveness (when positive causes are perceived as applicable to all events and negative causes are seen as applicable to some events) (Dawkins 2014). This means that optimistic people incorporate a positive explanatory style linking positive events directly to pervasive, internal and permanent causes, and negative events are



Source: Adapted from Dawkins, S.L., 2014, 'New directions in Psychological Capital research: A critical analysis and theoretical and empirical extensions to individual and team-level measurement', p. 9, Doctor of Philosophy, University of Tasmania

FIGURE 1: The individual PsyCap components.

linked to situation-specific, temporary and external factors (Seligman 2002).

Self-efficacy within the PsyCap context refers to an individual's confidence with regard to his/her ability to activate cognitive resources, establish a course of action and to find the motivation needed to successfully implement certain tasks in a given context (Stajkovic & Luthans 1998). In other words, when an individual's self-efficacy is high, he or she is more willing and able to face challenges and to extend his or her effort and motivation to successfully achieve goals (Dawkins 2014). According to Luthans et al. (2007), an individual with high self-efficacy cherishes five characteristics, namely: (1) setting high goals; (2) embracing challenges and then flourishing; (3) being self-motivated; (4) putting in effort to accomplish goals; and (5) persevering to overcome obstacles.

Resilience as a dimension of PsyCap is described by Luthans et al. (2007) as the ability to bounce back in order to attain success when affected by difficulty and problems. In the workplace, resilience assets are seen as protective factors used to reduce risk within an individual and his/her environment. Resilience assets may include temperament, spirituality, cognitive ability, a sense of humour, a positive outlook on life, initiative and emotional stability. Dawkins (2014) continues by saying that, on the other hand, resilience risk factors predict poor adjustment or negative outcomes and could include burnout and stress, lack of training and knowledge and unemployment (Dawkins 2014).

Hope as a PsyCap dimension can be defined as the willpower (to have positive expectations and goals) and the waypower (having alternative pathways in place to cope with these expectations should they not happen in the way they were supposed to) that employees have towards a certain goal (Luthans, Vogelgesang & Lester 2006).

PsyCap measurement

Luthans et al. (2007) developed the PCQ to measure PsyCap. The PsyCap questionnaire was developed by using published and pre-existing measures on the four PsyCap concepts (optimism, self-efficacy, resilience and hope). The measures varied in the number of items as well as Likert scale points and the degree to which these concepts were relevant and state-like to the workplace. Therefore, some the items were either eliminated or modified so that they fit into the PCQ (Dawkins et al. 2013). This questionnaire consists of 24 items and has four subscales which measures the four factors, namely, hope, self-efficacy, resilience and optimism. Each factor consists of six items. Examples of the items in the PCQ are *'I feel confident helping to set targets/goals in my work area'* (self-efficacy):

> 'If I should find myself in a jam at work, I could think of many ways to get out of it' [hope]; 'I usually take stressful things at work in stride' [resilience]; and 'When things are uncertain for me at work I usually expect the best' [optimism]. (p 1)

The PCQ follows a six-point Likert scale ranging from 1 to 6, (1 = strongly disagree and 6 = strongly agree). Respondents have to provide responses based on how they think about themselves right now. Dawkins et al. (2013) reported that the internal reliability of the PCQ was found to be relatively consistent across the 29 studies included in the meta-analysis. They further reported that optimism and resilience showed generally lower Cronbach alpha coefficients than the other two factors. This might be attributed to the inclusion of three negatively-worded or reversed items. However, the PCQ has also been criticised, despite the fact that this questionnaire is endorsed in the literature. Little, Gooty and Nelson (2007) criticised the PCA as they were of the view that the questionnaire is only conducted in a non-organisational setting. Dawkins et al. (2013) continued by suggesting that further research should be conducted (outside of the founding PsyCap research team) and in more diverse settings. This study is intended to contribute by establishing a valid measure of PsyCap.

Du Plessis and Barkhuizen (2012) have identified a three-factor structure for the PCQ through an exploratory factor analysis (EFA) with Hopeful-Confidence, Optimism and Resilience as factors, with Cronbach alpha coefficients of 0.86, 0.77 and 0.81 respectively. Görgens-Ekermans and Herbert (2013) on the other hand, after confirming the theoretical four-factor structure, reported acceptable Cronbach alpha coefficients for Hope and Self-efficacy. Similar to the findings of Dawkins et al. (2013), the Görgens-Ekermans and Herbert (2013) study reported Optimism and Resilience Cronbach alpha values of 0.67 and 0.69, respectively, which is regarded to be marginally acceptable, considering that $\alpha > 0.70$ is regarded as acceptable according to Nunnally and Bernstein (1994). Pillay et al. (2014), on the other hand, employed a principal component analysis on the PCQ, resulting in a one-factor solution, in other words, the subscales Hope, Optimism, Resilience and Self-efficacy all loaded on one factor with a Cronbach alpha value of 0.87.

Construct validity

An important scientific concept to evaluate the validity of a measure is construct validity. Construct validity is the extent to which a test measures the concept or construct that it is intended to measure. Construct validity is usually tested by measuring the correlation in assessments obtained from several scales purported to measure the same construct. There is no cut-off that defines construct validity. It is important to recognise that two measures may share more than construct similarity. Specifically, similarities in the way that constructs are measured may account for some covariation in scores, independent of construct similarity (DeVellis 2003).

Benson (1998) described three necessary components to developing a strong case for construct validity: (1) a substantive component, (2) a structural component, and (3) an external component. All three are fundamental in creating a case for construct validity. The substantive component of

construct validity involves theoretical and empirical definition of the domain of interest so that potential variables, or observables, of a construct are adequately represented in measurable ways. In the case of this study, the overall conceptualisation of the composite construct PsyCap (and its four components, optimism, self-efficacy, resilience and hope) would be accepted and would not be contested on a theoretical level, except if the results were to indicate a serious defect in this conceptualisation.

The first objective of this study was to examine the structural component, construct validity, that involves the inspection of the internal relationships among items or subscales representing a particular measure, using such statistical analyses as correlations, exploratory and confirmatory factor analyses, and reliability analyses. The external component entails establishing a nomological net, or examining the relationships between the construct of interest and related constructs.

This external investigation of construct validity entails both convergent and discriminant validity. Researchers emphasise that this third step is particularly critical in establishing necessary validity evidence for a scale (Benson 1998; Benson & Hagtvet 1996) and, consequently, such a step was conducted as part of this study and in support of various other correlational studies between previous PsyCap and positive organisational behaviour constructs such as Larson and Luthans (2006), Pillay et al. (2014) (organisational commitment), Shaik and Buitendach (2015) (locus of control), Cheung, Tang and Tang (2010), Hansen, Buitendach and Kanengoni (2015) and Larson and Luthans (2016) (job satisfaction), Avey, Luthens and Youssef (2010) (intention to quit), Avey, Wernsing and Luthans (2008) (engagement), Avey, Luthens et al. (2010), Avey et al. (2008), Gooty et al. (2009), Norman et al. (2010) (organisational citizenship behaviour), Luthans et al. (2007), as well as Luthans et al. (2010) (performance).

Research design

Research approach

This study employed a typical empirical paradigm using a cross-sectional design and quantitative analysis. Surveys were used as a data generation technique. Leedy and Ormrod (2014) highlighted the fact that a cross-sectional design involves sampling and comparing people from several different demographic groups. This approach enables the researcher to collect the required data at the same time.

Research participants

The population (N) of the study is the employees of 30 organisations, with the sample being 60 employees per organisation selected randomly by the participating co-researchers.

The characteristics of the participants in terms of the three relevant demographical variables, namely sector, race and gender, are reported in Table 1 (only the valid responses are reported).

The total sample consisted of 1749 participants. In terms of the racial distribution, the majority of the participants were African (61%), followed by white (20.8%), mixed race (9.7%) and Indian (7.7%). The representation of the gender groups was slightly higher for men at 52.8% compared to 46.7% for women. The racial and gender distribution of the sample seems to be relatively representative of the South African workforce in general, taking into consideration that the distribution of the workforce as indicated in Statistics South Africa (2015) was 73.4% African, 12.7% whites, 3.2% Indians and 10.7% mixed race. According to the same source, the proportion of men in employment is 56.3% while the proportion for women stands at 43.7%.

The characteristics of the participants in terms of the mean age as well as mean tenure, both expressed in years, are reported in Table 2.

The mean age of the respondents was 38.44 years (SD = 9.53), and the mean tenure in the specific organisation was 8.83 years (SD = 7.67).

Statistical analysis

The statistical analysis was conducted with the use of Statistical Package for the Social Sciences (SPSS), version 23. The statistical analysis was performed by using SPSS 23, supported by SPSS Amos (Analysis of Moment Structures).

The dataset was first cleaned up by means of case screening, followed by variable screening in order to explain why there was variation in the data. It was deemed necessary to follow this process to ensure that there were no missing values in the dataset and also to get a feel for the dataset. The dataset was further inspected for unengaged responses by running a standard deviation on inspected cases with $SD < 0.50$. The variables were further screened by means of Kurtosis and the Central Limit Theorem, in order to gather information about the distribution of the data. This information was used in

TABLE 1: Sample characteristics – Frequencies Of demographical variables, race, gender and the sector in which employed.

Variable	Category	*n*	%
Race	African	1067	61.0
	Mixed race	170	9.7
	Indian	134	7.7
	White	363	20.8
Gender	Female	816	46.7
	Male	924	52.8
Sector	Private	984	56.3
	Public	765	43.7

TABLE 2: Age and tenure statistics of the sample (n = 1749).

Category	*M*	*SD*	*n*
Age	38.44	9.53	1622
Tenure	8.83	7.67	1674

M, Mean; SD, Standard deviation.

parametric statistic techniques applied in this study. From the data cleaning process it was deduced that the missing values were very sparse and therefore they were not considered a main contributor to any bias. No cases were therefore removed.

The first step of the factor analysis was to evaluate the appropriateness of the sample size. The item to respondent ratio is ±1:73, which is acceptable according to Meyers, Gamst and Guarino (2013) and Tabachnick and Fidell (2007). Second, the inter-correlations between items were inspected using Bartlett's test of sphericity (Hair et al. 2010). With this test, the statistic generated should be significant ($p < 0.05$) for an EFA to be considered an appropriate technique (Hair et al. 2010). Finally, the Kaiser-Meyer-Olkin (KMO) measure was used to quantify whether the items correlated sufficiently in order to determine whether a factor analysis could be performed. The minimum level set for this statistic is 0.60 (Tabachnick & Fidell 2007).

To aid in the interpretation of the initial results, oblique rotation and specifically the Promax rotation was used, as it is assumed (based on the relevant literature) that the factors are correlated (Tabachnick & Fiddell 2007). The decision regarding the number of variables (factors) to be retained was based on the Guttman-Kaiser eigenvalue greater-than-one rule (K1 rule), together with the scree plot (with specific reference to the shape of the curve) and, lastly, the Monte Carlo PCA for parallel analysis. Meyers et al. (2013) indicate that a guide for variance accounted for by the factors needs to meet the lower limit of 50%.The Cronbach alpha coefficient was determined for factors of the instrument, taking into consideration that the general rule according to Nunnally and Bernstein (1994) is $\alpha > 0.70$.

To operationalise this construct definition, a higher order, multidimensional model of the PsyCap construct was conducted by means of a confirmatory factor analysis (CFA). CFA is generally intended to examine whether a second-order ethical risk factor exists and whether it explains the relationships among the five lower-order factors (as identified by the exploratory factor analysis) with Analysis of Moment Structures maximum likelihood procedure (Byrne 2010). To assess the model fit, several fit indices were used, including the comparative fit index (CFI), the root mean square error of approximation (RMSEA), chi-square (χ^2), and the ratio of the differences in chi-square to the differences in degrees of freedom (χ^2/df). Given that there is no one acceptable cut-off value of what constitutes adequate fit, it was elected to evaluate each model and to recommend the model closest to the CFI value of 0.90, an RMSEA value of 0.05 and χ^2/df, a ratio of less than 5.00 or lower (Byrne 2010).

The first model was a one-factor solution (unidimensional) in which all the items identified through the exploratory factor analysis were indicative of one larger PsyCap factor. The second was a first-order factor model in which items were allowed to load onto their respective factors. The third was a second-order factor model in which items were loaded onto their respective factors and the factors loaded on a second-order latent PsyCap factor.

The validity of the PCQ was also established, according to the various definitions and types of validity provided. Cohen, Swerdlik and Sturman (2013) are of the opinion that validity is, in short, an estimation of how well a test measures what it is intended to measure. For the purposes of this study, the main focus will be on construct validity, which is an estimate of how the construct (which is intended to be measured) behaves in relation to other constructs and related measures (DeVellis 2003). Thus, 'to evaluate the construct validity of a test, we must amass a variety of evidence from numerous sources' (Gregory 2011:119). An additional rigorous test of construct validity is the so-called factorial validity, which is based on the results of factor analysis, with the primary purpose of defining the underlying structure among the variables included in the analysis (Hair et al. 2010). When the instrument displays the expected structure internally, this could be indicative of construct validity (Moerdyk 2009) and, specifically, factorial validity.

The strategy adopted for model cross-validation was to use a combination of the Likelihood Ratio Test (differences in χ^2 or chi-square difference between the models), the difference in Tucker–Lewis Index (TLI) which should be less than or equal to 0.05 and lastly the comparison of the expected cross-validation index (ECVI) point estimates. If the model cross-validates well, there should be little, if any, difference between the chi-squares and ECVI point estimates for the calibration and validation samples.

Information on convergent validity was created by calculating the correlation between the PCQ (and its components/factors) and several other measures. It was hypothesised, supported by previous studies and literature, that Psychological Capital would correlate significantly with (developers indicated, with the Cronbach alpha coefficients (α) as determined in this overall study): *Passion for work*, including the sub-factors *Harmonious passion* ($\alpha = 0.87$) and *Obsessive passion* ($\alpha = 0.89$) (Vallerand & Houlfort 2003); *Person-organisational fit*, including *Supplementary fit* or Indirect fit (organisation fit as values congruence) ($\alpha = 0.91$) and *Complementary fit* or Direct fit (needs–supplies fit and demand) ($\alpha = 0.87$) (Cable & DeRue 2002; Grobler 2016); and lastly, *Organisational energy*, which comprises an *affective* ($\alpha = 0.96$), *behavioural* ($\alpha = 0.84$) and *cognitive* ($\alpha = 0.86$) dimension (Cole, Bruch & Vogel 2012).

A correlation of 0.4 is an indication of convergence with 0.50 and higher – a clear sign of convergence (Cohen et al. 2013; Gregory 2011) – and is often referred to as the heterotrait-mono method coefficient. This entails correlations between measures of different traits that are furnished by the same method of measurement, with the opposite being heterotrait-hetero method coefficients (correlations between measures of different traits that are obtained using different measurement methods).

Multiple regression was used to assess the discriminant validity of the factors. The PCQ factors will be used as independent (or predictor) variables in a multiple regression, with the hypothesised related constructs mentioned above as dependant variables. The rationale is to inspect the beta values, and to determine whether discriminant validity exists through the unique contribution of the PCQ factors when the beta values are inspected.

Ethical consideration

Ethical clearance was obtained from the Unisa Graduate School of Business Leadership's research ethical committee before the field work was conducted. The ethical clearance application included all the standard items such as: consent of participants (with an explanation of the study); permission to conduct the study in the respective organisations; inclusion criteria and the methodology to be used (pencil and paper). The research ethics clearance certificate is dated 16 February 2016, with reference number 2016_SBL_002_CA.

Results

An initial analysis of the PCQ was done through the assessment of the Cronbach alpha coefficient of the original factors and the results, together with the descriptive statistics of the four factors, are reported in Table 3.

The Cronbach alpha coefficients (α) of the factors were acceptable for *Self-efficacy* (0.90), *Hope* (0.86) and, to some extent, *Resilience* with 0.67, when the guideline of $\alpha > 0.7$ (Tabachnick & Fidell 2007) is applied. *Optimism* reported a low Cronbach alpha value with 0.55, which is probably due to the negative or reversed items (20 and 23). The results are consistent with previous studies reported in Dawkins et al. (2013), although the α of 0.55 for *Optimism* is even lower than the 0.65 reported by Avey, Patera and West (2006), and 0.63 by Roberts, Scherer and Bowyer (2011). The total *Psychological Capital* reported a 0.90 Cronbach alpha coefficient.

TABLE 3: Descriptive statistics, Cronbach's alpha coefficient of the original PCQ factors.

Variable	Items	Mean	*SD*	Skewness	Kurtosis	α
Self-efficacy	1–6	4.67	0.90	-0.95	1.06	0.90
Hope	7–12	4.63	0.78	-0.83	1.74	0.86
Resilience	13–18	4.50	0.66	-0.30	0.48	0.67
Optimism	19–24	4.24	0.64	-0.04	0.37	0.55
Total PsyCap	1–24	4.51	0.61	-0.51	0.83	0.90

SD, Standard deviation; α, alpha.

TABLE 4: Comparison of *a priori* Psychological Capital Questionnaire factor structure (original factor structure).

Structure	χ^2	*df*	$\chi^{2/df}$	$\Delta\chi^2$	CFI	RMSEA
One-factor model†	5549	252	22.02	-	0.72	0.110
First-order factor model	2041	224	9.11	$3508^{a\text{-}b*}$	0.90	0.068
Second-order factor model	2104	226	9.31	3445^{c*}	0.90	0.069

Note: All chi-square values are significant at $p < 0.001$; the Δχ2 is in relation to one-factor model.

CFI, comparative fit index; RMSEA, root mean square error of approximation.

†, all 24 items as determined by the exploratory factor analysis; *, $p < 0.01$ (two-tailed); a, One-factor model; b, First-order factor model; c, Second-order factor model.

The structural validity of the original PsyCap factor structure was further analysed by means of a CFA. Missing values in the dataset, related to the PCQ constructs, were deleted case-wise as the total dataset consisted of enough cases to accommodate this measure (the deletion was less than 5% which is considered to be the limit). A test for normality was performed.

The results of the three models tested are reported in Table 4 in terms of the respective fit indexes (comparative fit index, root mean square error of approximation, chi-square and the ratio of the differences in chi-square to the differences in degrees of freedom). The results of the assessment of the *a priori* PCQ factor structure (original factor structure) of Luthans et al. (2007) as used in South African studies by Görgens-Ekermans and Herbert (2013), Pillay et al. (2014), Shaik and Buitendach (2015) and Hansen et al. (2015), are reported in Table 4.

The first-order factor model, with *Self-efficacy*, *Hope*, *Resilience* and *Optimism* as factors, reported slightly better fit results (CFI = 0.90, RMSEA = 0.068) compared to the second-order model (with the sub-factors leading to a super factor, namely *Psychological Capital* (CFI = 0.90, RMSEA = 0.069).

It was further decided to assess the goodness of fit of the factor structure as determined by Du Plessis and Barkhuizen (2012), testing it against the sample of this study. They have identified a three-factor structure for the PCQ with *Hopeful-Confidence* (items 24, 20, 17, 15, 5, 21, 14, 16, 6, 10, 9 and 7), *Optimism* (items 12, 11, 13, 19, 18, 8 and 1) and *Resilience* (items 2, 23, 22, 3 and 4) as factors. The first-order model, with all 24 items loading onto the three factors, yielded the best (although not acceptable) goodness of fit results, with CFI and RMSEA values of 0.82 and 0.091, respectively.

Due to the relatively poor psychometric properties reported in Table 3, and the relatively poor fit statistics of the original factor structure as well as the structure determined by Du Plessis and Barkhuizen (2012) within the South African context, it was decided to conduct an EFA. In order to determine the suitability and appropriateness of a factor analysis on the existing instrument with 24 items, Bartlett's test of sphericity and the KMO were performed. The Bartlett's test of sphericity $\chi^2(276) = 19\,157.12$, $p < 0.001$, indicated that correlations between the items were sufficiently large for an EFA. The KMO value was 0.94, which is higher than the critical value of 0.60; in other words, both these criteria meet the criteria to perform an EFA.

The K1 rule was used in conjunction with the scree plot to determine the number of factors. The Kaiser's criterion focusing on eigenvalues >1 was performed and is reported in Table 5.

Five factors reported eigenvalues >1, with the first factor explaining 36.12% of the variance in the construct *Psychological Capital*, followed by 7.77%, 7.08%, 5.58% and 4.49% of factors

TABLE 5: Eigenvalues >1 and explanation of variance.

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	8.67	36.12	36.12
2	1.87	7.77	43.89
3	1.70	7.08	50.99
4	1.34	5.58	56.55
5	1.08	4.49	61.03

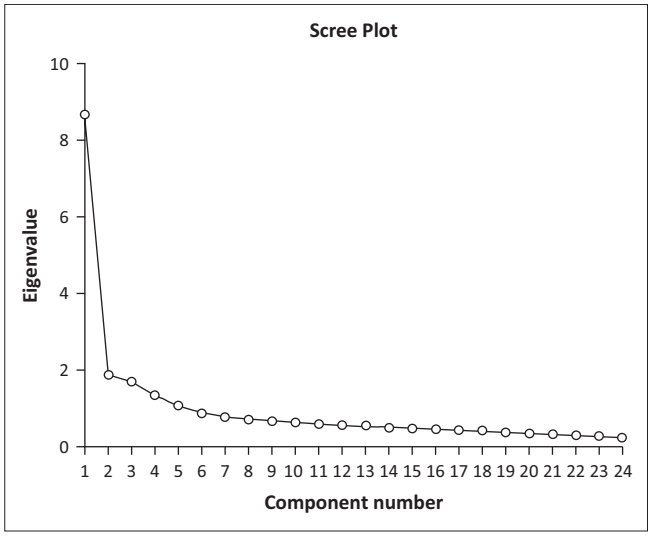


FIGURE 2: Cattell's scree plot.

two to five, respectively. The total variance explained by the five factors is 61.03%. In order to determine the number of factors to retain in the factor structure, the Cattell's scree test was performed and the results are reported in Figure 2.

Due to the fact that the interpretation of the scree plot does not yield a clear answer in terms of the number of factors to retain, the Monte Carlo parallel analysis simulation technique was utilised. The eigenvalues obtained from the actual data are compared to the eigenvalues obtained from the random data. If the actual eigenvalues from the principal component analysis from the actual data are greater than the eigenvalues from the random data, then the factor is retained. The results are reported in Table 6.

The results of the Monte Carlo parallel analysis yielded a four-factor model. The four factors accounted for 56.55% of the total variance (see Table 5). The results of the correlational analysis (Pearson correlation) are reported in Table 7.

The correlations between the F^1, F^2 and F^3 factors were relatively high, ranging between 0.59 and 0.65. F^4, however, reported low (although statistically significant) correlations with the other three factors. The fact that factors are strongly related overall suggests the appropriateness of an oblique factor rotation method and, consequently, Promax rotation was used. The results of each of the four factors are summarised in Tables 8 to 11. These tables include the factor loadings, commonalities, percentage variation of the first-order factor withdrawal and Promax rotation of the four respective factors, including the descriptive statistics and psychometric properties.

TABLE 6: Results of the Monte Carlo parallel analysis.

Component	Actual eigenvalues from principal component analysis	Criterion value from parallel analysis	Decision
1	8.67	1.21	Accept
2	1.87	1.19	Accept
3	1.70	1.16	Accept
4	1.34	1.14	Accept
5	1.08	1.12	Reject

TABLE 7: Pearson correlations between extracted factors (n = 1749).

Extracted factors	F^1	F^2	F^3	F^4
F^1	1.00	-	-	-
F^2	0.61*	1.00	-	-
F^3	0.59*	0.65**	1.00	-
F^4	-0.12*	-0.09**	-0.08**	1.00

*, Correlation is significant at the $p \leq 0.05$ level (2-tailed); **, Correlation is significant at the $p \leq 0.001$ level (2-tailed).

F^{1-4}, represents the extracted factors (unnamed at this stage).

The factor loadings also ranged between 0.43 and 0.93 for the four factors. The criteria of a factor loading cut-off point of 0.40 for inclusion in the interpretation of a factor (Hair et al. 2010; Meyers et al. 2013) resulted in all 24 items being included in the instrument, with significant factor loadings on two.

F^1: *Self-efficacy*, which is a composite dimension of the original instrument by Luthans et al. (2007), has seven items, with six items from the original self-efficacy factor (PsC1–6) and one item (PsC7) from the original hope factor. F^2: *Hope & Optimism* has eight items and is also a composite factor (in terms of the original factor structure), with four items each (eight in total) from the original hope factor (PsC8,10,11,12) and the original optimism factor (PsC19,21,22,24). F^3: *Resilience* (total five items) also consists of items from two of the original factors of Luthans et al. (2007), with four from the original resilience factor (PsC14–17) and one from the hope factor (PsC7). The last factor is the only factor not in the Luthans et al. (2007) factor structure, called for the purpose of this study, *Buoyancy*. The obvious factor name would have been Pessimism (as also alluded to by Dawkins et al. 2013), but due to the fact that PsyCap falls within the domain of positive organisational behaviour, it was decided to name it positively. It consists of one item from the original resilience factor (PsC13) and two from the original optimism factor (PsC20,23). The commonalities (h^2) of the items are relatively high (> 0.30).

The items as well as the factors were tested for multivariate normality. All the items, as well as the factors reporting skewness and kurtosis values for both factors, do not exceed the critical values of 2 and 7, respectively (West, Finch & Curran 1995), which means that the normality assumption was met for this sample and no data transformations would be required.

The Cronbach alpha coefficients (α) of *Self-efficacy*, *Hope & Optimism* and *Resilience* were acceptable (0.90, 0.85 and 0.79, respectively) when the guideline of $\alpha > 0.70$ (Tabachnick & Fidell 2007) was applied. The fourth factor, *Buoyancy*,

TABLE 8: Factor 1 – Self-efficacy.

Number	Item	Original factor†	Factor loading	h^2	*M*	*SD*	Mean (/6)	Skewness	Kurtosis	Cronbach alpha
PsC1	'I feel confident analysing a long-term problem to find a solution.'	Self-efficacy	0.65	0.54	4.81	0.90	-	-	-	-
PsC2	'I feel confident in representing my work area in meetings with management.'	Self-efficacy	0.72	0.63	4.78	0.94	-	-	-	-
PsC3	'I feel confident contributing to discussions about the company's strategy.'	Self-efficacy	0.93	0.72	4.40	1.17	-	-	-	-
PsC4	'I feel confident helping to set targets/goals in my work area.'	Self-efficacy	0.89	0.76	4.63	1.15	-	-	-	-
PsC5	'I feel confident contacting people outside the company (e.g., suppliers, customers) to discuss problems.'	Self-efficacy	0.90	0.67	4.62	1.26	-	-	-	-
PsC6	'I feel confident presenting information to a group of colleagues.'	Self-efficacy	0.89	0.72	4.75	1.14	-	-	-	-
PsC7	'If I should find myself in a jam at work, I could think of many ways to get out of it.'	Self-efficacy	0.51	0.49	4.62	1.02	-	-	-	-
Total	-	-	-	-	-	**0.86**	**4.66**	**-0.85**	**0.77**	**0.90**

†, Luthans, F., Avolio, B.J., Avey, J.B. & Norman, S.M., 2007, 'Positive psychological capital: Measurement and relationship with performance and satisfaction', *Personnel Psychology* 60, 541–572. https://doi.org/10.1111/j.1744-6570.2007.00083.x

TABLE 9: Factor 2 – Hope & Optimism.

Number	Item	Original factor†	Factor loading	h^2	*M*	*SD*	Mean (/6)	Skewness	Kurtosis	Cronbach alpha
PsC8	'At the present time, I am energetically pursuing my work goals.'	Hope	0.61	0.65	4.60	1.04	-	-	-	-
PsC10	'Right now I see myself as being pretty successful at work.'	Hope	0.63	0.56	4.53	1.05	-	-	-	-
PsC11	'I can think of many ways to reach my current work goals.'	Hope	0.71	0.63	4.67	0.97	-	-	-	-
PsC12	'At this time, I am meeting the work goals that I have set for myself.'	Hope	0.51	0.47	4.56	1.01	-	-	-	-
PsC19	'When things are uncertain for me at work, I usually expect the best.'	Optimism	0.45	0.43	4.32	1.02	-	-	-	-
PsC21	'I always look on the bright side of things regarding my job.	Optimism	0.86	0.57	4.60	1.05	-	-	-	-
PsC22	'I'm optimistic about what will happen to me in the future as it pertains to work.'	Optimism	0.88	0.56	4.47	1.16	-	-	-	-
Total	-	-	-	-	-	**0.74**	**4.51**	**-0.66**	**1.54**	**0.85**

†, Luthans, F., Avolio, B.J., Avey, J.B. & Norman, S.M., 2007, 'Positive psychological capital: Measurement and relationship with performance and satisfaction', *Personnel Psychology* 60, 541–572. https://doi.org/10.1111/j.1744-6570.2007.00083.x

TABLE 10: Factor 3 – Resilience.

Number	Item	Original factor†	Factor loading	h^2	*M*	*SD*	Mean (/6)	Skewness	Kurtosis	Cronbach alpha
PsC9	'There are lots of ways around any problem.'	Hope	0.44	0.47	4.80	1.06	-	-	-	-
PsC14	'I usually manage difficulties one way or another at work.'	Resilience	0.70	0.54	4.66	0.89	-	-	-	-
PsC15	'I can be 'on my own', so to speak, at work if I have to.'	Resilience	0.80	0.54	4.69	1.06	-	-	-	-
PsC16	'I usually take stressful things at work in stride.'	Resilience	0.45	0.34	4.14	1.19	-	-	-	-
PsC17	'I can get through difficult times at work because I've experienced difficulty before.'	Resilience	0.87	0.67	4.76	1.01	-	-	-	-
PsC18	'I feel I can handle many things at a time at this job.'	Resilience	0.43	0.54	4.67	0.92	-	-	-	-
Total	-	-	-	-	-	**0.71**	**4.62**	**-0.63**	**1.52**	**0.79**

†, Luthans, F., Avolio, B.J., Avey, J.B. & Norman, S.M., 2007, 'Positive psychological capital: Measurement and relationship with performance and satisfaction', *Personnel Psychology* 60, 541–572. https://doi.org/10.1111/j.1744-6570.2007.00083.x

reported a below-acceptable Cronbach alpha value with $\alpha = 0.60$, although such a value could be tolerated under exploratory circumstances (Clark & Watson 1995; Nunnally & Bernstein 1994). A possible cause of this low Cronbach alpha value is the relatively few items (three) that loaded onto this factor. Field (2009) is of the opinion that it is difficult to achieve high coefficients when a scale consists of only a few items. This is also the factor with the only negative or reversed items, which are known to impact negatively on the Cronbach alpha coefficient (DiStefano & Motl 2006; Jackson Barnette 2000).

A similar process, as described in Table 5, was followed to validate the adapted PCQ factor structure by means of a CFA. The results of the three models tested are reported in Table 12 in terms of the respective fit indices.

TABLE 11: Factor 4 – Buoyancy.

Number	Item	Original factor†	Factor loading	h^2	*M*	*SD*	Mean (/6)	Skewness	Kurtosis	Cronbach alpha
PsC13	'When I have a setback at work, I have trouble recovering from it, moving on.'	Resilience	0.68	0.47	2.91	1.33	-	-	-	-
PsC20	'If something can go wrong for me work-wise, it will.'	Optimism	0.80	0.63	3.29	1.22	-	-	-	-
PsC23	'In this job, things never work out the way I want them to.'	Optimism	0.71	0.57	3.02	1.34	-	-	-	-
Total	-	-	-	-	-	**0.96**	**3.08**	**0.20**	**-0.15**	**0.60**

†, Luthans, F., Avolio, B.J., Avey, J.B. & Norman, S.M., 2007, 'Positive psychological capital: Measurement and relationship with performance and satisfaction', *Personnel Psychology* 60, 541–572. https://doi.org/10.1111/j.1744-6570.2007.00083.x

TABLE 12: Comparison of *a priori* Psychological Capital Questionnaire four-factor structure (adapted factor structure).

Structure	χ^2	df	$\chi^{2/df}$	$\Delta\chi^2$	CFI	RMSEA
One-factor model†	5549	252	22.02	-	0.72	0.110
First-order factor model	1806	222	8.14	3 743[a-b*]	0.92	0.064
Second-order factor model	1808	224	8.07	3 741 [a-c*]	0.92	0.063

Note: All chi-square values are significant at $p < 0.001$; the $\Delta\chi^2$ is in relation to one-factor model.

CFI, comparative fit index; RMSEA, root mean square error of approximation.

†, all 24 items as determined by the exploratory factor analysis; *, $p < 0.01$ (two-tailed); a, One-factor model; b, First-order factor model; c, Second-order factor model.

TABLE 13: Convergent validity of the adapted (reconfigured) Psychological Capital Questionnaire factors by means of correlations (Pearson) with other related measures.

Variable	Self-efficacy	Hope & Optimism	Resilience	Buoyancy	Psycap total
Harmonious passion	0.43**	0.49**	0.29**	-0.05	0.47**
Obsessive passion	0.21**	0.31**	0.15**	0.21**	0.21**
Passion for work total	0.36**	0.46**	0.25**	0.11**	0.39**
Supplementary fit	0.39**	0.34**	0.24**	0.01	0.37**
Complementary fit	0.35**	0.43**	0.24**	-0.05*	0.40**
Person-organisational fit total	0.43**	0.44**	0.27**	-0.02	0.44**
Organisational energy: Affective	0.35**	0.34**	0.08**	0.00	0.31**
Organisational energy: Cognitive	0.50**	0.36**	0.22**	-0.02	0.42**
Organisational energy: Behavioural	0.47**	0.38**	0.27**	-0.03	0.43**
Organisational energy total	0.50**	0.41**	0.21**	-0.02	0.44**

*, Correlation is significant at the $p < 0.05$ level (2-tailed); **, Correlation is significant at the $p \leq 0.001$ level (2-tailed).

Assessment of the best-fitting model within the three models was conducted through the application of CFA. The one-factor model (all 24 items) was identified as the worst-fitting model (CFI = 0.72, RMSEA = 0.110). By analysing the chi-square test values, it further appears that the first-order factor model is slightly better than the second-order factor model. The difference in chi-square between the second-order factor and first-order factor models is 2 (i.e., 3743–3741), which is distributed as chi-square with 222–224 = 2 degrees of freedom. The best-fitting model is thus the first-order model ($model_b$) in which all 24 items loaded directly on their respective factors (i.e. *Self-efficacy*, *Hope & Optimism*, *Resilience* and *Buoyancy*).

The convergent validity of the PCQ was investigated by comparing it to a range of instruments which were also used in the broader study. These instruments and constructs are within the domain of positive organisational behaviour and were selected because of their hypothesised relationship with the PsyCap construct. The instruments/constructs used are: *Passion for work*, including the sub-factors *Harmonious passion* and *Obsessive passion*; *Person-organisational fit*, including *Supplementary fit* and *Complementary fit*; and lastly, *Organisational energy*, which comprises *Affective*, *Cognitive* and *Behavioural dimensions*. The results are reported in Table 13.

From Table 13, it can be read that *Self-efficacy* as well as *Hope and Optimism* reported relatively high correlations with the related constructs (ranging from $r = 0.21$ to $r = 50$, $p \leq 0.001$). Especially high correlations were reported with *Passion for Work: Harmonious passion* ($r = 0.43$ and $r = 0.49$, respectively, with $p \leq 0.001$) and *Person-organisational fit* ($r = 0.43$ and 0.44, respectively), and on all the *Organisational energy* factors, including the total *Organisational energy* with $r = 0.50$ and $r = 0.41$ for *Self-efficacy* as well as *Hope & Optimism*, respectively ($p \leq 0.001$). *Resilience* reported small to moderate correlations with all the related constructs (ranging from $r = 0.15$ to $r = 0.29$, $p \leq 0.001$), except for the *Organisational energy: Affective dimension* ($r = 0.08$, $p \leq 0.001$). The *Buoyancy* factor reported only two small, significant ($p < 0.05$) correlations, with *Passion for Work: Obsessive passion* and *Passion for Work: Total* with $r = 0.21$ and $r = 0.11$, respectively.

The correlation coefficients reported for *Self-efficacy* as well as *Hope & Optimism* and to some extent *Resilience*, may be seen as an indication that convergent validity exists. Very little evidence of convergent validity is, however, found for *Buoyancy*.

In order to determine discriminant validity, multiple regressions were performed with *Passion for work, Person-organisational fit,* and *Organisational energy* (each with its respective factors) as dependent variables (each one separately) and *Self-efficacy*, *Hope & Optimism*, *Resilience*, and *Buoyancy* as independent or predictor variables. The rationale for this procedure is to determine the uniqueness of the contribution (and therefore discriminant validity) of the respective PsyCap factors to the explanation of the variance in the dependent variables. The results are reported in Table 14, with the large differences in betas (ß) marked in bold to indicate discriminant validity.

TABLE 14: Discriminant validity of the adapted (reconfigured) Psychological Capital Questionnaire factors.

Variable	Self-efficacy		Hope & Optimism		Resilience		Buoyancy		R^2
	ß	*SE*	*ß*	*SE*	*ß*	*SE*	*ß*	*SE*	
Harmonious passion	0.21*	0.02	0.44*	0.03	-0.13*	0.03	0.02	0.02	0.28*
Obsessive passion	0.01*	0.03	0.40*	0.04	-0.13*	0.04	0.22*	0.02	0.16*
Passion for work total	0.15*	0.02	0.41*	0.03	-0.13*	0.03	0.11*	0.02	0.25*
Supplementary fit	0.33*	0.03	0.26*	0.04	-0.09*	0.04	-0.05	0.02	0.17*
Complementary fit	0.17*	0.03	0.44*	0.03	-0.15*	0.03	-0.01	0.02	0.21*
Person-organisational fit total	0.25*	0.02	0.35*	0.03	-0.12*	0.02	0.02	0.02	0.24*
Organisational energy: Affective	0.36*	0.03	0.46*	0.04	-0.46*	0.04	0.05	0.02	0.21*
Organisational energy: Cognitive	0.44*	0.02	0.18*	0.03	-0.19*	0.03	0.03	0.02	0.27*
Organisational energy: Behavioural	0.41*	0.03	0.23*	0.03	-0.11*	0.04	0.02	0.02	0.24*
Organisational energy total	0.40*	0.02	0.28*	0.03	-0.25*	0.03	0.03	0.02	0.30*

*, Significant at the $p \leq 0.001$ level.

Note: The large differences in betas (ß) are marked in bold to indicate discriminant validity.

TABLE 15: Comparison of *a priori* Psychological Capital Questionnaire three-factor structure (adapted factor structure).

Structure	χ^2	df	$\chi^{2/df}$	$\Delta\chi^2$	CFI	RMSEA
One-factor model†	3694	228	16.02		0.63	0.093
First-order factor model	1343	162	8.30	4206[a-b]*	0.93	0.065
Second-order factor model	978	141	6.93	4571[a-c]*	0.95	0.058

Note: All chi-square values are significant at $p < 0.001$; the $\Delta\chi^2$ is in relation to one-factor model.

CFI, comparative fit index; RMSEA, root mean square error of approximation.

†, all 24 items as determined by the exploratory factor analysis; *, $p < 0.01$ (two-tailed); a, One-factor model; b, First-order factor model; c, Second-order factor model.

All the multiple regression results, as reported in Table 14, are statistically significant ($p \leq 0.001$). The beta (*ß*) values reported indicate the uniqueness of the four factors in terms of their contribution in explaining the variance in the related constructs. This is an indication of discriminant validity, but, consistent with the convergent validity, *Buoyancy's* contribution, although unique, is relatively limited with only two beta (*ß*) values that are statistically significant ($p < 0.05$), on *Passion for work: Obsessive passion* and *Passion for work: Total*.

Due to the relatively poor psychometric properties, and convergent as well as discriminant validity results, a CFA was conducted with the exclusion of the *Buoyancy* factor. The results are reported in Table 15.

The best-fitting model, after the assessment of the three CFA models, is thus the second-order model (model$_c$) in which the reduced number of items (21 of the original 24) loading on *Self-efficacy*, *Hope & Optimism* and *Resilience*, and these factors contribute to a secondary factor, namely *Psychological capital* ($\chi^{2/df}$ (141) = 6.93, *CFI* = 0.95, *RMSEA* = 0.058). This specific model has the best-fitting indices reported for the four-factor (see Table 13) and the three-factor structures (reported in Table 15).

The purpose of this study was not to determine invariance between demographic groups, but it was deemed necessary to conduct an elementary cross-validation assessment of the preferred, second-order factor structure as reported in Table 15. The sample was split into gender groups, with 568 men (58%) and 410 women (42%). The results reported for the two sample groups were $\chi^{2/df}$ (162) = 4.65, *CFI* = 0.94, *TLI* = 0.92, RMSEA = 0.063 and $\chi^{2/df}$ (162) = 5.04, *CFI* = 0.92, *TLI* = 0.89, *RMSEA* = 0.070 for the male and female group respectively. The degree of invariance in terms of the Likelihood Ratio Test is 0.39 (5.04 – 4.65). A further indicator of invariance is the difference between the TLI values (0.92 – 0.89 = 0.03), which is lower that the norm of 0.05. The ECVI values reported by the male and female sample groups are 1.01 and 1.22, respectively (difference = 0.21), which is marginal. The results of this assessment in terms of the comparisons between the two sample groups lend support to the accuracy of the cross-validation results.

Discussion of results

The purpose of this study is to examine the instrument properties of the PCQ which (unlike other positive organisational constructs) have not been studied intensively, especially in the South African/African context. Validity of any measurement is regarded as paramount and is even included in the criteria for any construct to be regarded a positive organisational construct. The objectives of this study are twofold: first, to determine the construct (factorial), and second, to determine the discriminant and convergent validity of the PCQ. The substantive component of construct validity, although not directly an objective of this study, would be addressed where deviations from the original constructs (and items) of Luthans et al. (2007) are reported.

Construct validity – also referred to as factorial validity and based on the results of both an EFA and a CFA – was conducted with the primary purpose of defining the underlying structure among the 24 items of the PCQ.

The first step was to examine the psychometric properties of the original factors of PsyCap as proposed by Luthans et al. (2007), and used in various studies in South Africa, by, for instance, Görgens-Ekermans and Herbert (2013), Pillay et al. (2014), Shaik and Buitendach (2015), and Hansen et al. (2015). Acceptable Cronbach alpha coefficients were reported for *Self-efficacy* (0.90) and *Hope* (0.86), marginal for *Resilience* (0.67) and unacceptable for *Optimism* (0.55). This original factor structure was also examined by means of CFA, which found little difference between the first and secondary models ($\chi^{2/df}$ (224) = 9.11, *CFI* = 0.90, *RMSEA* = 0.068 and $\chi^{2/df}$

(226) = 9.31, *CFI* = 0.90, *RMSEA* = 0.069 respectively). The first-order model consists of the items loading on their respective factors; with the secondary model, in addition, the factors contribute to a higher order or secondary factor (in this case, Psychological Capital). The three-factor model determined by Du Plessis and Barkhuizen (2012) was also assessed, but yielded poor goodness of fit results (the first-order model was the best-fitting model with CFI = 0.82, RMSEA = 0.091.

Based on these relatively poor psychometric results, it was decided to conduct an EFA, a decision supported by the results of the Bartlett's test of sphericity and the KMO. The EFA with Promax rotation, as well as the Monte Carlo parallel analysis simulation, yielded a four-factor solution, explaining close to 57% of the variance.

The four factors extracted by means of the EFA reported reasonable psychometric properties, with Cronbach alpha coefficients of 0.90 and 0.60 (the lowest for F[4] which is a factor with only three items, all of which are negatively-worded). The factors were named in accordance with their original theoretical and PCQ names, with the *Self-efficacy* (seven items – six items from the original self-efficacy factor and one item from the original hope factor), *Hope & Optimism* (eight items – four items from the original hope factor and four from the original optimism factor), *Resilience* (five items – four from the original resilience factor and one from the hope factor) and lastly, *Buoyancy* (three items, a new factor with all items phrased negatively, with one item from the original resilience factor and two from the original optimism factor).

In order to satisfy the substantive element of construct validity (although not the aim of this study), and with full acceptance of the Luthans et al. (2007) conceptualisation of PsyCap, one has to determine possible causes for this reconfiguration. The *Self-efficacy* factor stayed very similar, with the addition of PsC7 '*If I should find myself in a jam at work, I could think of many ways to get out of it*'. This item includes an element of positive belief in the individual's abilities to execute a specific task successfully which, according to Stajkovic and Luthans (1998), is an attribute of self-efficacy. The structural positioning of this original *Hope* item with *Self-efficacy* can therefore be justified substantively, without changing the original definition of *Self-efficacy* by Luthans et al. (2007), Luthans and Youssef (2004) and Dawkins (2014), as '*having assurance to put in and take on the essential effort to successful overcome challenges, and to obtain specific outcomes*'.

The second factor is a composite factor which includes items of the original *Hope* and *Optimism* factors. Both these elements of the reconfigured *Hope* & *Optimism* factor have state-like properties (Luthans et al. 2007) which are not totally stable and are open to change and development. This factor is further based on the successful interaction between the agency (goal directed energy) and pathways (planning to meet goals). If one uses the Dawkins (2014) depiction of PsyCap, it is clear that hope and optimism are part of focusing on the future. Luthans et al. (2007) also indicate that hope and optimism are similar constructs as this factor entails the utilisation of goal-based cognitive processes that would be employed if the individual perceives the outcome as having substantial value. Based on this explanation, it is not unfamiliar to have items from the original *Hope* and *Optimism* factors loading on this composite factor and it would therefore be prudent to merely combine (or merge) the definitions of the original factors by Luthans et al. (2007) to describe this reconfigured factor. The factor could thus be described as:

> having the explanatory style that attributes positive events to internal and pervasive causes, and further having the willpower to succeed now and in the future, even if this requires a change of paths in order to succeed. (p. 1)

The third factor, *Resilience,* is very closely comparable to the original factor with the same name, with only the addition of PsC9 from the original *Hope* factor. The item reads '*There are lots of ways around any problem*' and could be related to the adapted description by Dawkins (2014:9) that what *Resilience* entails is '*bouncing back when affected by problems and difficulty and sustaining and going beyond this towards achieving goals*'. This item fits into this definition as it is about recovery from unfavourable stressors and events in maintaining the *status quo*, providing practical substantiation as to why it is added to the original *Resilience* factor.

All the elements of the original conceptualisation of PsyCap have been included so far, with the only deviation being that of the composite factor *Hope* & *Optimism*. The EFA has, however, yielded a four-factor model with the last factor comprising three items (all negatively phrased) with PsC13 '*When I have a setback at work, I have trouble recovering from it, moving on*' from the original *Resilience* factor and two from the original Optimism factor, namely *PsC20* '*If something can go wrong for me work-wise, it will*' and PsC23 '*In this job, things never work out the way I want them to*'. Due to the fact that PsyCap is considered to be a positive organisational behaviour construct, and that one of the criteria for it to be classified as such is that it should have a positive impact on work-related behaviour (according to Luthans 2002), it was decided to name it positively, hence *Buoyancy*. Based on the content of the three items, it can be defined as '*a positive work attitude by anticipating that things would go according to plan, with confidence in coping with setbacks occur and when things don't go according to plan*'.

CFA was further conducted on this factor structure, as determined by the EFA. The results explain that the best-fitting model is the second-order factor model, which is a confirmation of the EFA results. This second-order factor model consists of PsyCap as a super factor and equal contributions of the four factors (*Self-efficacy*, *Hope & Optimism*, *Resilience,* and *Buoyancy*) included in the second-order model. The respective indexes are $\chi^{2/df}$ (224) = 9.11, *CFI* = 0.92, *RMSEA* = 0.063.

The adjusted (reconfigured) factor structure was exposed to a rigorous investigation for construct validity, which also included convergent validity. This was based on the hypothesised relationship that PsyCap (specifically the newly-configured factors) has related work attitudinal and positive organisational behaviour constructs. The constructs chosen are *Passion for work*, *Person-organisational fit*; and *Organisational energy*, as well as their respective sub-factors. Convergent validity was confirmed through the reporting of many high correlations between *Self-efficacy*, *Hope & Optimism*, *Resilience* and the related measures. This is an indication of convergent validity. *Buoyancy,* however, reported very few strong and significant correlations with the related constructs, raising some validity questions.

The third construct validity measure performed was that of discriminant validity. This was done through a basic multiple regression with all the work attitudinal and positive organisational behaviour constructs as dependent variables, and the newly-configured factors of the PCQ as independent or predictor variables. The results are consistent with the findings in the convergent validity analysis with *Self-efficacy*, *Hope & Optimism*, and *Resilience* reporting a large degree of uniqueness in terms of their contribution in the accounting and explanation of the variance in the dependent variables. This is supportive of the notion of discriminant validity.

Due to the fact that *Buoyancy* reported a poor Cronbach alpha coefficient (α = 0.60) and the relatively low convergent and discriminant validity compared to that of the other three factors, it was decided to exclude it and to repeat the CFA, but with only the *Self-efficacy*, *Hope & Optimism* and *Resilience* factors. The remaining three factors explain 51% of the variance in PsC, as determined with the EFA.

The best-fitting model (also when compared to the CFA results discussed earlier) is the second-order model, with *Self-efficacy*, *Hope & Optimism* and *Resilience* contributing (with even weights) to the secondary factor, namely *Psychological Capital* ($\chi^{2/df}$ (141) = 6.93, *CFI* = 0.95, *RMSEA* = 0.058). This supports the notion of Dawkins et al. (2013) that the overall *Psychological Capital* has a synergistic effect where the whole may be greater than the sum of its parts.

The instrument in its adapted (reconfigured) structural configuration was thus found to be valid on the substantive (theoretical / conceptual), structural (factorial) and external (discriminant / convergent) levels. It has also been found to be reliable, all adding up to overall evidence that it is a suitable instrument to accurately measure PsyCap. The results of the cross-validation assessment support the notion of configural invariance; that is, participants belonging to different groups (in this instance, the gender groups) conceptualise the constructs in the same way. It is thus an indication that data collected from each group decompose into the same number of factors, with the same items associated with each factor.

Conclusion, limitations and recommendations

PsyCap is considered to be an important positive organisational behaviour construct in developing individuals in the workplace to become the best that they can become. As clearly indicated in the criteria of categorisation as a positive organisational behaviour construct, there must be an accurate measurement to enable the individual (as well as the organisation) to design and implement directed developmental interventions to enhance it.

The value of this study lies in the fact that the original conceptualisation of PsyCap – consisting of *Hope, Optimism, Resilience* and *Self-efficacy* elements – has been confirmed. The measurement of PsyCap (by means of the PCQ) has been adapted through a reconfiguration of items and factors, ending up with a three-factor solution (that includes all four PsyCap elements), and the elimination of three problematic items. Based on the results obtained, it seems that the PCQ is a suitable (valid and reliable) instrument for measuring PsyCap. This study could thus serve as a reference for the accurate measurement of PsyCap.

This research does have certain limitations, however, mainly in terms of the methodology. The PCQ is based on self-reporting – a method which may lead to method bias, and this may still be a reality, even with the assurance provided to participants during the briefing regarding anonymity as well as confidentiality. Social desirability and subsequent response bias will always remain a concern and a limitation in studies such as this one, while self-reporting may be seen as a one-sided report from the respondents' side. An additional possible limitation is that the wording of the initial scale was used 'as is', without adapting it to the South African (multilingual) context.

A further limitation of this study is the drawback of a cross-sectional design which might have increased the relationship between the four components artificially.

A recommendation for further studies is to investigate the relationship between the four components (and related measures) over a period of time through a longitudinal study. Another recommendation is to analyse results further with the possible addition of the effect of membership of specific demographic groups (e.g., generational differences) and the determination of the antecedents and consequences of PsyCap on work attitudes and organisational behaviour.

PsyCap profiling could also be considered in future research to determine how different organisational cultures, climates and leadership styles impact on the employees' PsyCap.

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Competing interests

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

Authors' contributions

Both authors, A.G. and Y.T.J., contributed equally to the writing of this article.

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