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Confirmatory factor analysis and invariance of an Organizational Citizenship Behaviour measure across samples in a Dutch-speaking context

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Confirmatory factor analysis and invariance of an organizational citizenship behaviour measure across samples in a Dutch-speaking context

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Although Organizational Citizenship Behaviour (OCB) has been studied extensively over the years in the US, the measurement of OCB has received relatively limited attention in other international contexts. This study investigates the dimensionality of a specific OCB measure in a Dutch-speaking context (Flemish part of Belgium). In addition, we examine the invariance of this measure across two different samples: supervisor ratings of 259 subordinates and peer ratings of 215 employees. Generally, we found clear support for the discriminant validity of five OCB factors but convergent validity was only established for three of the five factors. This measurement structure found was relatively invariant across the two different samples These results show that the forms of OCB that are predominantly studied in the US seem to hold relatively well in another international context, although there are some differences.

Over the years, the topic of Organizational Citizenship Behaviour (OCB) has generated a considerable amount of scholarly attention (for a review, see Podsakoff, MacKenzie, Paine, & Bachrach, 2000). OCB has been defined as individual behaviour that promotes the goals of the organization by contributing to its social and psychological environment (Organ, 1997; Rotundo & Sackett, 2002). It has been studied in a variety of domains and disciplines (e.g. human resources management, marketing, economics, health care). This widespread interest in OCB primarily stems from the fact that OCB leads to improved organizational effectiveness (Podsakoff, Ahearne, & MacKenzie, 1997; Podsakoff & MacKenzie, 1994).

Research on OCB has benefited greatly from Organ's (1988) conceptualization of OCB as consisting of five distinct factors: Altruism (e.g. helping behaviours directed at

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specific individuals), Conscientiousness (e.g. going beyond minimally required levels of attendance), Sportsmanship (e.g. tolerating the inevitable inconveniences of work without complaining), Courtesy (e.g. informing others to prevent the occurrence of work-related problems), and Civic Virtue (e.g. participating in and being concerned about the life of the company). Although this five-factor conceptualization reflects Organ's original thinking about OCB, recent research has found support for a three-factor model of OCB (Podsakoff *et al*., 1997). In this recent conceptualization, Conscientiousness is removed and Altruism and Courtesy are combined with cheerleading to form a single helping dimension (MacKenzie, Podsakoff, & Fetter, 1991, 1993; Podsakoff & MacKenzie, 1994), resulting in three factors (i.e. Helping Behaviour, Civic Virtue, and Sportsmanship).

Most OCB studies have been conducted in the US so that 'despite the voluminous and fruitful literature stemming form Organ's (1988) seminal work in this area, we know little about citizenship behaviour in a global context' (Farh, Early, & Lin, 1997, p. 421). Only recently has OCB been studied in other international contexts such as in China, Singapore, Taiwan, Australia, Japan and Hong Kong (Chen, Hui, & Sego, 1998; Hui, Law, & Chen, 1999: Lam, Hui, & Law, 1999; Tang, Furnham, & Davis, 2002; Van Dyne & Ang, 1998). Research on OCB measurement in contexts other than the US is important because the dimensionality of an OCB measure used in different cultural contexts should not be taken for granted. As Podsakoff *et al*. (2000) cautioned: 'Cultural context may affect the forms of citizenship behaviour observed in organizations (e.g., the factor structure)' (p. 556). Therefore, this study aims to contribute to the growing number of international studies on OCB by investigating the dimensionality of a specific OCB measure through confirmatory factor analysis in a Dutch-speaking context (Flemish part of Belgium). In addition, we examine the invariance of this measure across two different samples: a sample of supervisor OCB ratings and a sample of peer OCB ratings.

Method

Data were obtained from two different Belgian samples for research purposes only. The first Belgian sample (sample A) was obtained in a multinational specializing in IT services. Specifically, supervisor ratings of 259 subordinates were obtained from 25 managers (24 males, 1 female; mean age=35 years; mean organizational tenure=8.5 years, response rate=86.3%). Each supervisor rated 10 or 11 subordinates. The second sample (sample B) consisted of peer ratings of OCB from 215 Belgian employees (173 males, 42 females, mean age=36.8 years; mean organizational tenure=3.1 years, response rate=62.1%) of another IT multinational. Each employee was asked to rate one peer (colleague). In both samples, research assistants distributed the questionnaires at work. Study participation was voluntary and anonymous.

There exist various measures of OCB in the literature (e.g. Konovsky & Organ, 1996; Podsakoff, MacKenzie, Moorman, & Fetter, 1990; Van Dyne, Graham, & Dienesch, 1994). In this study, we used a Dutch translation of the OCB measure of Konovsky and Organ (1996). This questionnaire consists of 32 items designed to measure five aspects of OCB: Altruism, Conscientiousness, Sportsmanship, Courtesy and Civic Virtue. The rating scale was a 7-point Likert type scale, varying from 1=*does not apply at all to the person I am rating* to 7=*applies very well to the person I am rating*. The typical

procedure of back-translation with the help of professional translators was used to translate the questionnaire from English to Dutch.

Analyses and results

Unlike some measures of OCB (e.g. Podsakoff *et al.*, 1990), Konovsky and Organ's (1996) scale has not been used extensively in the literature. To our knowledge, only Konovsky and Organ (1996) examined the factor structure of this measure. They found that only 19 of the 32 items satisfied the criteria for a clean factor structure (i.e. with loadings > .35 on their designated factor and without cross-loadings > .35). Given these results, we also started by conducting an exploratory factor analysis (with principal axes extraction and varimax rotation) on sample A to screen out problematic items. Consistent with recommendations of Gerbing and Hamilton (1996), our aim was to use exploratory factor analysis in one sample as a precursor to confirmatory factor analysis in another sample (also Hurley *et al.*, 1997). Similar to Konovsky and Organ (1996), our exploratory factor analyses on sample A showed that only a subset of the items loaded on their designated factor. Specifically, 15 items had loadings > .35 on their designated factor and had no cross-loadings > .35. The eigen values of the five factors were 10.39, 2.12, 1.28, 1.07 and .73.

Next, we used EQS (Bentler, 1995) to conduct a confirmatory factor analysis (CFA) with maximum likelihood estimation on these 15 items. As recommended by Gerbing and Hamilton (1996), this CFA was first conducted on sample B. Two competing CFA models were tested: the five-factor model and the three-factor models described above. To assess how these models represented the data, absolute fit indices such as the χ^2 statistic and the goodness-of-fit index (GFI) as well as incremental fit statistics such as the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) were used. For both GFI and CFI, values > .95 constitute good fit and values > .90 acceptable fit (Medsker, Williams, & Holahan, 1994). For the RMSEA, it has been suggested that values < .05 constitute good fit, values in the .05 to .08 range acceptable fit, values in the .08 to.10 range marginal fit, and values > .10 poor fit (Browne & Cudeck, 1992).

The CFAs showed that the five-factor model produced an acceptable fit to the data of sample B, χ^2 (80)=153.97, GFI=.91 CFI=.92 and RMSEA=.066. The fit for sample A was even better, χ^2 (80)=140.96, GFI=.93, CFI=.96 and RMSEA=.054. The latter result was not surprising as the exploratory factor analysis that screened out problematic items was conducted on sample A. The fit for a three-factor OCB model (see MacKenzie *et al.*, 1991, 1993; Podsakoff & MacKenzie, 1994; Podsakoff *et al.*, 1997) was not acceptable in sample B, χ^2 (50)=183.38, GFI=.88, CFI=.77 and RMSEA=.11. Similar poor fit results for the three-factor model were found in sample A. A possible explanation is that this study used Konovsky and Organ's (1996) measure, whereas prior studies lending support to the three-factor model used the OCB measure of Podsakoff *et al.* (1990).

Given the fit results for the five-factor model we examined the convergent and discriminant validity of the five factors using a stringent procedure outlined by Fornell and Larcker (1981) and recommended by Podsakoff *et al.* (2000). In terms of convergent validity, we computed the $\rho_{vc(\eta)}$ index which denotes the proportion of variance in the items explained by the underlying factor. The $\rho_{vc(\eta)}$ values of Sportsmanship ($\rho_{vc(\eta)}$=38%) and Civic Virtue ($\rho_{vc(\eta)}$=27%) were well below the 50% criterion given by Fornell and Larcker (1981). In terms of discriminant validity, the five factors did not

Table 1. Tests of measurement invariance for multi-group model of OCB ratings across two Belgian samples

Model	χ^2	*df*	$\Delta\chi^2$	Δdf	GFI	CFI	ΔCFI	RMSEA	90% confidence interval of RMSEA
Equal number of factors	294.93**	160	—	—	.92	.94	—	.04	[.03–.05]
Equal factor loadings	300.11**	170	5.18	10	.92	.94	.00	.04	[.03–.05]
Equal error variances									
Fully invariant (all 15 error terms)	373.59**	185	73.48**	15	.91	.92	.02	.05	[.04–.05]
Partially invariant (10 error terms)	307.30**	180	7.19	10	.92	.94	.00	.04	[.03–.05]
Equal factor variances/covariances	349.03**	195	41.73**	15	.91	.93	.01	.04	[.03–.05]

**$p < .01$.
Note. $N = 474$.

share a substantial amount of variance. In sample B the five factors shared on average 15% of the variance (range 8% to 34%). In addition, the variance shared among two factors was always less than the variance in the items explained by each of these factors, satisfying Fornell and Larcker's (1981) discriminant validity criterion. Note also that Altruism and Courtesy shared only 17% of variance in sample B. This further shows that a three-factor model (wherein Altruism and Courtesy are collapsed) does not represent our data well.

Although the previous CFAs enabled us to establish an appropriate model underlying OCB ratings *within* each sample, there was still no evidence that the established measurement model was invariant *across* these samples. As noted above, the type of raters in these samples was not the same. Whereas supervisors served as raters in sample A, peers were the raters in sample B. An examination of 'measurement invariance' enables to determine whether the items and the underlying constructs mean the same thing to members of these different groups (Cheung & Rensvold, 2002; Vandenberg & Lance, 2000). Therefore, we used multiple-group CFA to conduct a sequence of increasingly more restrictive tests of invariance across the two groups (Byrne, 1994). The following measurement invariance tests were conducted: (a) factor form (i.e. the same number of factors and the factors have the same variables that load on them), (b) factor loadings, (c) errors of measurement, and (d) factor variances/covariances. Traditionally, the $\Delta\chi^2$has been used as the index of difference in fit. However, the use of $\Delta\chi^2$ has been criticized because of its sensitivity to sample size (Brannick, 1995; Cheung & Rensvold, 2002; Kelloway, 1995). Recently, Cheung and Rensvold (2002) provided evidence that ΔCFI was not prone to these problems. On the basis of extensive simulations they also determined that a ΔCFI value higher than .01 was indicative of a significant drop in fit.

Table 1 presents the results of the sequence of increasingly more restrictive tests of measurement invariance. The first test (factor form invariance) specified that—across the two samples—the number of factors was the same and that the factors had the same variables loading on them. A good fit was obtained for this model, $\chi^2(160)=294.93$, GFI=.92, CFI=.94 and RMSEA=.04. So, we continued with our tests of measurement invariance and constrained the factor loadings to be invariant across

samples. In this test, we constrained not only which items loaded on a specific factor (as in the previous test) but also constrained the factor loadings of these items to be equal across samples. This additional set of constraints did not produce a significant drop in fit (ΔCFI=.00). Hence, we tested for the invariance of the error variances of the items across the samples. Although fit was still acceptable (GFI=.91, CFI=.92 and RMSEA=.05), this set of constraints cannot be considered invariant because the ΔCFI was .02, exceeding the critical value of Cheung and Rensvold (2002).

To understand better why the set of error variances was not equivalent, we inspected the modification indices associated with these parameters (Byrne, 1994). These indices showed that there were significant differences across the two samples on 5 of the 15 error variances. In all cases, the error variances were higher for sample B (ratings given by peers) than for sample A (ratings given by supervisors), indicating that the reliabilities of these items were lower in sample B. Under the heading of partial measurement equivalence in terms of error variances, we removed the equality constraints on these 5 error variances. As indicated in Table 1, this revised model did not result in a significant drop in fit (ΔCFI=.00).

Finally, we tested for the invariance of factor variances/covariances across the samples. This means that we examined whether each of the five OCB factors showed equal variance across the samples, and whether the interrelations among these factors were the same. This test of invariance was supported because the ΔCFI was .01. Table 2 gives an overview of the parameters of the final model.

Discussion

This study investigated the dimensionality of a specific OCB measure through confirmatory factor analysis in a Dutch-speaking context (Flemish part of Belgium). Generally, our results obtained in a Dutch-speaking context corroborate previous studies in the US (e.g. LePine, Erez, & Johnson, 2002; Rioux & Penner, 2001) and in other international contexts (Lam *et al.*, 1999). Thus, the general picture is that the forms of citizenship behaviour observed in organizations (e.g. the factor structure) hold relatively well across international contexts.

However, some differences should also be noted. Although we found clear support for the discriminant validity of the five factors, the convergent validity of two of the five factors could not be established. Specifically, the convergent validity of Civic Virtue and Sportsmanship was not satisfactory. Probably, this resulted from the fact that these factors were measured by a small number of items in the CFAs (as many items did not survive the screening process). Clearly, future research is needed to address the question whether the flawed measurement on two dimensions is a drawback of Konovsky and Organ's (1996) measure or is due to the nature of OCB in this specific context. Therefore, we cautiously advise researchers to use related scales for measuring Civic Virtue and Sportmanship (e.g. Podsakoff *et al.*, 1990; Van Dyne *et al.*, 1994).

This study also examined the invariance of OCB measurement across two samples: a sample of supervisor OCB ratings and a sample of peer OCB ratings. The measurement structure of the OCB measure was relatively invariant across these different samples. Specifically, there was no significant departure from measurement invariance in terms of factor form, factor loadings, factor variances and factor covariances. There was partial invariance in terms of error variances. Yet, this latter test is known to be very

Table 2. Summary of parameter estimates for multi-group CFA model

Item	Factor loading					Uniqueness
	A	CO	S	CV	CU	
Helps make other workers productive	1.00					.79
Helps others who have heavy workloads	1.10					.46 (1.14)
Helps others who have been absent	.83					.68 (1.26)
Is always on time		1.00				.67
Maintains a clean workplace		.60				1.10 (1.88)
Always completes his/her work on time		.91				.543 (.93)
Complains a lot about trivial matters			1.00			1.33
Always finds fault with what the organization is doing			.87			1.28
Expresses resentment with any changes introduced by management			.79			2.08
Does not complain about work assignments			.80			1.23
Stays informed about developments in the company				1.00		.79
Pays no attention to announcements, messages or printed material that provide information about the company				.80		1.89
Attends and participates in meetings regarding the company				.89		1.93
Informs me before taking any important actions					1.00	.27 (.52)
Consults with me or other people who might be affected by his/her actions or decisions					.95	.54
	Factor variance/covariances					
Altruism (A)	1.20					
Conscientiousness (CO)	.81	1.36				
Sportsmanship (S)	.74	.57	1.57			
Civic Virtue (CV)	.26	.36	.18	.72		
Courtesy (CU)	.59	.64	.50	.26	1.19	

Note. Items were taken from Konovsky and Organ (1996). Unstandardized solution in EQS is given. All parameter estimates are significant at $p < .05$. When parameters were not invariant, values for both groups are given. In that case, the values of sample B (peer ratings) are within parentheses.

stringent (Byrne, 1994). These results bode well for the equivalence of OCB ratings across supervisors and peers. However, our study precludes drawing definite conclusions because the rating target was not the same in our two samples (supervisor ratings were obtained in a different organization than peer ratings). Therefore, an interesting avenue for future research consists of examining the equivalence of OCB scales across supervisor and peer ratings of the same target person.

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References

Bentler, P. M. (1995). *EQS: Structural equations program manual*. Encino, CA: Multivariate Software.

Brannick, M. T. (1995). Critical comments on applying covariance structure modeling. *Journal of Organizational Behavior*, *16*, 201–213.

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods and Research*, *21*, 230–258.

Byrne, B. M. (1994). *Structural equation modeling with EQS and EQS/Windows: Basic concepts, applications, and programming*. Thousand Oaks, CA: Sage.

Chen, X. P., Hui, C., & Sego, D. J. (1998). The role of organizational citizenship behavior in turnover: Conceptualization and preliminary tests of key hypotheses. *Journal of Applied Psychology*, *83*, 922–931.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*, 233–255.

Farh, J. L., Early, P. C., & Lin, S. C. (1997). Impetus for action: A cultural analysis of justice and organizational citizenship behavior in Chinese society. *Administrative Science Quarterly*, *42*, 421–444.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *48*, 39–50.

Gerbing, D. W., & Hamilton, J. G. (1996). Viability of exploratory factor analysis as a precursor to confirmatory factor analysis. *Structural Equation Modeling*, *3*, 62–72.

Hui, C., Law, K., & Chen, Z. X. (1999). A structural equation model of the effects of negative affectivity, leader–member exchange, and perceived job mobility on in-role and extra-role performance: A Chinese case. *Organizational Behavior and Human Decision Processes*, *77*, 3–21.

Hurley, A. E., Scandura, T. A., Schriesheim, C. A., Brannick, M. T., Seers, A., Vandenberg, R. J., & Williams, L. J. (1997). Exploratory and confirmatory factor analysis: Guidelines, issues, and alternatives. *Journal of Organizational Behavior*, *18*, 667–683.

Kelloway, E. K. (1995). Structural equation modeling in perspective. *Journal of Organizational Behavior*, *16*, 215–224.

Konovsky, M. A., & Organ, D. W. (1996). Dispositional and contextual determinants of organizational citizenship behavior. *Journal of Organizational Behavior*, *16*, 215–224.

Lam, S. K., Hui, C., & Law, K. (1999). Organizational citizenship behavior: Comparing perspectives of supervisors and subordinates across four international samples. *Journal of Applied Psychology*, *84*, 594–601.

LePine, J. A., Erez, A., & Johnson, D. E. (2002). The nature and dimensionality of organizational citizenship behavior: A critical review and meta-analysis. *Journal of Applied Psychology*, *87*, 52–65.

MacKenzie, S. B., Podsakoff, P. M., & Fetter, R. (1991). Organizational citizenship behavior and objective productivity as determinants of managerial evaluations of salespersons' performance. *Organizational Behavior and Human Decision Processes*, *50*, 123–150.

MacKenzie, S. B., Podsakoff, P. M., & Fetter, R. (1993). The impact of organizational citizenship behavior on evaluations of sales performance. *Journal of Marketing*, *57*, 70–80.

Medsker, G. J., Williams, L. J., & Holahan, P. J. (1994). A review of current practices for evaluating causal-models in organizational-behavior and human-resources management research. *Journal of Management*, *20*, 439–464.

Organ, D. W. (1988). *Organizational citizenship behavior: The good soldier syndrome*. Lexington, MA: Lexington Books.

Organ, D. W. (1997). Organizational citizenship behavior: It's construct clean-up time. *Human Performance*, *10*, 85–97.

Podsakoff, P. M., Ahearne, M., & MacKenzie, S. B. (1997). Organizational citizenship behavior and the quantity and quality of work group performance. *Journal of Applied Psychology*, *82*, 262–270.

Podsakoff, P. M., & MacKenzie, S. B. (1994). Organizational citizenship behaviors and sales unit effectiveness. *Journal of Marketing Research*, *3*, 351–363.

Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., & Bachrach, D. G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. *Journal of Management*, *26*, 513–563.

Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. *Leadership Quarterly*, *1*, 107–142.

Rioux, S., & Penner, L. A. (2001). The causes of organizational citizenship behavior: A motivational analysis. *Journal of Applied Psychology*, *86*, 1306–1314.

Rotundo, M., & Sackett, P. R. (2002). The relative importance of task, citizenship, and counterproductive performance to global ratings of job performance: A policy-capturing approach. *Journal of Applied Psychology*, *87*, 66–80.

Tang, T. L., Furnham, A., & Davis, G. M. (2002). The meaning of money: The money ethic endorsement and work-related attitudes in Taiwan, the USA and the UK. *Journal of Managerial Psychology*, *17*, 542–563.

Van Dyne, L., Graham, J. W., & Dienesch, R. M. (1994). Organizational citizenship behavior: Construct redefinition, measurement, and validation. *Academy of Management Journal*, *37*, 765–802.

Van Dyne, L., & Ang, S. (1998). Organizational citizenship behavior of contingent workers in Singapore. *Academy of Management Journal*, *41*, 692–703.

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, *3*, 4–69.

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