Leadership & Organization Development Journal

Multilevel structural equation modeling analysis of the servant leadership construct and its relation to job satisfaction

Zhonghua Zhang John Chi-Kin Lee Ping Ho Wong

Multilevel structural equation modeling analysis of the servant leadership construct and its relation to job satisfaction

Received 27 July 2015
Revised 9 October 2015
Accepted 12 October 2015

Zhonghua Zhang
Melbourne Graduate School of Education,
The University of Melbourne, Victoria, Australia
John Chi-Kin Lee
Department of Curriculum and Instruction and
The Centre for Religious and Spirituality Education,
The Education University of Hong Kong,
Hong Kong, China, and
Ping Ho Wong
Department of International Education and Lifelong Learning and
The Centre for Religious and Spirituality Education,
The Education University of Hong Kong, Hong Kong, China

Abstract

Purpose – The purpose of this paper is to address the statistical issues associated with the hierarchically structured data in previous studies that focused on servant leadership. To resolve these issues, multilevel modeling methods were applied to re-visit the construct validity of the servant leadership questionnaire developed by Barbuto and Wheeler (2006) and investigate the relationship between servant leadership and job satisfaction under a multilevel framework.

Design/methodology/approach – The survey data was obtained from a sample of 2,089 teachers from 117 primary and secondary schools in Hong Kong. The analyses were conducted using multilevel confirmatory factor analysis (MLCFA) and multilevel structural equation modeling (MLSEM).

Findings – The results revealed the significant and non-trivial variances that were explained at the organization level in the items measuring servant leadership, which justified the use of MLCFA and MLSEM. The results of MLCFA provided empirical support for the multidimensional construct as well as the second-order factorial structure of servant leadership measures at both the individual and organization levels. In addition, the positive relationships between servant leadership and the followers' job satisfaction were found to vary at different levels.

Originality/value – This study reiterates the importance of using appropriate methods to capture a solid definition of the construct of servant leadership and provides new insights into the conceptual framework of servant leadership as well as the effects of servant leadership on individual and organizational outcomes.

Keywords Servant leadership, Job satisfaction, Multilevel SEM, Multilevel CFA, Second-order model

Paper type Research paper

The authors would like to thank the Centre for Religious and Spirituality Education, The Education University of Hong Kong for supporting the study. Thanks are extended to Professor John Barbuto, Jr and Professor Robert Eisenberger for their support as well as the editor and the reviewers for their advice for improving the manuscript.

Leadership & Organization
Development Journal
Vol. 37 No. 8, 2016
pp. 1147-1167

0143-7739
DOI 10.1108/LODJ-07-2015-0159

Introduction

Servant leadership

In recent years, servant leadership has been receiving increasing attention and considerable investigation (for reviews, see Parris and Peachey, 2013; Russell and Stone, 2002; Van Dierendonck, 2011). Servant leadership can be seen as a type of leadership that focuses on the needs and interests of followers with the goal of helping those followers grow, develop, and prosper (Graham, 1991; Greenleaf, 1970; Mayer *et al.*, 2008). Servant leadership is advocated because of the inadequacies of traditional leadership forms when it comes to motivating followers. The proponents of servant leadership advocate that a leader should prioritize the needs of the followers ahead of his or her own self-interests, have a genuine desire to serve the members to improve their professional development, share decision-making power with members, and promote a sense of community through team building (Page and Wong, 2000). This essential leadership role in serving followers enables followers to reach their fullest potential which will in turn help organizations accomplish their shared goals and missions.

Measures of servant leadership

Since Greenleaf (1970) initially proposed the service-oriented leadership philosophy, various multidimensional models have been proposed to define the concept of servant leadership which have resulted in the emergence of different measures of servant leadership (e.g. Barbuto and Wheeler, 2006; Dennis and Bocarnea, 2005; Dennis and Winston, 2003; Joseph and Winston, 2005; Laub, 1999; Liden *et al.,* 2008; Page and Wong, 2000; Reed *et al.*, 2011; Sendjaya and Cooper, 2011; Sendjaya *et al.*, 2008; Van Dierendonck and Nuijten, 2011). The literature review on empirical studies of servant leadership, conducted by Parris and Peachey (2013), revealed that 14 different measures have been used in 27 survey studies. Table I presents a summary of some of the instruments with regard to the measured dimensions, methods of examining construct validity, and the inter-correlations among the dimensions. Notably, all of the instruments were developed to measure the multidimensional characteristics of servant leadership. Although the multidimensional structure of servant leadership has been empirically supported, the moderate to high inter-correlations (see Table I) among the dimensions may indicate the need to investigate the presence of an underlying factor that explains the relationships among the dimensions. For example, recent studies have started to investigate the high-order factorial structure of servant leadership measures (e.g. Van Dierendonck and Nuijten, 2011; Reed *et al.,* 2011; Sendjaya and Cooper, 2011). Reviews of these servant leadership measures also identified the methodological weakness in the existing studies and this provided the motivation for carrying out the present study. As shown in Table I, most of the instruments are rater-report questionnaires that require the followers to rate the servant leadership characteristics of their leaders. One of the advantages of rater-report measures, compared with self-report measures, is that more reliable assessments can be obtained for a leader if his or her servant leadership characteristics are evaluated by multiple followers. However, collecting the assessments of servant leadership characteristics from multiple followers within the same organization also leads to complicated statistical issues. For example, the independent observations assumption of conventional multivariate statistical methods might be violated due to cluster sampling. The summary presented in Table I indicated that the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) methods were mainly employed to explore the factorial structure of servant leadership measures and to examine the

Table I. Summaries of servant leadership measures

Instrument	Version	No. of factors	Factors	Analytic method	Inter-correlations among factors
Barbuto and Wheeler (2006)	Self-report and rater-report	5	Altruistic calling; emotional healing; wisdom; persuasive mapping; organizational stewardship	EFA, CFA	Ranging from 0.28 to 0.53 with a mean 0.43 (self-report); Ranging from 0.47 to 0.71 with a mean 0.59 (rater-report)
Dennis and Bocarnea (2005)	Rater-report	5	Empowerment; love; humility; trust; vision	EFA	na
Laub (1999) (servant organizational leadership assessment (SOLA))	Rater-report	6	Values people; develops people; builds community; displays authenticity; provides leadership; Shares leadership	na	Ranging from 0.736 to 0.892 with a mean of 0.833
Liden *et al.* (2008)	Rater-report	7	Emotional healing; creating value for the community; conceptual skills; empowering; helping subordinates grow and succeed; putting subordinates first; behaving ethically	EFA, CFA	Ranging from 0.27 to 0.77 with a mean 0.56
Reed *et al.* (2011) (executive servant leadership scale)	Rater-report	5	Interpersonal support; building community; altruism; egalitarianism; moral integrity	EFA; CFA	Ranging from 0.88 to 0.97 with a mean 0.93
Sendjaya and Cooper (2011); Sendjaya *et al.* (2008) (servant leadership behavior scale)	Rater-report	6	Voluntary subordination; authentic self; covenantal relationship; responsible morality; transcendental spirituality; transforming influence	CFA	Ranging from 0.65 to 0.87 with mean 0.76 (2008); Ranging from 0.78 to 0.91 with a mean 0.86 (2011)
Van Dierendonck and Nuijten (2011)	Rater-report	8	Empowerment; accountability; standing back; humility; authenticity; courage; forgiveness; stewardship	EFA, CFA	Ranging from 0.02 to 0.71 with a mean 0.37 (Dutch sample); Ranging from 0.08 to 0.81 with a mean 0.46 (UK sample)

construct validity of the instruments. The assumption of independent observations which is required for EFA and CFA may not always hold if the rater-report instruments are used to measure the servant leadership characteristics of a leader. Therefore, the statistical methods used in validating the scales may be severely constrained. The limitations of these methods are discussed in detail in the following section.

Limitations of statistical methods used in previous empirical studies on servant leadership

Despite the growing popularity of empirical studies on servant leadership, most studies have not fully addressed the hierarchically structured nature of the data involved. In the field of leadership studies, studying the interaction between leaders and members in the same organization normally determines that the multistage or stratified sampling strategy should be required (Dyer *et al.*, 2005). For example, a typical feature of a servant leadership study is that multiple followers belonging to the same organization are invited to evaluate the servant leadership characteristics of their leader. The non-independence among the individuals within the same organization is a characteristic of a real organization and the interactions of the individuals within an organization with its own norms, climates, social interaction, and leadership styles can never be eliminated (Dyer *et al.*, 2005). The majority of previous studies on servant leadership have used conventional multivariate statistical methods (e.g. CFA, SEM) to either develop servant leadership measures or explore the relationship between servant leadership and individual or organizational outcomes. These statistical methods always assume that the data are randomly sampled from a given population and the observations in the data are independently and identically distributed (Muthén, 1991). However, as mentioned, this assumption cannot always be guaranteed in leadership studies. The application of conventional multivariate statistical methods to analyze data with nested structure may lead to inaccurate estimates of the standard errors in parameter estimates and model fit indices. Therefore, insecure conclusions may have been drawn in previous studies on servant leadership.

Another limitation of the statistical methods used in previous studies on servant leadership is that they can not fully capture the multilevel constructs of servant leadership. With hierarchically structured data, whether or not the relationships among constructs are different at different levels of analysis or even whether or not the meanings of constructs are different at different levels of analysis is often questioned (Dyer *et al.*, 2005; Muthén, 1994). For example, some items that are good indicators of a within-level (e.g., individual) factor may not be significant indicators of a between-level (e.g., organization) factor (Cheung and Au, 2005). The measurement models at the between level and the within level may not be the same and the aggregated variables may not have the same definitions as those in the within-level data (Chan, 1998; Klein and Kozlowski, 2000; Muthén, 1994). When the assessments of servant leadership are collected from multiple followers, the measures of servant leadership can vary within an organization as a result of the perceptions of the individual followers in that organization as well as between organizations as a result of the characteristics of the organizations or leaders. Therefore, a potential atomistic fallacy, which incorrectly assumes that the relationship between variables observed at the within level also holds for those at the between level, may be committed if the nested structure of the data are ignored when using conventional multivariate statistical methods (Dedrick and Greenbaum, 2011).

Multilevel modeling is one of the appropriate methods for resolving the statistical issues raised in the previous studies on servant leadership. It can decompose the sample covariance matrix into within-level and between-level components, which allows same or

different models to be tested at different levels (Hox, 2010). Multilevel confirmatory factor analysis (MLCFA) and multilevel structural equation modeling (MLSEM), which can be seen as direct generalizations of CFA and SEM in the context of multilevel modeling (Muthén, 1991, 1994), can be used to analyze data with a nested structure by modeling different relationships among different latent constructs at different levels. With MLCFA, different factorial structures can be examined at different levels of analysis. MLSEM can be flexibly applied to examine different structural models at different levels that incorporate different level-specific latent constructs and covariates. A detailed introduction about the application of MLCFA and MLSEM can be found elsewhere (e.g. Cheung and Au, 2005; Dedrick and Greenbaum, 2011; Dyer *et al.*, 2005; Reise *et al.*, 2005; Toland and De Ayala, 2005; Zimprich *et al.*, 2005).

Servant leadership and followers' job satisfaction

Servant leadership is recognized as one of the positive antecedents of job satisfaction for followers. Job satisfaction has been an important construct in leadership and organization studies because it is closely associated with job performance (Harrison *et al.*, 2006; Saari and Judge, 2004). Previous studies have identified servant leadership as a significant and positive predictor of followers' job satisfaction (e.g. Barbuto and Wheeler, 2006; Mayer *et al.*, 2008; Van Dierendonck and Nuijten, 2011). However, as these studies failed to take into account the hierarchical structure of the data, there remains a lack of knowledge about how the relationship between servant leadership and followers' job satisfaction will present under the multilevel framework.

Purpose of the study

The main purpose of this study is to use appropriate statistical method, namely, MLCFA (Muthén, 1991, 1994), to re-examine the construct validity of Barbuto and Wheeler's (2006) servant leadership questionnaire. Although the statistical issues associated with the hierarchically structured data collected in leadership studies have already been realized and discussed extensively (e.g. Barbuto and Wheeler, 2006; Dyer *et al.*, 2005; Liden *et al.,* 2008; Yammarino *et al.*, 2001), there is still a dearth of empirical studies to employ MLCFA to examine the construct validity of servant leadership measures. As a result, the present study aims to fill this gap by employing MLCFA to re-examine the construct validity of the servant leadership questionnaire developed by Barbuto and Wheeler (2006). Focusing on the factorial structures and based on the previous findings that servant leadership factors were mutually highly correlated, this study also aims to examine the support for a global servant leadership factor that explains the strong correlations among the servant leadership factors. To do so, different models, including unidimensional, multidimensional, and second-order measurement models, were compared to re-examine the conceptual framework of servant leadership under a multilevel framework. The final purpose of the study is to use MLSEM to investigate how the influence of servant leadership on followers' job satisfaction varies at the individual level and the organization level.

In summary, based on the issues and the identified research purposes, the following questions were pursued in the study:

RQ1. Are there significant and non-trivial variances that can be explained by the organization level in the responses of the followers to the items measuring servant leadership?

RQ2. Does the servant leadership measure display a multilevel construct?

RQ3. Do the measurement models of servant leadership vary at the individual level and the organization level?

RQ4. Is the second-order factorial structure of servant leadership supported at both the individual and organization levels?

RQ5. Is servant leadership a significant and positive predictor of followers' job satisfaction at both the individual and organization levels?

RQ6. Do the strengths of the relationship between servant leadership and followers' job satisfaction vary at different levels?

Method

Participants

A total of 2,089 teachers from 117 primary and secondary schools in Hong Kong took part in the study (average sampled teachers per school = 17.86, range = 5-38). This sample consisted of 1,388 female teachers (66.44 percent), 671 male teachers (32.12 percent), and 30 teachers (1.44 percent) whose gender were unspecified.

Measures

Servant leadership. The rater-report servant leadership questionnaire developed by Barbuto and Wheeler (2006) was adopted to measure the perceptions of teachers regarding the servant leadership characteristics of their school principals. The questionnaire is composed of 23 items (see Appendix) that measure five characteristics of servant leadership: altruistic calling (four items), emotional healing (four items), wisdom (five items), persuasive mapping (five items), and organizational stewardship (five items). All the items were rated by the teachers on a four-point Likert-type scale that ranged from 1 (strongly disagree) to 4 (strongly agree).

Job satisfaction. Four items (Eisenberger *et al.*, 1997) were used to evaluate the overall job satisfaction of the teachers. The teachers were asked to rate the items based on the extent of their agreement with each of the four items along a six-point Likert-type scale that ranged from 1 (strongly disagree) to 6 (strongly agree).

Data analysis

The construct validity of Barbuto and Wheeler's (2006) servant leadership questionnaire was examined using MLCFA in three steps. First, one-level CFA analysis, which ignores the nested structure of the data, was conducted to fit Barbuto and Wheelers' (2006) five-factor measurement model to the total sample covariance matrix with the aim of identifying the obvious model misspecification. The appropriateness of multilevel analysis was then examined in the second step. This step aimed to determine the systematic organization-level variations on each item and justify the requirement of applying MLCFA. Two indices, including the intra-class correlation (ICC) coefficient and the design effect, which are widely used in determining the necessity of multilevel analysis, were computed to detect whether the organization-level variations are present or not. ICC shows the proportion of the total variance in an item that can be explained by between level (Hox, 2010; Muthén, 1994). The design effect indicates the ratio of the variance of estimator under clustering sampling to the variance under simple random sampling (Muthén and Satorra, 1995). If the values of the ICC and design effect for the items in the study are small, it means that the majority of the total variances in the teachers' responses to the items are explained by the

varieties within schools rather than between schools. A multilevel analysis will therefore not necessarily be required. Conventional CFA analysis, which was conducted in the first step, can be reasonable and unbiased. However, if the values of the ICC and design effect for the items are substantial, indicating large variances in the teachers' responses among school levels, MLCFA is then required to simultaneously incorporate the within-school and between-school varieties. In this study, the two criteria that were used to determine whether MLCFA was warranted were that the ICC was greater than 0.05 (Dyer *et al.*, 2005) and the design effect was greater than two (Muthén and Satorra, 1995). After the requirement of multilevel modeling analysis was justified, MLCFA analyses were conducted to examine the construct validity of the servant leadership questionnaire (Barbuto and Wheeler, 2006) in the last step.

The relationship between servant leadership and job satisfaction was examined using MLCFA and MLSEM after the construct validity of the servant leadership questionnaire (Barbuto and Wheeler, 2006) was supported with MCLFA.

Multiple goodness-of-fit indices were used in this study to assess how well the models fitted the data. These indices include the χ^2 statistic, the comparative fit index (CFI) (Bentler, 1990), the Tucker-Lewis index (TLI) (Tucker and Lewis, 1973), the root mean square error of approximation (RMSEA) (Browne and Cudeck, 1992), and the standardized root mean residual (SRMR). According to Hu and Bentler (1999), a cutoff value close to 0.95 or above for CFI and TLI, a cutoff value close to 0.08 or below for SRMR, and a cutoff value of 0.06 or below for RMSEA were primarily used to determine the adequacy of the model fit in the study. In addition, the Akaike information criterion (AIC) (Akaike, 1974) and the Bayesian information criterion (BIC) (Schwartz, 1978) were also used in the present study to compare the non-nested models. Relatively smaller AIC and BIC values suggest better model in terms of model fit and parsimony.

All the analyses were conducted with the robust maximum likelihood estimation method (MLR) using the computer software Mplus Version 6.1 (Muthén and Muthén, 2008/2011). With MLR, the standard errors of the parameter estimates as well as the tests of fit were corrected and were robust in relation to the non-normality of observations and categorical nature of the variables (Yuan and Schuster, 2013).

Results

Preliminary analysis

The descriptive statistics of the items that measure servant leadership are presented in Table II. The means of all the items are greater than the median point (2.5), indicating the positive attitude of the teachers toward the characteristics of servant leadership of their principals.

CFA analysis of servant leadership questionnaire

CFA was first run to test the five-factor measurement model (Model 1), replicating the analysis conducted by Barbuto and Wheeler (2006). The goodness-of-fit indices are shown in Table III. These indices indicate that the five-factor model (Model 1) fits the data very well ($\chi^2_{(216)} = 916.644, p < 0.001$; CFI = 0.975; TLI = 0.971; RMSEA = 0.039; SRMR = 0.027; AIC = 57,618.435; BIC = 58,086.725). On the basis of the modification indices provided by the software, the residuals between items 6 and 7, between items 9 and 11, between items 12 and 13, as well as between items 16 and 18 were allowed to be correlated. The standardized factor loadings of the items range from 0.719 to 0.881, indicating strong relationships between the items and the five latent factors. Table IV presents the variances of as well as the inter-correlations among the five factors.

Item	*M*	SD	ICC	Design effect
Altruistic calling (Cronbach's α = 0.89)				
1	2.573	0.670	0.122	3.051
2	2.695	0.701	0.120	3.017
3	2.488	0.679	0.123	3.068
4	2.751	0.663	0.099	2.664
Emotional healing (Cronbach's α = 0.93)				
5	2.792	0.736	0.132	3.219
6	2.592	0.720	0.151	3.539
7	2.559	0.730	0.159	3.673
8	2.661	0.711	0.152	3.555
Wisdom (Cronbach's α = 0.91)				
9	2.931	0.637	0.173	3.908
10	2.904	0.670	0.197	4.312
11	2.923	0.656	0.170	3.858
12	2.751	0.665	0.188	4.161
13	2.765	0.646	0.143	3.404
Persuasive mapping (Cronbach's α = 0.89)				
14	2.908	0.644	0.132	3.219
15	2.809	0.684	0.149	3.505
16	2.855	0.718	0.281	5.724
17	2.896	0.671	0.189	4.177
18	2.823	0.732	0.222	4.732
Organizational stewardship (Cronbach's α = 0.88)				
19	3.139	0.576	0.121	3.034
20	3.119	0.547	0.113	2.900
21	3.068	0.554	0.139	3.337
22	3.198	0.561	0.154	3.589
23	3.200	0.596	0.148	3.488

Table II. Descriptive statistics of items measuring servant leadership

The inter-correlations among the five latent factors range from 0.602 (between altruistic calling and organizational stewardship) to 0.910 (between wisdom and persuasive mapping) with a mean of 0.765. The strong correlations among the five latent factors may be indicative of an underlying general servant leadership factor. Therefore, a single-factor model (Model 2) and a second-order model (Model 3) were also fitted to the data. The goodness-of-fit indices of Model 2, which are shown in Table III, suggest that the unidimensional model (Model 2) does not fit the data satisfactorily ($\chi^2_{(226)} = 4{,}337.912$, $p < 0.001$; CFI = 0.853; TLI = 0.835; RMSEA = 0.093; SRMR = 0.064; AIC = 62,217.616; BIC = 62,629.485). However, the goodness-of-fit indices of Model 3, which are also presented in Table III, indicate that the second-order model fits the data reasonably well ($\chi^2_{(221)} = 1{,}212.976, p < 0.001$; CFI = 0.965; TLI = 0.959; RMSEA = 0.046; SRMR = 0.040; AIC = 57,997.454; BIC = 58,437.533).

Appropriateness of multilevel modeling

The ICCs and design effects for the 23 items measuring servant leadership are presented in Table II. As shown in the table, the ICCs for the 23 items range from 0.099 (i.e. "the principal goes above and beyond the call of duty to meet my needs") to 0.281 (i.e. "the principal is very persuasive") with a mean of 0.156, suggesting that the

Table III.
Summary of the goodness-of-fit statistics for the measurement models of servant leadership

Model	χ^2	df	CFI	TLI	RMSEA	SRMR Within	SRMR Between	AIC	BIC	Model description
CFA models										
Model 1	916.644	216	0.975	0.971	0.039		0.027	57,618.435	58,086.725	Model 1: five-factor
Model 2	4,337.912	226	0.853	0.835	0.093		0.064	62,217.616	62,629.485	Model 2: one-factor
Model 3	1,212.976	221	0.965	0.959	0.046		0.040	57,997.454	58,437.533	Model 3: second-order
MLCFA models										
Model 4	1,520.038	439	0.970	0.966	0.034	0.028	0.047	56,772.259	57,539.577	Model 4: five-factor (within) and five-factor (between)
Model 5	1,702.134	446	0.966	0.961	0.037	0.031	0.091	56,886.340	57,614.164	Model 5: five-factor (within) and one-factor (between)
Model 6	6,550.662	456	0.833	0.815	0.080	0.076	0.098	61,273.011	61,944.414	Model 6: one-factor (within) and one-factor (between)
Model 7	1,971.030	448	0.958	0.953	0.040	0.045	0.057	57,165.047	57,881.587	Model 7: second-order (within) and second-order (between)
Model 8	2,119.337	451	0.954	0.949	0.042	0.046	0.091	57,257.102	57,956.715	Model 8: second-order (within) and one-factor (between)

Notes: df, degree of freedom; within, within level (individual level); between, between level (organization level)

Factor	1	2	3	4	5	6
CFA						
1. Altruistic calling	*0.300*					
2. Emotional healing	0.840	*0.376*				
3. Wisdom	0.701	0.740	*0.265*			
4. Persuasive mapping	0.781	0.835	0.910	*0.275*		
5. Organizational stewardship	0.602	0.647	0.769	0.824	*0.181*	
MLCFA						
Individual level						
1. Altruistic calling	*0.252*					
2. Emotional healing	0.818	*0.316*				
3. Wisdom	0.679	0.715	*0.205*			
4. Persuasive mapping	0.755	0.804	0.892	*0.238*		
5. Organizational stewardship	0.542	0.589	0.756	0.800	*0.151*	
6. Job satisfaction	0.377	0.403	0.388	0.458	0.357	*0.433*
Organization level						
1. Altruistic calling	*0.045*					
2. Emotional healing	0.957	*0.058*				
3. Wisdom	0.820	0.849	*0.061*			
4. Persuasive mapping	0.902	0.947	0.955	*0.039*		
5. Organizational stewardship	0.916	0.914	0.816	0.892	*0.027*	
6. Job satisfaction	0.739	0.703	0.613	0.654	0.865	*0.040*

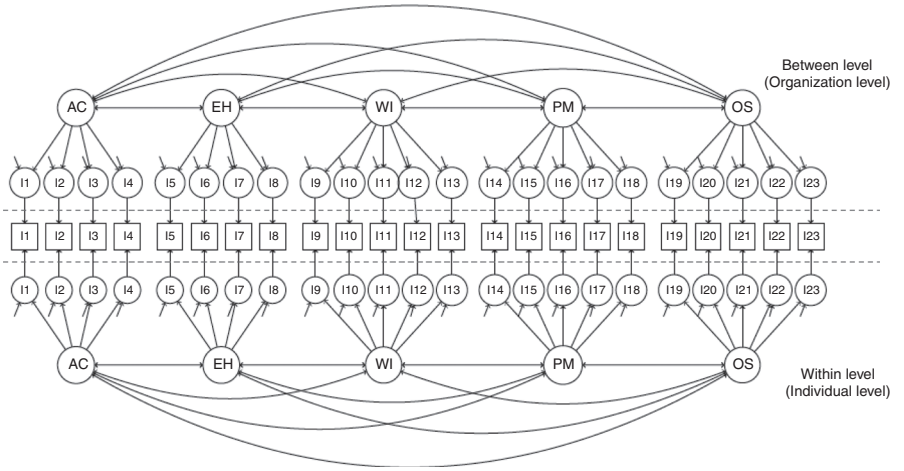
Note: All coefficients (correlation and variance) are significant ($p < 0.01$)

Table IV.
Variances of and inter-correlations among the latent factors

organization level can account from 9.9 to 28.1 percent of the variances in these items. The items that measure the factor of persuasive mapping have the largest average ICC, whereas the items measuring altruistic calling have the smallest average ICC. In other words, the teachers across the schools may be more similar in their perceptions regarding the altruistic calling behaviors of their principals and more dissimilar in their perceived persuasive mapping behaviors of their principals. The values of the design effects range from 2.664 to 5.724 with a mean of 3.615, which are all greater than two. In summary, these results show the substantial variances in the items that are explained by the organization level, suggesting that conventional multivariate statistical methods that ignore the nested structure of data are limited and MLCFA is warranted to be conducted to create valid statistical inferences.

MLCFA analysis of servant leadership questionnaire

The first MLCFA model (Model 4) to be tested incorporates two five-factor models at both the individual and organization levels (see Figure 1). The goodness-of-fit indices in Table III indicate that the five-factor model fits the data at both levels very well ($\chi^2_{(439)} = 1{,}520.038, p < 0.001$; CFI = 0.970; TLI = 0.966; RMSEA = 0.034; $\text{SRMR}_{\text{within}} = 0.028$; $\text{SRMR}_{\text{between}} = 0.047$; AIC = 56,772.259; BIC = 57,539.577). Comparisons of the AIC and BIC fit statistics indicate that the multilevel five-factor model (Model 4) fits better than the one-level five-factor model (Model 1). This finding demonstrates the advantage of running MLCFA with the hierarchical data over CFA. The values of the standardized factor loadings of the items are all greater than 0.678 at the individual level and 0.862 at the organization level. This result indicates that strong relationships exist between the items and the latent factors at both levels. The variances of the latent factors as well as the inter-correlations among the latent factors



Notes: AC, Altruistic calling; EH, Emotional healing; WI, Wisdom; PM, Persuasive mapping; OS, Organizational stewardship

Figure 1.
Multilevel five-factor model of servant leadership

at both levels are shown in Table IV. All the variances of the five individual-level factors are statistically significant ($p < 0.01$), which indicates the statistically significant differences in scores on the five latent factors among the individual teachers. The variances of the five organization-level factors are also statistically significantly different from zero ($p < 0.01$), indicating that the principals' levels on the five characteristics of servant leadership as evaluated by the teachers are significantly different across the schools. As for the inter-correlations among the five latent factors at the individual level, the correlation coefficients derived from the multilevel five-factor model (Model 4) are close to those derived from the one-level five-factor model (Model 1). The inter-correlations among the five servant leadership factors at the organization level are uniformly greater than those at the individual level. The inter-correlations among the five individual-level factors range from 0.542 (between altruistic calling and organizational stewardship) to 0.892 (between wisdom and persuasive mapping) with a mean of 0.735. The inter-correlations among the five factors at the organization level range from 0.816 (between wisdom and organizational stewardship) to 0.957 (between altruistic calling and emotional healing) with a mean of 0.90.

The strong inter-correlations among the five servant leadership factors might indicate the presence of a general underlying servant leadership factor that predominantly determines the teachers' responses to the items or captures the relations among these servant leadership factors. Therefore, four additional MLCFA models were tested.

Model 5 incorporates a five-factor model at the individual level and a single-factor model at the organization level. Overall, the goodness-of-fit indices shown in Table III indicate that the model fits the data well ($\chi^2_{(446)} = 1{,}702.134, p < 0.001$; CFI = 0.966; TLI = 0.961; RMSEA = 0.037; $\text{SRMR}_{\text{within}} = 0.030$; $\text{SRMR}_{\text{between}} = 0.091$; AIC = 56,886.340; BIC = 57,614.164). However, the value of the between-structure SRMR indicates that the single-factor model fits marginally well at the organization level.

Another model (Model 6) that was tested incorporates two single-factor models at both the individual and organization levels. The goodness-of-fit indices in Table III indicate that the multilevel single-factor model does not fit the data adequately ($\chi^2_{(456)} = 6{,}550.662, p < 0.001$; CFI = 0.833; TLI = 0.815; RMSEA = 0.080;

$SRMR_{within} = 0.076$; $SRMR_{between} = 0.098$; AIC = 61,273.011; BIC = 61,944.414). The seriously inadequate fit of Model 6, compared with the goodness-of-fit of Model 5, can be principally explained by the misspecification of the model at the individual level.

The next model to be tested is a multilevel second-order model (Model 7), which is graphically depicted in Figure 2. This model incorporates two second-order models which are fitted to the pooled-within sample covariance matrix at the individual level and to the scaled between-level covariance matrix at the organization level, respectively. The goodness-of-fit indices of Model 7 ($\chi^2_{(448)} = 1{,}971.030, p < 0.001$; CFI = 0.958; TLI = 0.953; RMSEA = 0.040; $SRMR_{within} = 0.045$; $SRMR_{between} = 0.057$; AIC = 51,765.047; BIC = 57,881.587), which are presented in Table III, show that the multilevel second-order model fits the data reasonably well. The standardized structural loadings, which show the associations between the second-order factor and the five first-order factors, range from 0.79 to 0.95 at the individual level and from 0.90 to 0.96 at the organization level.

The last model (Model 8) accommodates a second-order model at the individual level and a single-factor model at the organization level. The goodness-of-fit indices in Table III indicate that Model 8 fits the data adequately ($\chi^2_{(451)} = 2{,}119.337, p < 0.001$; CFI = 0.954; TLI = 0.949; RMSEA = 0.042; $SRMR_{within} = 0.046$; $SRMR_{between} = 0.091$; AIC = 57,257.102; BIC = 57,956.715). However, similar to the results of Model 6, the between-structure SRMR indicates that the single-factor model fits only marginally well at the organization level. The comparison of the AIC and BIC fit statistics indicates that Model 7 fits better than Model 8, providing additional support for a second-order model over a single-factor model at the organization level.

Relationship between servant leadership and job satisfaction

The psychometric properties of the job satisfaction questionnaire were examined before the relationship between servant leadership and job satisfaction was explored using MLCFA and MLSEM. The results of CFA support the one-factor

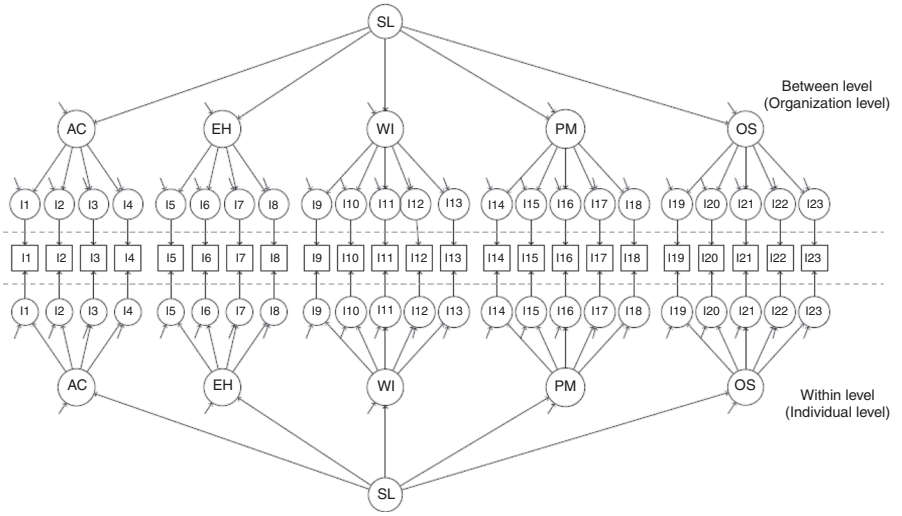


Figure 2.
Multilevel second-order model of servant leadership

Notes: AC, Altruistic calling; EH, Emotional healing; WI, Wisdom; PM, Persuasive mapping; OS, Organizational stewardship; SL, Servant leadership

model ($\chi^2_{(2)} = 63.336, p < 0.001$; CFI = 0.972; TLI = 0.915; RMSEA = 0.121; SRMR = 0.019; AIC = 18,258.802; BIC = 18,326.524). The values of ICCs and design effects indicated the significant and non-trivial variance in the four items accounted for by organization level and warranted MLCFA analysis. MLCFA was subsequently employed to examine how well the single-factor model fitted the data at both the individual and organization levels. The goodness-of-fit indices indicate that the MLCFA model fits the data adequately ($\chi^2_{(4)} = 142.195, p < 0.001$; CFI = 0.958; TLI = 0.875; RMSEA = 0.129; $SRMR_{within} = 0.024$; $SRMR_{between} = 0.007$; AIC = 18,200.079; BIC = 18,312.949). The standardized factor loadings at both the individual and organization levels range from 0.628 to 0.997, suggesting the strong relationships between the latent factor job satisfaction and the four items at the two levels. The variances of the latent factors are statistically significant ($p < 0.01$) at both the individual and organization levels, indicating the significant differences in job satisfaction among individual teachers and in the overall job satisfaction of teachers among different schools.

The relationships between servant leadership factors and job satisfaction at both the individual and organization levels were first examined by running MLCFA analysis. Table IV presents the inter-correlations among the five latent factors of servant leadership and the latent variable job satisfaction at the two levels. All five factors of servant leadership are significantly and positively associated with job satisfaction at both the individual and organization levels. The individual-level correlation coefficients range from 0.357 (between organizational stewardship and job satisfaction) to 0.458 (between persuasive mapping and job satisfaction) with a mean of 0.396. The organization-level correlation coefficients range from 0.613 (between wisdom and job satisfaction) to 0.865 (between organizational stewardship and job satisfaction) with a mean of 0.715. These results show that the relationships between job satisfaction and servant leadership are stronger at the organization level than at the individual level.

MLSEM was further conducted to investigate how servant leadership predicted the job satisfaction of followers at both the individual and organization levels. The multilevel second-order model of servant leadership (Model 7) was selected here because of its simplicity, conceptual appeal, and good model fit. In addition, it was chosen to avoid the potential multi-collinearity problem that might result from the high inter-correlations among the five servant leadership factors. MLSEM analysis was conducted to examine the influence of the second-order factor of servant leadership on job satisfaction at both the individual and organization levels. The goodness-of-fit indices suggest that the model fits the data reasonably well ($\chi^2_{(634)} = 2{,}402.194, p < 0.001$; CFI = 0.959; TLI = 0.955; RMSEA = 0.037; $SRMR_{within} = 0.041$; $SRMR_{between} = 0.078$). The standardized structural regression coefficients indicate that servant leadership has a statistically significant effect on job satisfaction at both the individual level ($\beta = 0.470, p < 0.001; R^2 = 0.221$) and the organization level ($\beta = 0.690, p < 0.001; R^2 = 0.476$). The effect of servant leadership on job satisfaction is significantly stronger at the organization level than at the individual level, which suggests varying relationships between servant leadership and job satisfaction at different levels. This finding is in line with the results of the inter-correlations between the five latent factors of servant leadership and the latent variable job satisfaction estimated from MLCFA.

Discussion

By addressing the statistical issues associated with nested data which are inherent in servant leadership studies, we re-examined the construct validity of Barbuto and

Wheeler's (2006) servant leadership questionnaire, explored the factorial structures of servant leadership measures, and investigated the relationship between servant leadership and job satisfaction under a multilevel framework. This study justified the use of multilevel analysis to deal with the nested data in servant leadership studies and made significant contributions to the literature of servant leadership studies.

Methodological implications

MLCFA and MLSEM are superior to conventional multivariate statistical modeling methods in dealing with the hierarchical data that are prevalent in servant leadership studies. The ICCs and design effects for the items that measure servant leadership revealed the significant and non-trivial variances explained by organization level in the study, which is in line with the findings of Liden *et al.* (2008). The substantial organization-level variations justified the requirement of employing MLCFA and MLSEM in studying servant leadership associated with nested data. The advantage of MLCFA over CFA in resolving the statistical issues relevant to the nested structure of the data in the studies on servant leadership is shown by the better fit of MLCFA models. MLCFA and MLSEM are flexible and superior in scale validation and model building for nested data in servant leadership studies. It is arguable that varying measurement models might be displayed at different levels for hierarchically structured data (Cheung and Au, 2005; Dyer *et al.*, 2005; Muthén, 1991, 1994). The findings of the present study provide additional empirical evidence to support the argument. As revealed in the present study, the strengths of the relationships among the servant leadership factors and the indicators as well as the inter-correlations among these latent factors were significantly stronger at the organization level than at the individual level. Therefore, the inter-correlations among the servant leadership factors could be underestimated if CFA, which ignores the nested structure of the data, is used to describe the characteristics of servant leadership. In addition, the empirical support for different MLCFA models provides further support to the possibility that the factor structures of a measure might vary at different levels for the data collected in a hierarchical structure. Furthermore, the finding of the stronger influence of servant leadership on job satisfaction at the organization-level than at the individual level also illustrates the importance of considering the nested structure of the data. Overall, our study reiterates the importance of using appropriate methods to capture a solid definition of the construct at the theoretically appropriate levels of analysis at the beginning of any analysis on servant leadership. In a broad sense, this study shows the feasibility and capacity of using MLCFA and MLSEM as systematic analytical frameworks that link both theoretical and methodological considerations in validating servant leadership measures and developing models associated with hierarchical structure data in servant leadership studies. We hope that this illustrative implementation of MLCFA and MSEAM can lead to their widespread applications in servant leadership studies.

Theoretical implications

This study provides support for the multilevel conceptual framework of servant leadership. With respect to the factorial structure of servant leadership measures at the individual level, our study replicated the five-factor measurement model derived by Barbuto and Wheeler (2006). In line with previous findings (e.g. Barbuto and Wheeler, 2006; Sendjaya and Cooper, 2011), our results also revealed strong correlations among the servant leadership characteristics with respect to the individual-level model.

An important finding of the study was that the servant leadership measure also operated well at the organization level of analysis and the construct validity for the scale at the organization level was empirically supported. The substantive interest in the organization-level servant leadership requires an organization-level approach to the data. This study demonstrates that the differences in servant leadership among different organizations can be captured by the measurement models at the organization level.

The second-order factorial structure of servant leadership was empirically supported at both the individual and organization levels. The strong correlations among the five servant leadership factors at both levels observed in the study revealed the presence of ambiguity in differentiating between the dimensions of servant leadership. This result is in accordance with the findings of Reed *et al.* (2011) and Sendjaya and Cooper (2011). The sustained multilevel second-order model indicates that servant leadership can be taken as a holistic yet multifaceted construct that signifies a selfless life and a profound and all-embracing philosophy of leadership, largely reflecting the character strength of the leaders (Sendjaya and Cooper, 2011). The second-order factorial structure of servant leadership at both the individual and organization levels sustained by the current study advances an improved understanding of the conceptual framework of servant leadership in which the distinct but related servant leadership characteristics can be considered manifestations of an underlying single and high-order construct. This finding contributes to better conjectures on what might constitute the primary and secondary aspects of servant leadership behavior as experienced by the followers. The advantages of demonstrating the conceptual framework of servant leadership with the multilevel second-order model should be acknowledged. A simple interpretation of the results can be provided if the second-order factor is used in understanding the antecedents and consequences of servant leadership (Reed *et al.*, 2011). In addition, the potential multi-collinearity problem possibly caused by the high correlations among the first-order servant leadership characteristics can be avoided if the second-order factor rather than the five first-order factors is included as an exploratory variable in a model that aims to investigate the effect of servant leadership on individual or/and organizational outcomes.

This study also found the adequate fit of a unidimensional model for demonstrating organization-level servant leadership. However, this unidimensional measurement model did not reasonably fit to the individual-level data. Although the multilevel second-order model was chosen in investigating the effect of servant leadership on job satisfaction in the present study, we cannot simply exclude the unidimensional model from the alternative models that can be employed to demonstrate the framework of servant leadership at the organization level. We believe that both qualitative and quantitative studies are needed to help elaborate which or what competing model(s) can further comprehensively demonstrate servant leadership at different levels. Therefore, based on this preliminary study, we invite future researchers to extensively examine the constructs of servant leadership under a multilevel framework to advance our understanding of the construct of servant leadership.

Although we urge future researchers to continuously explore "better" models to demonstrate the conceptual framework of servant leadership, we believe that some preliminary recommendations can be given to future researchers regarding the selection of measurement models of servant leadership in their studies based on the findings of this study. The selection of servant leadership measurement models partly

depends on the manner in which servant leadership is incorporated in the hypothesized model or the served purpose of employing servant leadership. The empirical support of the multilevel second-order model (Model 7) does not preclude practitioners and researchers from employing the multilevel five-factor model (Model 4) because these distinct factors, although sharing common variances, uniquely contribute to constituting the framework of servant leadership (Sendjaya and Cooper, 2011). We suggest that the multilevel five-factor model is preferred when servant leadership is considered as a dependent variable in a model that aims to identify the antecedents of servant leadership. When servant leadership is considered an independent variable in a model, the multilevel second-order model is recommended to eliminate the potential multi-collinearity problem possibly caused by the high correlations among the five first-order factors. Clearly, MLCFA allows flexible selection of measurement models at different analysis levels. MLSEM provides flexibility to build different structural models that depict the relationships between different constructs at different levels (Dyer *et al.*, 2005; Muthén, 1991, 1994). Considering the manner in which servant leadership is treated in the models at different analysis levels, different measurement models of servant leadership can be employed to serve different level-specific purposes. For example, if a multilevel model is applied to simultaneously explore how servant leadership affects individual outcomes at the individual level and investigate how servant leadership is predicted by leader personalities at the organization level, then the second-order model and the five-factor model can be selected to serve their respective purposes in the individual-level and organization-level models.

As expected, the significant and positive relationship between servant leadership and followers' job satisfaction was further empirically confirmed by this study. With respect to the individual-level model, all five servant leadership factors were positively correlated with job satisfaction. The results of MLSEM suggested that servant leadership was a significant and positive predictor of job satisfaction and approximately 22 percent of the variance in the job satisfaction of the followers was accounted for by their perceptions of servant leadership. This is as expected because servant leadership has been found to be significantly and positively related to job satisfaction in previous studies (e.g. Barbuto and Wheeler, 2006; Jenkins and Stewart, 2010; Mayer *et al.*, 2008). The additional contribution of our study to understanding the relationship between servant leadership and job satisfaction resides in the findings of their relationship at the organization level. With regard to the organization-level model, all the five factors were highly correlated with job satisfaction, indicating a very strong relationship between servant leadership and job satisfaction. Interestingly, organizational stewardship had the strongest correlation with job satisfaction at the organization level. This result differs from the result obtained from the individual-level model. The proportion of variance in job satisfaction explained by servant leadership at the organization level was approximately 48 percent, which was significantly greater than that at the individual level. As a result, neglecting the multilevel structure of the data might underestimate the relationship between servant leadership and job satisfaction and therefore lead to inadequate conclusions. The positive relationship between servant leadership and followers' job satisfaction implies that the employee job satisfaction can be improved by emphasizing servant leadership in an organization. Servant leadership offers the potential to positively revolutionize interpersonal work relations, which is a process that can possibly change organizational culture (Russell and Stone, 2002). With this strategy, followers will feel that they are treated fairly and supported completely in such a service-oriented organization and are more likely to feel

that their basic needs at work are satisfied. As a result, their job satisfaction and commitment will increase, which will in turn help the organization to achieve its goals (Barbuto and Wheeler, 2006).

Limitations of the study

The limitations of this investigation should be considered when interpreting and generalizing the findings of the study. The key limitation of the study is the cross-sectional nature of the data. The design of the study involved only one concurrent data collection for servant leadership and job satisfaction at a single point in time. One of the limitations of cross-sectional study is that it does not allow for confident casual conclusions irrespective of the advanced statistical methods used in the analysis (Spector, 1994). The possibility that the direction of causality might be the reverse of that hypothesized can never be ruled out in cross-sectional studies. Therefore, the relationship between servant leadership and job satisfaction might be explained in an opposite direction to the assumption that servant leadership influences job satisfaction. That is, the perceptions of individual followers toward job satisfaction might affect their ratings of their leaders. A longitudinal study where the servant leadership measures are collected prior to the job satisfaction measures can be conducted in the future to address this concern. Another limitation of the study is that the data were collected in an educational setting. Whether or not the findings of the study can be replicated in the corporate setting is still an open question.

Directions for future research

The findings of this illustrative study of applying MLCFA and MLSEM to validate servant leadership instrument and investigate the relationship between servant leadership and followers' job satisfaction highlight at least two areas for future research. Although different measurement models have been compared by using MLCFA in our study to explore the conceptual framework of servant leadership, MLCFA cannot indicate whether or not a model fits the true model because multiple models probably all fit the data reasonably well (MacCallum *et al.*, 1993). The findings of our study, in accordance with other studies (e.g. Reed *et al.*, 2011; Sendjaya and Cooper, 2011), indicated strong relationships among the characteristics of servant leadership. Thus, a possible underlying general servant leadership factor might explain the responses of the followers to all the servant leadership items, except for domain-specific servant leadership factors. Although our study supports the high-order factorial structure of servant leadership, the roles of specific factors that are independent of the general factor cannot be studied using this second-order model. Therefore, alternative models such as the bi-factor model (Chen *et al.*, 2006; Gibbons *et al.*, 2007) can be examined for their fit to the data to explore the conceptual framework of servant leadership in depth. Doing so will further elucidate the conceptual framework of servant leadership as well as the effects of servant leadership factors on individual and organizational outcomes.

The relationship between the rater-report servant leadership measure and the self-report servant leadership measure, which has not yet been fully explored, is another interesting area for future research. Our study shows that MLCFA and MLSEM can be directly applied in future studies to investigate how the self-report and rater-report servant leadership measures are associated by adding self-report servant leadership measure to the organization-level model.

Conclusion

This study illustrates how to use MCFA and MSEM to appropriately address the methodological issues associated with nested data raised in previous studies on servant leadership. Our results show the non-trivial variances in the responses of the followers to the servant leadership items explained by the organization level and justify the requirement of running multilevel factor analysis for rater-report measures of servant leadership. The findings of the study provide additional evidence that MLCFA produces superior estimation than CFA which ignores the inherent hierarchical structure of data collected in servant leadership studies. This study reveals the multilevel construct of servant leadership that has not been adequately researched in previous studies. Revisiting the construct validity of Barbuto and Wheeler's (2006) servant leadership questionnaire using MLCFA in this study provides empirical support for the multidimensional measurement model, which is composed of five distinct but closely related factors at both the individual and organization levels. The results of MLCFA also provide support for the second-order factorial structure of servant leadership at both levels, suggesting the presence of an underlying single and high-order construct that captures the correlations among the five first-order subdomains of servant leadership. All the five factors of servant leadership display significant, positive, and unique relationships with job satisfaction at both the individual and organization levels. The results of MLSEM not only indicate the significant and positive effects of servant leadership on job satisfaction but also show varying degrees of the influences at different levels. Overall, our study offers new insights into the conceptual framework of servant leadership measures and the effects of servant leadership on individual and organizational outcomes by applying appropriate statistical methods to analyze the hierarchically structured servant leadership data. These findings will promote the appropriate usage of servant leadership measures in research and practice, provide empirical insights into the burgeoning field of servant leadership, and expand and enhance the impacts of servant leadership studies.

References

Akaike, H. (1974), "A new look at the statistical model identification", *IEEE Transactions on Automatic Control*, Vol. 19 No. 6, pp. 716-723.

Barbuto, J.E. Jr and Wheeler, D.W. (2006), "Scale development and construct clarification of servant leadership", *Group and Organization Management*, Vol. 31 No. 3, pp. 300-326.

Bentler, P.M. (1990), "Comparative fit indexes in structural models", *Psychological Bulletin*, Vol. 107 No. 2, pp. 238-246.

Browne, M.W. and Cudeck, R. (1992), "Alternative ways of assessing model fit", *Sociological Methods and Research*, Vol. 21 No. 2, pp. 230-258.

Chan, D. (1998), "Functional relations among constructs in the same content domain in different levels of analysis: a typology of composition models", *Journal of Applied Psychology*, Vol. 83 No. 2, pp. 234-246.

Chen, F.F., Stephen, G.W. and Karen, H.S. (2006), "A comparison of bifactor and second-order models of quality of life", *Multivariate Behavioral Research*, Vol. 41 No. 2, pp. 189-225.

Cheung, M.W.-L. and Au, K. (2005), "Applications of multilevel structural equation modeling to cross-cultural research", *Structural Equation Modeling*, Vol. 12 No. 4, pp. 598-619.

Dedrick, R.F. and Greenbaum, P.E. (2011), "Multilevel confirmatory factor analysis of a scale measuring interagency collaboration of children's mental health agencies", *Journal of Educational and Behavioral Disorders*, Vol. 19 No. 1, pp. 27-40.

Dennis, R. and Winston, B.E. (2003), "A factor analysis of Page and Wong's servant leadership instrument", *Leadership and Organization Development Journal*, Vol. 24 No. 8, pp. 455-459.

Dennis, R.S. and Bocarnea, M. (2005), "Development of the servant leadership assessment instrument", *Leadership and Organization Development Journal*, Vol. 26 No. 8, pp. 600-615.

Dyer, N.G., Hanges, P.J. and Hall, R.J. (2005), "Applying multilevel confirmatory factor analysis techniques to the study of leadership", *The Leadership Quarterly*, Vol. 16 No. 1, pp. 149-167.

Eisenberger, R., Cummings, J., Armeli, S. and Lynch, P. (1997), "Perceived organizational support, discretionary treatment, and job satisfaction", *Journal of Applied Psychology*, Vol. 82 No. 5, pp. 812-820.

Gibbons, R.D., Bock, R.D., Hedeker, D., Weiss, D.J., Segawa, E., Bhaumik, D.K., Kupfer, D.J., Frank, E., Grochocinski, V.J. and Stover, A. (2007), "Full-information item bifactor analysis of graded response data", *Applied Psychological Measurement*, Vol. 31 No. 1, pp. 4-19.

Graham, J.W. (1991), "Servant-leadership in organizations: Inspirational and moral", *Leadership Quarterly*, Vol. 2 No. 2, pp. 105-119.

Greenleaf, R.K. (1970), *The Servant as Leader*, The Robert K. Greenleaf Center, Newton Centre, MA.

Harrison, D.A., Newman, D.A. and Roth, P.L. (2006), "How important are job attitudes? Meta-analytic comparisons of integrative behavioral outcomes and time sequences", *Academy of Management Journal*, Vol. 49 No. 2, pp. 305-325.

Hox, J.J. (2010), *Multilevel Analysis: Techniques and Applications*, 2nd ed., Routledge, New York, NY.

Hu, L. and Bentler, P.M. (1999), "Cutoff criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives", *Structural Equation Modeling*, Vol. 6 No. 1, pp. 1-55.

Jenkins, M. and Stewart, A.C. (2010), "The importance of a servant leader orientation", *Health Care Management Review*, Vol. 35 No. 1, pp. 46-54.

Joseph, E.E. and Winston, B.E. (2005), "A correlation of servant leadership, leader trust, and organizational trust", *Leadership and Organization Development Journal*, Vol. 26 No. 1, pp. 6-22.

Klein, K.J. and Kozlowski, S.W.J. (2000), "From micro to meso: critical steps in conceptualizing and conducting multilevel research", *Organizational Research Methods*, Vol. 3 No. 3, pp. 211-236.

Laub, J. (1999), "Assessing the servant organization: development of the Servant Organizational Leadership Assessment (SOLA) instrument", unpublished doctoral dissertation, Florida Atlantic University, Boca Raton, FL.

Liden, R.C., Wayne, S.J., Zhao, H. and Henderson, D. (2008), "Servant leadership: development of a multidimensional measure and multi-level assessment", *The Leadership Quarterly*, Vol. 19 No. 2, pp. 161-177.

MacCallum, R.C., Wegener, D.T., Uchino, B.N. and Fabrigar, L.R. (1993), "The problem of equivalent models in applications of covariance structure analysis", *Psychological Bulletin*, Vol. 114 No. 1, pp. 185-199.

Mayer, D.M., Bardes, M. and Piccolo, R.F. (2008), "Do servant-leaders help satisfy follower needs? An organizational justice perspective", *European Journal of Work and Organizational Psychology*, Vol. 17 No. 2, pp. 180-197.

Muthén, B.O. (1991), "Multilevel factor analysis of class and student achievement components", *Journal of Educational Measurement*, Vol. 28 No. 4, pp. 338-354.

Muthén, B.O. (1994), "Multilevel covariance structure analysis", *Sociological Methods and Research*, Vol. 22 No. 3, pp. 376-398.

Muthén, B.O. and Satorra, A. (1995), "Complex ample data in structural equation modeling", in Marsden, P.V. (Ed.), *Sociological Methodology*, American Sociological Association, Washington, DC, pp. 267-316.

Muthén, L.K. and Muthén, B.O. (2008/2011), *Mplus User's Guide*, Authors, Los Angeles, CA.

Page, D. and Wong, T.P. (2000), "A conceptual framework for measuring servant-leadership", in AdjGibolosoo, S. (Ed.), *The Human Factor in Shaping the Course of History and Development*, University Press of America Inc, New York, NY, pp. 69-109.

Parris, D.L. and Peachey, J.W. (2013), "A systematic literature review of servant leadership theory in organizational contexts", *Journal of Business Ethics*, Vol. 113 No. 3, pp. 377-393.

Reed, L.L., Vidaver-Cohen, D. and Colwell, S.R. (2011), "A new scale to measure executive servant leadership: development, analysis, and implications for research", *Journal of Business Ethics*, Vol. 101 No. 3, pp. 415-434.

Reise, S.P., Ventura, J., Nuechterlein, K.H. and Kim, K.H. (2005), "An illustration of multilevel factor analysis", *Journal of Personality Assessment*, Vol. 84 No. 2, pp. 126-136.

Russell, R.F. and Stone, A.G. (2002), "A review of servant leadership attributes: developing a practice model", *Leadership and Organization Development Journal*, Vol. 23 No. 3, pp. 145-157.

Saari, L.M. and Judge, T.A. (2004), "Employee attitudes and job satisfaction", *Human Resource Management*, Vol. 43 No. 4, pp. 395-407.

Schwartz, G.T. (1978), "Estimating the dimensions of a model", *Annuals of Statistics*, Vol. 6 No. 2, pp. 461-464.

Sendjaya, S. and Cooper, B. (2011), "Servant leadership behavior scale: a hierarchical model and test of construct validity", *European Journal of Work and Organizational Psychology*, Vol. 20 No. 3, pp. 416-436.

Sendjaya, S., Sarros, J.C. and Santora, J. (2008), "Defining and measuring servant leadership behavior in organizations", *Journal of Management Studies*, Vol. 45 No. 2, pp. 402-424.

Spector, P.E. (1994), "Using self-report questionnaires in OB research: a commont on the use of a controversial method", *Journal of Organizational Behavior*, Vol. 15 No. 5, pp. 385-392.

Toland, M.D. and De Ayala, R.J. (2005), "A multilevel factor analysis of students' evaluations of teaching", *Educational and Psychological Measurement*, Vol. 65 No. 2, pp. 272-296.

Tucker, L.R. and Lewis, C. (1973), "A reliability coefficient for maximum likelihood factor analysis", *Psychometrika*, Vol. 38 No. 1, pp. 1-10.

Van Dierendonck, D. (2011), "Servant leadership: a review and synthesis", *Journal of Management*, Vol. 37 No. 4, pp. 1228-1261.

Van Dierendonck, D. and Nuijten, I. (2011), "The servant leadership survey: development and validation of a multidimensional measure", *Journal of Business Psychology*, Vol. 26 No. 3, pp. 249-267.

Yammarino, F.J., Dansereau, F. and Kennedy, C.J. (2001), "A multiple-level multidimensional approach to leadership: viewing leadership through an elephant's eye", *Organizational Dynamics*, Vol. 29 No. 3, pp. 149-163.

Yuan, K.-H. and Schuster, C. (2013), "Overview of statistical estimation methods", in Little, T.D. (Ed.), *The Oxford Handbook of Quantitative Methods, Volume 1, Foundation*, Oxford University Press, New York, NY, pp. 361-387.

Zimprich, D., Perren, S. and Hornung, R. (2005), "A two-level confirmatory factor analysis of a modified Rosenberg self-esteem scale", *Educational and Psychological Measurement*, Vol. 65 No. 3, pp. 465-481.

Appendix

Servant leadership questionnaire (Barbuto and Wheeler, 2006)

(1) The principal puts my best interests ahead of his/her own.
(2) The principal does everything he/she can to serve me.
(3) The principal sacrifices his/her own interests to meet my needs.
(4) The principal goes above and beyond the call of duty to meet my needs.
(5) The principal is the one I would turn to if I had a personal trauma.
(6) The principal is good at helping me with my emotional issues.
(7) The principal is talented at helping me heal emotionally.
(8) The principal is the one who could help me mend my hard feelings.
(9) The principal seems alert to what's happening.
(10) The principal is good at anticipating the consequences of decisions.
(11) The principal has great awareness of what is going on.
(12) The principal seems in touch with what's happening.
(13) The principal seems to know what is going to happen.
(14) The principal offers compelling reasons to get me to do things.
(15) The principal encourages me to dream "big dreams" about the organization.
(16) The principal is very persuasive.
(17) The principal is good at convincing me to do things.
(18) The principal is gifted when it comes to persuading me.
(19) The principal believes that the organization needs to play a moral role in society.
(20) The principal believes that our organization needs to function as a community.
(21) The principal sees the organization for its potential to contribute to society.
(22) The principal encourages me to demonstrate community spirit in the workplace.
(23) The principal is preparing the organization to make a positive difference in the future.