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Psychometric properties of the Service Leadership Behavior Scale: Preliminary findings

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Abstract

Using a sample of 231 students recruited from The Hong Kong Polytechnic University (PolyU), this paper reports the findings of a validation study for the 97-item long-form of the Service Leadership Behavior Scale (SLB-LF-97), which was specifically designed to measure the behavioral characteristics of a quality Service Leader. Results showed that the SLB-LF-97 had high internal consistency and convergent validity. Exploratory factor analysis revealed that 12 factors were extracted from the data, with 65 items retained to form the short-form of the inventory (SLB-SF-65). Both the long-form (SLB-LF-97) and the short-form (SLB-SF-65) of the scale showed excellent internal consistency, with the latter demonstrating robust convergent validity as shown by its significant positive correlation with several theoretically linked constructs.

Keywords: Service Leadership Behavior Scale, convergent validity, factor analysis, service leadership education, scale validation

Introduction

Regarding the transformation of manufacturing-driven to service-driven and knowledge-based economies typical of advanced capitalist societies (1-3), Hong Kong has undergone the most complete and swift transition, despite the absence of any strategic political planning (4). As such, Po Chung, Chairman of the Hong Kong Service Leadership and Management Limited (HKI-SLAM), strongly advocated the necessity to teach undergraduates in Hong Kong about effective leadership in a service economy which is vital to their career aspirations as well as personal growth (3, 5). Indeed, the HKI-SLAM is committed to the development of sustainable Service Leadership education (i.e., SLAM curriculum framework) tailored to tertiary institutions in Hong Kong (6, 7).

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Against such a background, a multi-year project entitled the "Fung Service Leadership Education Initiative (FSLEI)" was implemented in eight local universities funded by the University Grants Committee (UGC). The FSLEI was conceived with the financial support of the Victor and William Fung Foundation and the collaborative effort of the HKI-SLAM and the UGC. Under the FSLEI, each participating institution independently designs curriculum materials and programs on Service Leadership based on the SLAM curriculum framework (6-8). Particularly, Chung (9,10) contended that there are three fundamental building blocks of effective Service Leadership (**E**), namely, *competence* (**C_1**; "Expertise" dimension), *moral character* (**M**; "Moral" dimension), and *caring disposition* (**C_2**; "Compassion" dimension). Besides, the seven Core Beliefs [i.e., CBs 1 to 7] pertaining to Service Leadership and Management outlined by HKI-SLAM (11) also underlie the theoretical foundation of Service Leadership education under the FSLEI (7).

With the purpose of filling the research gap on the evaluation of leadership education (8,12), as well as facilitating the objective assessment of qualities of an effective Service Leader (13), the research team at The Hong Kong Polytechnic University (PolyU) embarked on a project entitled "Development and validation of measures based on the Service Leadership model (i.e., "The Project" hereafter)" (14). Through the construction and validation of three scales on attitude, behavior, and knowledge which constitute the three defining attributes of an effective Service Leader (12), Shek and colleagues (14) developed three related assessment tools. The present paper reports the findings of a validation study of the long-form of Service Leadership Behavior Scale (SLB-LF-97).

Designed to examine the "kind of behavioral qualities a Service Leader should demonstrate" (14), the SLB-LF-97 comprises 97 English items developed based on the SLAM curriculum framework, 25 principles of Service Leadership (9), 12 dimensions of a Service Leader (10), and other relevant publications from the leadership and management literature (15-17). Each item describes a specific leadership behavior related to the Service Leadership model. Participants were asked to use a six-point Likert scale (1: very dissimilar to me; 6: very similar to me) to evaluate whether each statement appropriately describes one's behavior in a situation which warrants his/her leadership (see Table 1 for the sample items). Resembling Yukl's (18) proposed a hierarchical taxonomy of leadership behaviors, the SLB-LF-97 covered a wide range of component behaviors subsumed under four "metacategories". These "meta-categories" included, i) service provision, ii) principle **E** (effective leadership) = **MC^2** (Moral character *Competence* Caring disposition), iii) commitment to continuous improvement, and iv) distributed leadership.

The SLB-LF-97 was also examined in a content validation study which is described in detail in another paper under preparation. While it is crucial in scale development to examine content validity, which informs how each item represents the construct being measured (19), it is equally important to establish the convergent validity of the measure, which can be derived from "correlations with measures purporting to measure related constructs" (20, p. 179), as well as internal consistency for the measurement tool under validation. Hence, as a preliminary step paving the way for the main study, the present study utilized a sample of 231 PolyU students to examine the reliability, factorial validity, and convergent validity of the SLB-LF-97.

Methods

A total of 231 students at The Hong Kong Polytechnic University (PolyU) completed the questionnaire used in the present study via an online survey platform. Seventeen questionnaires were excluded from the working sample due to concern about response quality. Amongst the 214 valid questionnaires, 60 (28.0%) were male respondents while 154 (72.0%) were female respondents. Most participants (55.1%) were aged 20 to 24 years (mean age: 20.0 years, SD: 1.86). The majority of respondents had previous work experience (86.0%), had taken one (or more) credit-bearing Service Leadership course(s) at PolyU (52.9%), and received other prior leadership training (32.2%). Taken as a whole, 76.6 % of respondents claimed to possess "some" or "a lot of" knowledge about Service Leadership. Finally, 49.5% were admitted to PolyU based on performance on the Hong

Kong Diploma of Secondary Education Examination (HKDSE). Details regarding other basic demographics of the sample are featured in Table 2.

Procedures

The study was conducted in a computer lab with each student seated in a separate cubicle. Participants were instructed to access the electronic survey implemented via the mySurvey@PolyU electronic survey system. The rationale of the study, instructions on how to participate, the principles of voluntary participation and withdrawal, and the pledge of data confidentiality were detailed in the invitation documents and on the e-survey. It was emphasized during the invitation and before the start that 30 minutes would be required for students to conscientiously complete the whole questionnaire. Each respondent was offered for his/her participation a supermarket gift voucher valued at HK$50 (USD$6.40) and an opportunity to win an iPad Air 2 via a lucky draw. Participants indicated whether they consented to join the study (or to withdraw) on the opening page.

We used time of completion as a proxy for gauging participants' seriousness in completing the survey. Specifically, we regarded responses submitted within half of our suggested time (i.e., 30 minutes) as invalid. Accordingly, 17 cases with a completion time below 15 (mean: 13.3, SD: 2.6) minutes were deleted, resulting in 214 valid cases.

Instruments

The present e-survey consists of items of the long-form of the Service Leadership Behavior Scale (i.e., the 97-item SLB-LF-97). As part of the project entitled "Development and validation of measures based on the Service Leadership model" (14), the SLB-LF-97 was developed based on the SLAM curriculum framework, 25 principles of Service Leadership (9), 12 dimensions of a Service Leader (10), and other published papers from the leadership literature (e.g., 17,21). The SLB-LF-97 is in English with a six-point Likert scale (1: very dissimilar; 6: very similar). Each item describes a certain leadership behavior whereby participants rate how each descriptiton resembles their own behaviors when they assume leadership roles in formal (e.g., workplace) or informal (e.g., family) contexts. Four sample items are illustrated in Table 1.

Table 1. Four sample items of the SLB-LF-97

Items	Very Dissimilar to Me	Moderately Dissimilar to Me	Slightly Dissimilar to Me	Slightly Similar to Me	Moderately Similar to Me	Very Similar To Me
10. I can make convincing arguments.	1	2	3	4	5	6
18. I draw meaning from undesirable experience.	1	2	3	4	5	6
58. I find it hard to think from other people's perspectives. (Reverse-item)	1	2	3	4	5	6
89. I usually do not let others participate in the decision-making process. (Reverse-item)	1	2	3	4	5	6

Note. These sample items were slightly modified out of copyright concern.

To assess the convergent validity of the SLB-LF-97, six additional measures based on the personality and leadership literature were administered alongside the SLB-LF-97. These validated criterion inventories included the Revised Servant Leadership Profile (RSLP; 20 items), the Paternal Leadership Scale (PTL; 5 items), the Leadership Attitude and Belief Scale (LABS; 28 items), the Interpersonal Reactivity Index (IRI; 14 items), the Moral Self-Concept Scale (MSC; 8 items), and the Leadership Efficacy Scale (LEF; 8 items). There were also a few closed-ended and open-ended items probing into the demographics of the respondents.

- *Revised Servant Leadership Profile (RSLP):* The RSLP was developed by Wong and Page (22) as a self-assessment tool which assesses *Servant Leadership* as a multifactorial construct. Of the eight factors outlined in Wong and Page's (22) revised model of *Servant Leadership*, 20 items from five factors considered relevant to the SLAM framework were included in the present study. These five factors included *Empowering and developing others* (5 items), *Serving others* (7 items), *Open, participatory leader-ship* (2 items), *Inspiring leadership* (2 items), and *Courageous leadership* (4 items). The RSLP operates on a seven-point Likert scale, with a higher composite score denoting a higher propensity to exhibit *Servant Leadership* behaviors. The RSLP was demonstrated to possess excellent internal consistency (α =0.93; mean inter-item correlations=0.42).
- *Paternalistic Leadership Scale (PTL):* Developed by Aycan and associates (23), the PTL (5 items) measures *Paternalism* as a leadership style epitomized by a strong sense of hierarchy combined with a fatherly benevolence and moral integrity bestowed upon followers (24,25). Items were rated on a six-point Likert scale, with a higher score illustrating a greater alignment with the mentality of a paternalistic leader. Reliability analyses underlined the acceptable internal consistency of PTL in the current study (α = 0.79; mean inter-item correlations = 0.43).
- *Leadership Attitude and Belief Scale (LABS):* Developed by Wielkiewicz (17) as a measure of college students' "attitudes and beliefs about the nature of leadership" (p. 337), the LABS is formed of two inde-pendent dimensions probing into two distinct thinking styles regarding what leadership should be about. They included, the *Systemic Thinking Scale* (ST; 14 items) which exam-ines people's construal of leadership as a distributed and decentralized process, as opposed to the *Hierarchical Thinking Scale* (HT; 14 items) which assesses individuals' interpretation of leadership as involving centralization and hierarchies. Items were rated on a five-point Likert scale, with higher scale scores reflecting a greater likelihood to adopt a certain construal of the nature of leadership. Both ST (α = 0.84; mean inter-item correlations = 0.28) and HT (α = 0.83; mean inter-item correlations = 0.26) recorded meritorious reliability in the present study.
- *Interpersonal Reactivity Index (IRI):* As a cross-culturally validated assessment tool (26-28), the IRI comprises four subscales with each assessing a dimension of empathy (29). Subscales *Perspective Taking* (PT; 7 items) and *Empathic Concern* (EC; 7 items) were adopted in this study. Participants rated the 14 items on a five-point Likert scale, with higher subscale and composite scores indicating higher empathy, which constitutes the roots of compassion as a key dimension of a Service Leader (10). Cronbach's alpha for subscales PT and EC and the composite IRI score were 0.66, 0.67, and 0.73, respectively.
- *Moral Self-Concept (MSC):* As a subscale under the Chinese Adolescent Self-Esteem Scales (30), the MSC specifically examines students' self-evaluation on areas including i) *Conduct and virtues*, ii) *Self-control and discipline*, and iii) *Altruism*. Participants rated the eight items using a seven-point Likert scale, with a higher composite score representing the respondent's perceived significance of *morality* to oneself, a fundamental attribute of leadership effectiveness according to the SLAM curriculum framework (11). The MSC was shown to possess a good internal consistency in the present study (α =0.88; mean inter-item correlations=0.49).
- *Leadership Efficacy Scale (LEF):* Developed by Murphy (31), the 8-item LEF constitutes a self-report inventory in which respondents rate their self-perceived capacity to lead. The LEF operates on a five-point Likert scale, with a higher score indicative of one's "level of confidence in knowledge, skills, and abilities associated with leading others" (32, p. 669). Reliability assessment again highlighted a good internal consistency of the LEF (α =0.84; mean inter-item correlations=0.41).

Table 2. Demographic information for the current working sample (N= 214)

Demographic Variables		N = 214
Gender	Male	60 (28.0%)
	Female	154 (72.0%)
Age group	15 to 19 years	92 (43.0%)
	20 to 24 years	118 (55.1%)
	25 to 29 years	4 (1.9%)
Year commencing on one's undergraduate study	2016	103 (48.1%)
	2015	52 (24.3%)
	2014	23 (10.7%)
	2013	30 (14.0%)
	2012 or before	6 (2.8%)
Faculty	Faculty of Applied Science and Textiles	17 (7.9%)
	Faculty of Business	36 (16.8%)
	Faculty of Construction and Environment	27 (12.6%)
	Faculty of Engineering	60 (28.0%)
	Faculty of Health and Social Sciences	47 (22.0%)
	Faculty of Humanities	3 (1.4%)
	School of Design	1 (0.5%)
	School of Hotel and Tourism Management	22 (10.3%)
	Others	1 (0.5%)
Number of credit-bearing Service Leadership (SL) courses taken*	0	101 (47.2%)
	1	105 (49.1%)
	2	7 (3.3%)
	3	1 (0.5%)
	4	0 (0%)
Participated in the non-credit bearing "Silk Road Youth Leadership Programme"	Yes	3 (1.4%)
	No	211 (98.6%)
Other leadership training or workshops taken?	Yes	69 (32.2%)
	No	145 (67.8%)
Previous work experience	Yes	184 (86.0%)
	No	30 (14.0%)
Self-proclaimed SL knowledge	No knowledge	11 (5.1%)
	Little knowledge	39 (18.2%)
	Some knowledge	128 (59.8%)
	A lot of knowledge	36 (16.8%)
	All the knowledge	0 (0%)
Leadership position ever taken?	Yes	152 (71.0%)
	No	62 (29.0%)

Note. * The list of credit-bearing SL courses offered by PolyU included i) APSS 1L01 Tomorrow's Leaders, ii) APSS 1A22 Promotion of Leadership Qualities in University Students. iii) APSS 1A21/1A21 M Service Leadership, and iv) APSS 2S09 Service Leadership through Serving Children and Families with Special Need.

Data analysis plan

To explore the dimensionality of SLB-LF-97, we performed the exploratory factor analysis (EFA) in this validation study. Specifically, the present EFA was conducted using the principal axis analysis (PAA) with Promax rotation (kappa = 4). Tabachnick and Fidell (33) argued that PAA should be preferred for studies that attempted to reach an uncontaminated theoretical solution and were designed on the basis of several underlying theoretical constructs. Both these criteria matched well with the objectives and nature of the present study. SPSS statistics version 24.0 (IBM) was used to perform descriptive analyses as well as internal consistency, convergent validity, and factorial validity.

Table 3. Factor loadings of the SLB-LF-97 (N = 214)

	M	SD	Factors Extracted													
			1	2	3	4	5	6	7	8	9	10	11	12	13	Retained?
SLB-01	4.51	1.04	-0.01	-0.05	0.00	-0.16	-0.11	-0.04	-0.02	0.04	**0.77**	-0.02	0.06	0.09	0.15	Yes
SLB-02	4.28	1.05	-0.03	0.00	-0.03	-0.15	-0.04	0.09	0.01	0.05	**0.81**	-0.14	-0.10	0.12	0.18	Yes
SLB-03	4.76	0.79	0.15	0.16	-0.13	-0.10	0.15	-0.13	0.17	-0.20	**0.64**	0.01	-0.17	0.07	0.14	Yes
SLB-04	4.69	0.93	0.25	0.12	-0.11	-0.05	0.11	-0.02	0.11	0.06	0.38	-0.19	0.13	-0.01	0.48	No
SLB-05	4.59	0.92	**0.59**	0.09	0.16	0.01	0.08	0.07	0.00	-0.02	0.04	-0.18	-0.01	0.06	0.17	Yes
SLB-06	4.21	0.96	**0.63**	0.15	0.19	-0.01	-0.05	0.11	0.02	-0.13	-0.10	-0.11	0.02	0.08	0.04	Yes
SLB-07	4.66	0.98	**0.75**	-0.07	0.03	0.01	0.04	-0.09	0.00	0.07	-0.02	0.01	0.13	0.00	0.08	Yes
SLB-08	4.66	0.95	**0.83**	-0.01	-0.05	0.02	0.01	0.00	0.01	0.00	0.09	-0.15	0.17	-0.05	0.10	Yes
SLB-09	4.63	0.96	**0.69**	-0.13	-0.02	0.06	0.03	-0.08	-0.10	0.17	0.12	0.16	0.12	-0.16	-0.01	Yes
SLB-10	4.47	1.01	**0.66**	-0.01	0.00	-0.02	0.03	0.02	-0.03	0.10	0.04	0.22	0.07	-0.06	-0.04	Yes
SLB-11	4.27	0.92	**0.48**	0.08	0.35	-0.05	0.08	0.16	-0.06	-0.10	-0.20	-0.07	0.04	0.08	-0.01	No
SLB-12	4.87	0.93	-0.02	0.02	**0.54**	0.27	0.05	-0.16	-0.02	0.04	0.03	0.03	-0.05	-0.20	0.11	Yes
SLB-13	4.71	0.92	0.09	-0.03	0.34	0.12	0.05	-0.12	-0.21	0.10	0.20	0.04	0.21	-0.15	0.53	No
SLB-14	4.22	1.14	0.02	-0.07	**0.73**	0.22	-0.24	-0.16	-0.19	-0.19	0.09	0.09	0.10	0.21	0.01	Yes
SLB-15	4.36	1.05	-0.10	-0.01	0.42	-0.04	-0.05	0.01	-0.03	-0.02	0.14	0.19	0.36	-0.09	0.10	No
SLB-16	4.30	1.13	0.09	-0.04	**0.84**	0.20	0.09	-0.11	-0.06	-0.03	-0.15	-0.12	-0.12	0.15	0.02	Yes
SLB-17	4.51	1.07	0.03	-0.07	**0.55**	-0.08	-0.04	-0.01	0.18	0.19	-0.12	-0.14	0.27	0.08	0.09	Yes
SLB-18	4.42	0.95	0.01	-0.08	**0.42**	-0.08	-0.06	0.12	0.19	0.29	-0.04	0.01	0.13	0.03	0.02	Yes
SLB-19	4.60	0.88	0.04	0.05	**0.48**	-0.18	-0.07	0.11	0.03	0.08	0.19	0.00	0.05	0.05	0.01	Yes
SLB-20	4.42	1.07	0.05	0.24	**0.58**	-0.15	-0.05	0.02	0.11	0.13	0.07	0.06	-0.15	-0.07	0.09	Yes
SLB-21	4.29	1.11	-0.02	0.31	**0.50**	-0.13	0.05	0.03	0.10	0.09	0.04	0.02	-0.21	-0.03	-0.14	Yes
SLB-22	4.42	1.07	0.12	-0.07	**0.80**	0.02	0.03	-0.10	-0.17	-0.05	-0.06	0.02	-0.11	0.05	0.01	Yes
SLB-23	4.42	1.11	-0.01	0.06	**0.60**	-0.13	-0.01	-0.08	0.19	-0.01	-0.09	0.05	0.16	0.03	0.03	Yes
SLB-24	4.44	0.81	0.04	-0.21	0.12	-0.08	0.19	0.17	0.21	-0.05	0.26	0.25	-0.09	0.07	0.01	No
SLB-25	4.66	0.82	0.01	-0.25	0.17	-0.05	0.03	0.16	0.36	0.04	0.24	0.28	0.01	0.04	-0.08	No

	M	SD	Factors Extracted													
			1	2	3	4	5	6	7	8	9	10	11	12	13	Retained?
SLB-26	4.91	0.82	0.09	0.07	-0.05	-0.05	-0.01	0.06	0.12	-0.11	-0.10	**0.77**	0.18	-0.09	-0.07	Yes
SLB-27	4.86	0.89	-0.09	0.13	0.03	0.04	0.19	0.02	-0.08	-0.17	-0.09	**0.67**	0.12	-0.01	0.01	Yes
SLB-28	4.93	0.84	-0.07	-0.06	0.01	0.10	0.10	-0.10	-0.06	0.14	-0.13	**0.77**	0.11	0.01	-0.09	Yes
SLB-29	5.00	0.93	-0.14	0.00	-0.18	-0.12	**0.49**	-0.03	-0.10	0.14	0.22	0.28	-0.01	0.10	-0.05	Yes
SLB-30	4.87	0.89	-0.11	0.04	0.01	0.12	0.19	-0.07	-0.17	0.08	0.26	0.21	-0.02	0.32	0.14	No
SLB-31	4.60	0.85	0.25	-0.11	0.02	0.33	0.07	-0.08	0.12	0.02	-0.02	-0.05	0.38	-0.11	-0.07	No
SLB-32	4.50	0.96	0.33	-0.16	0.16	-0.03	0.10	0.08	0.11	-0.17	0.10	0.16	0.04	0.01	-0.14	No
SLB-33	2.80	1.18	0.14	0.20	-0.05	-0.09	0.14	-0.27	-0.07	-0.08	-0.11	0.18	-0.10	-0.04	-0.29	No
SLB-34	4.60	0.89	-0.08	0.10	0.03	0.02	-0.05	0.15	0.07	-0.11	-0.06	0.23	**0.44**	0.05	0.18	Yes
SLB-35	4.63	0.86	-0.17	0.11	0.00	-0.09	0.17	0.28	-0.01	-0.10	0.03	0.28	0.27	0.04	0.15	No
SLB-36	4.55	0.98	-0.06	-0.01	-0.04	0.14	0.39	0.26	-0.04	-0.09	-0.08	0.13	0.07	-0.12	-0.04	No
SLB-37	4.50	0.91	0.09	0.00	0.25	0.06	0.36	0.18	-0.18	-0.03	0.01	0.04	0.20	-0.12	-0.12	No
SLB-38	4.76	0.84	0.06	0.11	-0.05	0.31	0.04	0.28	-0.21	-0.14	0.25	-0.04	0.25	-0.06	-0.05	No
SLB-39	4.35	1.09	0.17	-0.04	-0.05	-0.05	-0.08	0.23	0.01	-0.03	-0.06	0.14	**0.67**	0.04	0.14	Yes
SLB-40	4.40	1.08	0.30	-0.06	-0.15	0.04	-0.10	0.25	-0.06	0.08	-0.17	0.17	**0.62**	0.05	0.04	Yes
SLB-41	4.64	0.92	0.12	0.03	0.04	0.03	0.12	0.06	-0.15	-0.01	0.05	-0.02	**0.49**	0.03	0.08	Yes
SLB-42	5.03	1.10	-0.12	0.16	0.12	0.24	0.33	-0.17	-0.03	-0.11	-0.08	0.11	0.03	0.07	0.08	No
SLB-43	4.50	0.93	0.20	0.05	0.08	0.14	**0.45**	0.03	0.00	-0.02	-0.08	-0.08	0.09	0.06	0.00	Yes
SLB-44	4.95	0.90	0.13	0.12	0.03	0.04	**0.81**	-0.03	0.00	0.01	-0.16	-0.05	-0.16	0.06	-0.02	Yes
SLB-45	4.97	0.85	0.05	-0.01	-0.08	-0.04	**0.77**	-0.04	0.00	0.08	-0.01	0.04	-0.07	0.21	0.00	Yes
SLB-46	5.05	0.88	0.18	0.11	-0.14	-0.04	**0.60**	-0.14	-0.03	0.01	-0.01	0.07	0.21	0.27	-0.02	Yes
SLB-47	4.71	1.01	-0.05	0.00	0.07	0.12	0.23	0.21	-0.11	0.02	0.23	-0.11	-0.06	**0.44**	0.01	Yes
SLB-48	4.39	1.06	0.00	-0.06	0.10	0.03	0.18	0.17	-0.09	0.04	0.07	-0.02	0.01	**0.68**	-0.08	Yes
SLB-49	4.66	0.91	0.02	0.08	0.09	-0.02	0.11	0.13	-0.03	0.06	0.12	-0.08	0.19	**0.43**	-0.08	Yes
SLB-50	4.39	1.08	-0.08	-0.18	0.10	0.07	0.15	0.17	-0.11	0.16	0.12	0.00	0.04	**0.60**	-0.08	Yes
SLB-51	5.04	0.82	0.04	-0.05	-0.12	0.28	0.19	0.03	0.31	0.11	0.04	-0.01	-0.13	-0.04	-0.02	No

(Table 3 continued on next page.)

	M	SD	Factors Extracted													
			1	2	3	4	5	6	7	8	9	10	11	12	13	Retained?
SLB-37	4.50	0.91	0.09	0.00	0.25	0.06	0.36	0.18	-0.18	-0.03	0.01	0.04	0.20	-0.12	-0.12	No
SLB-38	4.76	0.84	0.06	0.11	-0.05	0.31	0.04	0.28	-0.21	-0.14	0.25	-0.04	0.25	-0.06	-0.05	No
SLB-39	4.35	1.09	0.17	-0.04	-0.05	-0.05	-0.08	0.23	0.01	-0.03	-0.06	0.14	**0.67**	0.04	0.14	Yes
SLB-40	4.40	1.08	0.30	-0.06	-0.15	0.04	-0.10	0.25	-0.06	0.08	-0.17	0.17	**0.62**	0.05	0.04	Yes
SLB-41	4.64	0.92	0.12	0.03	0.04	0.03	0.12	0.06	-0.15	-0.01	0.05	-0.02	**0.49**	0.03	0.08	Yes
SLB-42	5.03	1.10	-0.12	0.16	0.12	0.24	0.33	-0.17	-0.03	-0.11	-0.08	0.11	0.03	0.07	0.08	No
SLB-43	4.50	0.93	0.20	0.05	0.08	0.14	**0.45**	0.03	0.00	-0.02	-0.08	-0.08	0.09	0.06	0.00	Yes
SLB-44	4.95	0.90	0.13	0.12	0.03	0.04	**0.81**	-0.03	0.00	0.01	-0.16	-0.05	-0.16	0.06	-0.02	Yes
SLB-45	4.97	0.85	0.05	-0.01	-0.08	-0.04	**0.77**	-0.04	0.00	0.08	-0.01	0.04	-0.07	0.21	0.00	Yes
SLB-46	5.05	0.88	0.18	0.11	-0.14	-0.04	**0.60**	-0.14	-0.03	0.01	-0.01	0.07	0.21	0.27	-0.02	Yes
SLB-47	4.71	1.01	-0.05	0.00	0.07	0.12	0.23	0.21	-0.11	0.02	0.23	-0.11	-0.06	**0.44**	0.01	Yes
SLB-48	4.39	1.06	0.00	-0.06	0.10	0.03	0.18	0.17	-0.09	0.04	0.07	-0.02	0.01	**0.68**	-0.08	Yes
SLB-49	4.66	0.91	0.02	0.08	0.09	-0.02	0.11	0.13	-0.03	0.06	0.12	-0.08	0.19	**0.43**	-0.08	Yes
SLB-50	4.39	1.08	-0.08	-0.18	0.10	0.07	0.15	0.17	-0.11	0.16	0.12	0.00	0.04	**0.60**	-0.08	Yes
SLB-51	5.04	0.82	0.04	-0.05	-0.12	0.28	0.19	0.03	0.31	0.11	0.04	-0.01	-0.13	-0.04	-0.02	No
SLB-52	4.27	1.20	0.02	0.03	-0.16	0.04	-0.13	0.13	**0.61**	-0.18	0.13	-0.13	0.04	-0.12	-0.11	Yes
SLB-53	5.04	0.90	0.02	0.24	0.06	0.14	-0.06	-0.05	0.24	-0.06	**0.51**	-0.19	-0.03	0.00	-0.17	Yes
SLB-54	4.82	0.82	-0.08	0.28	-0.03	0.30	0.08	-0.19	0.25	0.09	0.16	-0.02	-0.01	0.04	-0.27	No
SLB-55	4.10	1.03	-0.02	0.06	-0.01	0.08	-0.03	0.13	0.18	0.01	0.05	0.06	0.22	0.24	0.01	No
SLB-56	4.39	0.94	-0.02	0.00	0.09	0.03	-0.14	0.27	0.02	0.10	0.24	0.06	0.21	0.23	0.03	No
SLB-57	5.19	0.80	-0.05	0.04	0.16	0.18	**0.41**	0.04	0.14	-0.16	0.20	-0.08	-0.02	-0.04	0.11	Yes
SLB-58	4.25	1.20	0.08	-0.09	0.01	0.43	-0.04	-0.37	-0.04	0.15	0.25	0.14	-0.05	-0.17	0.20	No
SLB-59	4.56	0.92	0.12	0.01	0.01	0.15	0.01	0.03	0.25	0.03	0.02	0.12	0.06	-0.11	0.38	No
SLB-60	4.70	0.80	0.16	-0.05	-0.10	-0.02	0.20	0.37	0.40	-0.05	0.00	0.07	-0.19	-0.02	0.22	No
SLB-61	4.87	0.89	0.05	-0.04	0.06	0.06	-0.08	0.07	**0.64**	0.09	0.01	0.14	-0.21	-0.12	0.11	Yes
SLB-62	4.58	1.04	-0.05	-0.17	0.07	0.06	0.17	0.21	**0.48**	0.01	-0.08	-0.07	0.14	-0.07	0.12	Yes
SLB-63	4.48	0.99	0.00	-0.01	0.02	0.36	-0.23	0.37	0.01	0.00	0.06	0.08	-0.01	0.09	-0.04	No

	M	SD	Factors Extracted													
			1	2	3	4	5	6	7	8	9	10	11	12	13	Retained?
SLB-64	4.58	1.02	0.12	-0.09	-0.15	0.23	0.19	0.38	0.04	-0.11	0.14	0.01	-0.06	0.19	0.03	No
SLB-65	3.79	1.35	0.11	-0.01	0.11	0.05	-0.23	-0.12	0.16	-0.15	0.13	0.34	-0.13	0.20	-0.05	No
SLB-66	4.75	0.84	-0.14	-0.02	-0.05	0.12	0.30	**0.42**	0.09	0.00	0.14	-0.06	0.03	-0.02	0.19	Yes
SLB-67	4.82	0.82	-0.13	0.07	-0.01	0.23	0.21	**0.43**	-0.03	0.06	-0.01	-0.05	0.03	-0.01	0.19	Yes
SLB-68	4.81	0.95	-0.07	0.10	0.07	0.05	0.29	0.22	0.28	-0.10	-0.06	0.00	0.13	-0.11	0.16	No
SLB-69	4.46	0.98	0.10	0.17	-0.10	-0.05	-0.12	**0.58**	0.06	0.00	-0.01	0.06	0.24	-0.01	0.12	Yes
SLB-70	4.14	1.04	-0.03	0.07	-0.03	-0.09	-0.05	**0.66**	0.17	0.07	-0.02	-0.06	0.18	0.06	-0.04	Yes
SLB-71	4.21	1.09	-0.14	0.09	-0.11	-0.11	0.03	**0.64**	0.08	-0.03	0.12	-0.01	0.16	0.07	0.00	Yes
SLB-72	4.45	1.07	-0.07	**0.71**	0.23	-0.08	0.18	-0.16	-0.16	-0.04	-0.07	0.08	0.05	0.01	-0.01	Yes
SLB-73	4.88	0.89	-0.01	**0.91**	-0.10	-0.07	0.08	-0.03	-0.01	-0.04	0.08	-0.09	-0.02	-0.10	0.04	Yes
SLB-74	4.94	0.86	-0.10	**0.58**	0.05	0.10	-0.17	0.08	-0.04	0.18	0.24	-0.05	-0.03	-0.12	0.21	Yes
SLB-75	4.68	1.00	-0.09	**0.77**	0.03	-0.03	0.18	0.00	-0.07	-0.02	-0.06	0.02	0.04	-0.05	-0.05	Yes
SLB-76	4.64	1.02	0.09	**0.48**	-0.05	-0.19	0.12	-0.21	0.19	0.23	0.00	0.10	0.20	-0.02	-0.15	Yes
SLB-77	4.92	0.94	0.05	0.23	-0.08	0.03	0.08	0.11	-0.17	**0.69**	-0.01	0.01	-0.05	0.01	0.09	Yes
SLB-78	5.00	0.93	0.08	0.00	-0.04	0.15	-0.12	0.09	-0.06	**0.79**	-0.02	0.01	-0.11	0.08	0.07	Yes
SLB-79	4.81	0.97	-0.02	0.04	0.16	-0.09	0.02	-0.05	-0.07	**0.80**	0.01	-0.08	0.05	0.10	0.08	Yes
SLB-80	4.80	0.95	0.01	0.04	-0.08	0.09	0.09	-0.06	0.09	**0.72**	0.01	-0.10	0.09	0.02	0.00	Yes
SLB-81	5.10	0.79	0.10	**0.52**	0.00	0.15	-0.11	0.19	0.05	0.07	-0.02	0.07	-0.06	-0.03	-0.15	Yes
SLB-82	5.08	0.83	0.05	**0.46**	-0.12	0.08	0.03	0.16	-0.02	0.27	-0.10	0.16	-0.03	0.04	-0.03	Yes
SLB-83	4.90	0.86	0.12	**0.48**	-0.04	0.23	-0.12	0.21	0.01	0.02	-0.03	0.05	-0.01	-0.03	-0.05	Yes
SLB-84	4.88	0.89	0.09	**0.48**	-0.10	0.23	-0.06	0.22	-0.09	0.14	-0.09	0.04	-0.09	0.07	-0.03	Yes
SLB-85	4.51	0.95	0.00	0.03	0.10	0.16	0.04	**0.40**	0.05	0.02	-0.05	0.15	-0.09	0.18	-0.10	Yes
SLB-86	5.11	0.79	-0.02	-0.05	0.07	**0.62**	0.12	0.12	-0.06	0.09	-0.04	-0.01	-0.03	0.10	-0.04	Yes
SLB-87	4.44	0.98	0.00	0.04	0.15	**0.65**	0.10	0.06	0.06	0.01	-0.20	-0.05	-0.10	0.04	-0.18	Yes
SLB-88	3.74	1.33	-0.09	-0.09	0.02	0.38	0.19	0.08	0.17	0.12	-0.19	-0.08	-0.06	-0.14	0.00	No
SLB-90	4.67	0.91	-0.07	-0.04	-0.04	**0.50**	-0.09	-0.25	0.33	-0.01	-0.06	-0.10	0.25	0.14	0.04	No

(Table 3 continued on next page.)

	M	SD	Factors Extracted													
			1	2	3	4	5	6	7	8	9	10	11	12	13	Retained?
SLB-91	4.82	0.79	0.01	0.21	0.05	**0.59**	-0.16	-0.19	0.06	-0.11	-0.06	0.05	0.10	0.10	0.15	Yes
SLB-92	4.44	0.98	0.16	-0.03	-0.09	**0.54**	-0.02	-0.04	0.12	-0.02	-0.09	0.01	0.15	0.02	0.14	Yes
SLB-93	3.74	1.33	-0.13	0.08	0.08	0.13	-0.03	**-0.44**	0.12	-0.03	0.07	0.02	-0.04	-0.09	0.01	Yes
SLB-94	4.66	0.78	-0.01	0.07	0.09	0.32	-0.13	0.28	0.10	0.06	-0.14	0.03	0.03	0.02	0.13	No
SLB-95	5.16	0.78	-0.02	-0.04	-0.03	**0.64**	0.16	-0.08	0.15	0.06	-0.16	0.13	-0.02	0.04	0.10	Yes
SLB-96	4.78	0.95	-0.20	0.01	-0.03	0.37	0.03	-0.14	0.58	-0.02	-0.13	-0.01	0.11	0.08	0.04	No
SLB-97	4.63	1.14	-0.06	-0.03	0.01	0.20	0.04	-0.56	0.56	0.01	0.12	0.16	-0.07	0.04	0.02	No
Eigenvalues			27.53	5.00	3.86	2.79	2.75	2.52	2.19	2.09	1.84	1.77	1.73	1.59	1.52[a]	
Variance Explained (%)			28.68	5.21	4.02	2.90	2.86	2.63	2.28	2.18	1.91	1.84	1.80	1.66	1.58[a]	
Total Variance (%)[b]															57.97[b]	
S1	4.54	0.78														
S2	4.84	0.68	0.47													
S3	4.50	0.71	0.52	0.51												
S4	4.89	0.62	0.32	0.52	0.46											
S5	4.94	0.65	0.41	0.59	0.49	0.54										
S6	4.38	0.63	0.32	0.59	0.48	0.54	0.57									
S7	4.57	0.79	0.14	0.29	0.30	0.32	0.31	0.46								
S8	4.88	0.81	0.43	0.63	0.43	0.35	0.39	0.39	0.21							
S9	4.65	0.70	0.21	0.36	0.35	0.33	0.43	0.46	0.38	0.28						
S10	4.90	0.74	0.34	0.44	0.45	0.43	0.50	0.49	0.31	0.24	0.29					
S11	4.50	0.80	0.49	0.49	0.52	0.41	0.52	0.54	0.32	0.30	0.27	0.57				
S12	4.54	0.85	0.31	0.51	0.54	0.51	0.62	0.57	0.29	0.41	0.48	0.37	0.48			
SLB-LF-97	4.62	0.48	0.60	0.77	0.76	0.71	0.77	0.77	0.51	0.58	0.57	0.65	0.71	0.73		
SLB-SF-65	4.66	0.51	0.64	0.81	0.78	0.68	0.77	0.77	0.47	0.63	0.55	0.63	0.71	0.73		

Note. N= 214. M: mean scores; SD: standard deviation. Bold and underlined values are the highest loadings by a variable which are retained for subsequent analyses. Item SLB-89 was excluded here due to its unacceptable individual measure of sampling adequacy in the initial PAA (i.e., anti-image correlations diagonals <. 0.50). Sixty-five items were retained to form the short-form of the behavior scale (SLB-SF-65) which were subjected to a large-scale validation study involving 4,486 Hong Kong undergraduates. a.Item SLB-13, the only sufficiently-loaded (loading ≥ |0.40|) item on Component 13, was removed together with the component. bAs component 13 only contained one item and was subsequently removed from the final solution, the total variance was computed by the summation of variance explained by the remaining twelve components. SLB-LF-97: 97-item Service Leadership Behavior Scale- Long-Form; SLB-SF-65: 12-factor, 65-item version of SLB-SF-65. S1: Subscale 1 (6 items, Problem-Solving); S2: Subscale 2 (9 items, Self-leadership and Life-long Learning); S3: Subscale 3 (10 items, Non-cognitive Intrapersonal Competences); S4: Subscale 4 (5 items, Distributed Leadership); S5: Subscale 5 (6 items; Integrity); S6: Subscale 6 (7 items, Caring Behavior); S7: Subscale 7 (3 items, Compassion); S8: Subscale 8 (4 items, Self-reflection); S9: Subscale 9 (4 items, Service Provision); S10: Subscale 10 (3 items, Positive Social Relationship); S11: Subscale 11 (4 items, Communication Skills); S12: Subscale 12 (4 items, Fairness). All correlation coefficients are statistically significant at p <.001 (two-tailed).

Factorial validity analyses

Owing to the large number of survey items involved, we adopted the Minimum Average Partials (MAP) (34) to determine the number of factors to extract a priori as to avoid the issue of over-extraction (35). The MAP, which involves "comparison of systematic and unsystematic variance remaining in a correlation matrix after each factor is extracted" (36, p. 108), has been shown in a simulation study to be the most accurate amongst a host of alternative extraction methods (36). The MAP was administered using the SPSS R-Menu V 2.0 (see 35).

With the purpose of simplifying and enhancing the interpretability of the final factorial solution, we applied two exclusion criteria to help downsize the scale. First, double-loaded items were removed (37). Second, only non- double-loaded items that are of substantive importance (i.e., highest loadings $\geq |0.40|$) to a factor were retained (see 19). Table 3 details the post-rotation factor loadings of each item and other relevant statistics.

Reliability and convergent validity analyses

We referred to the Cronbach's alpha values and mean inter-item correlations as indicators of internal consistency of the scale and the factors derived (i.e., subscales). As regards the assessment of convergent validity, the composite scores calculated by averaging participants' responses of both the scale and subscales were correlated with the six concurrently administered external criterion measures. Specifically, we hypothesized a positive and significant association between the behavior scale (and the subscales) and the i) RSLP (i.e., Hypothesis 1), ii) LEF (i.e., Hypothesis 2), iii) MSC (i.e., Hypothesis 3), and iv) IRI (i.e., Hypothesis 4), considering that *Servant Leadership*, *leadership efficacy*, *morality*, and *empathy*, respectively are all constructs theorized to underline the behavioral standard of a bona fide Service Leader (9,10).

Furthermore, as the SLAM framework is catered to service economies which are characterized by *distributed leadership* and *decentralization* rather than *absolute control* and *centralization* (38), we expected a positive correlation between the behavior scale with the *Systemic Thinking Scale* (i.e., Hypothesis 5) while a negative association with the *Hierarchical Thinking Scale* (i.e., Hypothesis 6). Finally, while paternalistic leadership is characterized by a strong sense of hierarchy which contradicts the SLAM framework (7,38), it also emphasizes leaders' exhibition of benevolence and integrity which correspond to the fundamentals of Service Leadership education (39). As a result, a positive while mild correlation between the behavior scale (and the subscales) and the *Paternalistic Leadership Scale* (PTL) was predicted (i.e., Hypothesis 7).

Results

Results of the MAP showed that the squared average partial correlation was at a minimum (0.00821) upon the extraction of the thirteenth factor, suggesting that thirteen factors should be retained (40). Item 89 was deleted due to its poor (i.e., anti-image correlations diagonals below 0.50) individual measure of sampling adequacy (19). Accordingly, the PAA was re-administered on the remaining 96 items specifying the extraction of thirteen factors. Each item's factor loadings, eigenvalues, the percentage of variance explained by each factor, and the correlations amongst the different factors are presented in Table 3.

Applying the two exclusion criteria as above-mentioned, nine double-loaded items were first eliminated. This was followed by the removal of 21 insufficiently-loaded items. Item 13, the only item loaded sufficiently on the thirteenth factor (see Table 3), was deleted as well. Ultimately, the resultant 65-item, twelve-factor solution—which accounted for 57.97% of the total variance—formed the short-form of the Service Leadership Behavior Scale (SLB-SF-65). The twelve factors, each of which forms a subscale, were accordingly named "Problem-Solving" (items 5 to 10), "Self-leadership and Life-long Learning" (items 72 to 76, 81 to 84), "Non-cognitive Intrapersonal Competences" (items 12, 14, 16 to 23), "Distributed Leadership" (items 86, 87, 91, 92, 95), "Integrity" (items 29, 43 to 46, 57), "Caring Behavior" (items 66, 67, 69 to 71, 85, 93), "Compassion" (items 52, 61, 62), "Self-reflection" (items 77 to 80), "Service Provision" (items 1 to 3, 53), "Positive Social Relationship" (items 26 to 28), "Communication Skills" (items 34, 39 to 41), and "Fairness" (items 47 to 50).

Reliability of the total scale and subscales

As detailed in Table 4, both long-form (SLB-LF-97) and short-form (SLB-SF-65) of the behavior scale showed excellent internal consistency (all α values ≥ .95, mean inter-item correlations > .20) in the whole sample (N= 214) and across two subsamples split based on participants' gender. All subscales, except for the three-item subscale "Compassion," demonstrated at least acceptable internal consistency (all α values ≥ .70, mean inter-item correlations > .30).

Despite the seemingly unacceptable alpha values (i.e., 0.59 to 0.61), inspection of the range of mean inter-item correlations of subscale "Compassion" (i.e., 0.34 to 0.37) revealed that they all fell within the range (i.e., 0.20 to 0.40) of "optimal level of homogeneity" (p. 114) defined by Briggs and Cheek (41). In short, the present findings provided support for the high reliability of the different forms of the behavior scale and its subscales.

Validity assessment: Correlation with external criterion measures

Confirming Hypotheses 1 to 4, correlational findings (see Table 5) revealed a significant (p <. 05, two-tailed), positive correlation between the SLB-SF-65 (and almost all the subscales) and the *Revised Servant Leadership Profile*, *Interpersonal Reactivity Index* (including the composite score and the two sub-scales), *Moral Self-Concept*, and *Leadership Efficacy*, respectively. Hypothesis 5 was also supported as the *Systemic Thinking Scale* (ST) was significantly and positively associated with the SLB-SF-65 alongside its subscales (see Table 5). Echoing Hypothesis 7, despite the statistical significance (p <.05, two-tailed), the SLB-SF-65 was only mildly correlated (r = 0.25) to the *Paternalistic Leadership Scale* (PTL). Similar findings (see Table 5) emerged when the subscales were correlated with PTL (rs ranging from 0.04 to 0.25), further supporting Hypothesis 7.

Meanwhile, contrary to Hypothesis 6, both SLB-SF-65 and the subscales were positively correlated to the *Hierarchical Thinking Scale* (see Table 5). This may be attributable to the non-mutual exclusiveness of *Hierarchical* (HT) and *Systemic Thinking* (ST) whereby people can be both hierarchical and systemic thinkers (17). Hence, it is possible that the present positive link between HT and SLB-SF-65 (r = 0.30) was due to the moderate correlation between ST and SLB-SF-65 (r = 0.51) and that of HT and ST (r = 0.44). Indeed, once ST was controlled for, the HT-SLB-SF-65 correlation was no longer significant (p = .17, two-tailed). In contrast, the ST-SLB-SF-65 link (r = 0.44) remained to be moderate even after controlling for HT.

Table 4. Internal consistencies of SLB-LF-97, SLB-SF-65, and subscales across gender

	Whole Sample (N = 214)		Males (N = 60)		Females (N = 154)	
	α	Mean Inter-Item Correlations	α	Mean Inter-Item Correlations	α	Mean Inter-Item Correlations
Long-Form Service Leadership Behavior Scale (SLB-LF-97)	0.97	0.26	0.97	0.27	0.97	0.25
Short-Form Service Leadership Behavior Scale (SLB-SF-65)	0.96	0.28	0.96	0.29	0.96	0.27
Subscale 1: *Problem-Solving*	0.90	0.59	0.91	0.64	0.89	0.56
Subscale 2: *Self-leadership and Life-long Learning*	0.90	0.51	0.90	0.50	0.90	0.51
Subscale 3: *Non-cognitive Intrapersonal Competences*	0.88	0.42	0.90	0.47	0.86	0.39
Subscale 4: *Distributed Leadership*	0.79	0.44	0.78	0.43	0.79	0.44
Subscale 5: *Integrity*	0.84	0.46	0.85	0.49	0.83	0.45
Subscale 6: *Caring Behavior*	0.74	0.34	0.76	0.35	0.72	0.34
Subscale 7: *Compassion*	0.61	0.35	0.61	0.37	0.59	0.34
Subscale 8: *Self-reflection*	0.88	0.65	0.91	0.73	0.87	0.62
Subscale 9: *Service Provision*	0.73	0.40	0.70	0.36	0.73	0.41
Subscale 10: *Positive Social Relationship*	0.85	0.65	0.88	0.70	0.83	0.61
Subscale 11: *Communication Skills*	0.81	0.52	0.86	0.61	0.78	0.47
Subscale 12: *Fairness*	0.86	0.61	0.88	0.64	0.85	0.59

Note. A = Cronbach's alpha value.

Table 5. Correlations with external criterion scales (and subscales)

	RSLP	PTL	IRI	IRI-EC	IRI-PT	MSC	HT	ST	LEF
Long-Form Service Leadership Behavior Scale (SLB-LF-97)	0.81	0.26	0.51	0.28	0.56	0.75	0.28	0.51	0.56
Short-Form Service Leadership Behavior Scale (SLB-SF-65)	0.78	0.25	0.46	0.25	0.52	0.72	0.30	0.51	0.55
Subscale 1: *Problem-Solving*	0.33	$0.04^{n.s.}$	$0.11^{n.s.}$	$-0.04^{n.s.}$	0.22	0.27	0.20	0.28	0.43
Subscale 2: *Self-Leadership and Life-Long Learning*	0.58	0.24	0.26	$0.09^{n.s.}$	0.34	0.55	0.28	0.47	0.42
Subscale 3: *Non-Cognitive Intrapersonal Competences*	0.52	$0.10^{n.s.}$	0.30	0.16	0.34	0.44	0.18	0.29	0.44
Subscale 4: *Distributed Leadership*	0.66	0.21	0.39	0.16	0.49	0.57	0.21	0.49	0.34
Subscale 5: *Integrity*	0.67	0.20	0.40	0.21	0.46	0.66	0.25	0.37	0.45
Subscale 6: *Caring Behavior*	0.71	0.24	0.39	0.22	0.42	0.65	0.22	0.44	0.33
Subscale 7: *Compassion*	0.49	0.15	0.43	0.42	0.29	0.49	$0.04^{n.s.}$	0.30	$0.13^{n.s.}$
Subscale 8: *Self-Reflection*	0.35	0.17	0.30	0.20	0.30	0.36	0.27	0.38	0.29
Subscale 9: *Service Provision*	0.58	0.22	0.44	0.26	0.47	0.55	0.15	0.35	0.29
Subscale 10: *Positive Social Relationship*	0.54	0.14	0.37	0.24	0.38	0.54	$0.10^{n.s.}$	0.20	0.49
Subscale 11: *Communication Skills*	0.53	0.18	0.35	0.23	0.34	0.48	0.19	0.30	0.51
Subscale 12: *Fairness*	0.67	0.25	0.39	0.18	0.48	0.56	0.30	0.37	0.41

Note. N= 214. RSLP: RSLP: Revised Servant Leadership Profile; PTL: Paternal Leadership; IRI: Interpersonal Reactivity Index; IRI-EC: Subscale "Empathic Concern"; IRI: PT: Subscale "Perspective Taking"; MSC: Moral Self-Concept; HT: Hierarchical Thinking about leadership; ST: Systematic Thinking about leadership; LEF: Leadership Efficacy. Unless otherwise specified by the superscript "n.s." which denotes statistical non-significance (p >. 05, two-tailed), all correlation coefficients are significant at p <.05 (two-tailed).

In short, while these results seemingly contradicted Hypothesis 6, further scrutiny revealed a pattern of findings that resonated with Wielkiewicz's (17) conceptualization of HT and ST.

Furthermore, utilizing the statistical package *cocor* (42) which allows the comparison of strengths between two pairs of correlation coefficients using Steiger's (43) z-test, the results (see Table 6) highlighted that out of all significant associations, the SLB-SF-65 was most strongly correlated to the *Revised Servant Leadership Profile* (r = 0.78) while considerably more weakly associated with the *Paternalistic Leadership Scale* (r = 0.25) as well as the *Hierarchical Thinking Scale* (r = 0.30). Taken together, these findings are generally supportive of the convergent validity of the SLB-SF-65—which was shown to consistently correlate with various constructs theorized to underscore the behavioral qualities characteristic of an elite Service Leader.

Table 6. Comparison of the strength of correlations between SLB-SF-65 with the criterion scales

Correlations with the External Criterion Measures (and Subscales)			Z-Scores of Difference between *r*s with SLB-SF-65:							
	Cronbach's Alpha (Mean Inter-Item Correlations)	*r*	PTL	IRI	IRI-EC	IRI-PT	MSC	HT	ST	LEF
1. RSLP	0.93 (0.42)	0.782***	8.91	6.92	8.89	6.14	2.51	8.47	6.04	4.96
2. PTL	0.79 (0.43)	0.249***	—	-2.71	$0.04^{n.s.}$	-3.65	-7.30	$-0.69^{n.s.}$	-3.55	-4.09
3. IRI	0.73 (0.17)	0.462***	—	—	5.94	$-1.64^{n.s.}$	-5.57	1.97	$-0.77^{n.s.}$	$-1.44^{n.s.}$
4. IRI-EC	0.67 (0.23)	0.245***	—	—	—	-3.96	-8.18	$-0.54^{n.s.}$	-3.50	-4.13
5. IRI-PT	0.66 (0.24)	0.523***	—	—	—	—	-4.12	2.95	$0.20^{n.s.}$	$-0.49^{n.s.}$
6. MSC	0.88 (0.49)	0.716***	—	—	—	—	—	6.62	4.09	3.22
7. HT	0.83 (0.26)	0.297***	—	—	—	—	—	—	-2.96**	-3.65
8. ST	0.84 (0.28)	0.511***	—	—	—	—	—	—	—	$-0.64^{n.s.}$
9. LEF	0.84 (0.41)	0.553***	—	—	—	—	—	—	—	—

Note. N= 214. ***p < .001 (two-tailed). RSLP: Revised Servant Leadership Profile; PTL: Paternal Leadership; IRI: Interpersonal Reactivity Index; IRI-EC: Subscale "Empathic Concern"; IRI: PT: Subscale "Perspective Taking"; MSC: Moral Self-Concept; HT: Hierarchical Thinking; ST: Systematic Thinking; LEF: Leadership Efficacy. Unless otherwise specified by the superscript "n.s." which denotes statistical non-significance, all other Z-scores of difference were significant at p <.05 (two-tailed) (i.e., |Z-score| > 1.96).

Discussion

Utilizing a sample of 231 PolyU students, the present study attempted to examine the internal consistency, factorial validity, and convergent validity of the 97-item long-form of the Service Leadership Behavior Scale (SLB-LF-97). Moreover, findings of the EFA suggested the retention of 65 items which formed the short-form of the behavior scale (SLB-SF-65). Besides recording meritorious internal consistency, the SLB-SF-65 and the subscales were shown to correlate significantly and positively with all the external criterion measures. Specifically, by confirming six out of seven hypotheses (i.e., Hypotheses 1 to 5 and 7), the present correlational findings underscored the convergent validity of the SLB-SF-65. In short, the present results not only vouch for the psychometric property of the 65-item SLB-SF-65, but also its utility in serving as a sound measurement tool to help evaluate whether an individual has exhibited adequate behavioral qualities representative of a genuine Service Leader.

There are several key contributions of this work. First, amidst the scanty evidence base of assessment inventory about leadership especially in the Chinese context (8, 12), the SLB-SF-65 constitutes a timely addition to the literature. As remarked by Ho and Nesbit (44), the interdependent construal of interpersonal relationships unique to a collectivist society such as China could constitute a fundamentally different interpretation of leadership. Hence, it is imperative that an objective measurement tool be tailor-made for the Chinese population, especially considering that China accounts for about 20% of the global population. Second, the present paper in forms the literature of Service Leadership education. Considering the paucity in robust evaluation methodologies as regards leadership training programs (13), the SLB-SF-65 would be useful for implementers attempting to gauge the effectiveness of a Service Leadership training program. A successful training should, in principle, enhance trainees' propensity to display behavioral qualities representative of a true Service Leader which can be operationalized by a post-program improvement in one's SLB-SF-65 score. Third, as a precursor to a validation study involving 4,486 Hong Kong undergraduates (i.e., the main event of "The Project"), the present findings justify the inclusion of the 65-item SLB-SF-65 by underscoring its excellent internal consistency and strong convergent validity. Moreover, the preliminary item-screening and eventual trimming of the scale did not only add to the ease of administration, but also facilitate the elicitation of quality responses which are crucial to the ensuing large-scale validation study.

Nonetheless, there are certain issues worthy of our attention. One glaring concern would be the legitimacy of the present EFA attributable to the sample size of the present study (N = 214). As the present subjects-to-variables (i.e., STV) ratio only amounts to 2.23, which is below the commonly adopted "rule-of-thumb" STV ratio of 5 (see (45) for a list of "rule-of-thumb" STV ratios), there is inevitably a concern of under-sampling. However, previous research (e.g., 46, 47) had staunchly challenged the validity and utility of those "rules of thumbs", as these researchers maintained that sampling adequacy should also depend on other factors such as communalities and size of loadings. Particularly, MacCallum and colleagues (45) specified that good recovery of population factors can be achieved "with communalities in the range of 0.5" (p. 96) and "a somewhat larger sample in the range of 100 to 200" (p. 96). Given that both these criteria were met in the present analysis (i.e., N = 214; average communality = 0.53), there is no reason to outright dismiss the meaningfulness of the present EFA findings just because of the low STV ratio. Of course, there is a need to further assess the stability of the factors extracted because it is easy for multivariate statistics to capitalize on chance.

Additionally, owing to the exploratory nature of the present dimensionality assessment, there is a need to conduct a confirmatory factor analysis (CFA) to further examine the absolute and relative model fit of the current twelve-factor solution to participants' responses (20). Nevertheless, due to the sample size concern as outlined above, conducting a CFA by further splitting the present sample into two halves is just not workable. Therefore, to better ascertain the stability and fit indices of the current twelve-factor solution, both EFA and CFA need to be administered in the ensuing large-scale validation study (N= 4,486) as mentioned above.

Furthermore, contrary to Hypothesis 6, the SLB-SF-65 was positively correlated to the *Hierarchical*

Thinking Scale measuring people's orientation toward leadership as a "leader-centric" concept whereby leaders ought to take the lion's share of blames or credits for the organizational outcomes (17, 48). As abovementioned, the non-mutual exclusiveness of Hierarchical (HT) and Systemic Thinking (ST) (17), coupled with the present positive, moderate correlation between the two and that between ST and SLB-SF-65, may account for the present positive association between HT and SLB-SF-65. Indeed, Wielkiewicz and colleagues (48) contended that an elite leader should in theory "embrace these two forms of leadership (beliefs)" (p. 4) owing to their more sophisticated understanding on and experience with leadership. Taken together, it is conceivable that the positive link between HT and SLB-SF-65 was attributable to those "elite leaders" in the present sample who scored high on both HT and ST. Findings from the partial correlation analyses implied just that. As ST was controlled for, the positive HT-SLB-SF-65 association became non-existent, while the ST-SLB-SF-65 link remained highly significant and moderate even after controlling for HT. Nevertheless, the question why is Service Leadership behavior insignificantly, instead of negatively, linked to Hierarchical Thinking remains an interesting research topic to be examined in future.

Notwithstanding the above concerns, the present paper constitutes a pioneer assessment on the convergent and factorial validity of the Service Leadership Behavior Scale. Not only did the current findings strongly corroborate the psychometric soundness of the SLB-LF-97, they also provided a glimpse into an interpretable factorial structure of SLB-LF-97 which warrants further empirical scrutiny. More importantly, as the precursor to the main event of "The Project," the current study serves a preliminary screening purpose which informs the list of scale items worthy of inclusion in the upcoming large-scale validation study. Last but not least, the current paper helps to bridge a well-documented literature gap in the systematic evaluation of Service Leadership education (8, 13) by introducing a valid and reliable tool to measure people's behavioral qualities as a good Service Leader.

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Ethical compliance

The authors have stated all possible conflicts of interest within this work. The authors have stated all sources of funding for this work. If this work involved human participants, informed consent was received from each individual. If this work involved human participants, it was conducted in accordance with the 1964 Declaration of Helsinki. If this work involved experiments with humans or animals, it was conducted in accordance with the related institutions' research ethics guidelines.

References

[1] Antonelli C, Fassio C. The economics of the light economy: Globalization, skill biased technological change and slow growth. Technol Forecast Soc Change 2014;87:89-107.

[2] Castells M. The service economy and postindustrial society: A sociological critique. Int J Health Serv 1976; 6:595-607.

[3] Chung PPY. Service reborn: The knowledge, skills, and attitudes of service companies. 1st ed. New York: Lexingford, 2012.

[4] Fung VK. Development of the service economy in Hong Kong: Challenges and opportunities. In: Shek DTL, Chung PPY, eds. Promoting Service Leadership qualities in university students. Singapore: Springer, 2015:xi-xiii.

[5] Chung PPY. Where there is no vision, the people will perish. In: Shek DTL, Chung PPY, eds. Promoting Service Leadership qualities in university students: The case of Hong Kong. Singapore: Springer, 2015:xv-xviii.

[6] Shek DTL, Chung PPY, Lin L, Leung H, Ng ECW. Service Leadership under the Service Economy. In: Chin JL, Trimble JE, Garcia JE, eds. Global and culturally diverse leaders and leadership: New dimensions and challenges for business, education and society, 1st ed. Bingley, UK: Emerald, 2018:143-61.

[7] Shek DTL, Chung PPY, Yu L, Merrick J, eds. Service Leadership curriculum and higher education reform in Hong Kong. Int J Disabil Hum Dev 2015;14:297-406.
[8] Shek DTL, Chung PPY. Service Leadership education for university students: Seven unfinished tasks. In: Shek DTL, Chung PPY, eds. Promoting Service Leadership qualities in university students. Singapore: Springer, 2015:225-32.
[9] Chung PPY, Bell AH. 25 Principles of service leadership, 1st ed. New York: Lexingford Publishing, 2015.
[10] Chung PPY, Elfassy R. The 12 dimensions of a service leader, 1st ed. New York: Lexingford Publishing, 2016.
[11] Shek DTL, Lin L. Core Beliefs in the Service Leadership model proposed by the Hong Kong Institute of Service Leadership and Management. Int J Disabil Hum Dev 2015;14:233-42.
[12] Shek DTL, Lin L. Validation of the Service Leadership Knowledge Scale: Criterion-Related validity. In: Shek DTL, Chung PPY, Lin L, Merrick J, eds. Service Leadership education for university students. New York: Nova Science, 2017:189-204.
[13] Shek DTL, Lin L. Evaluating Service Leadership programs with multiple strategies. In: Shek DTL, Chung PPY, eds. Promoting Service Leadership qualities in university students: The case of Hong Kong. Singapore: Springer, 2015:197-211.
[14] Shek DTL, Lin L, Leung H, Yu L, Ma CMS, Li X. Development and validation of the Service Leadership Knowledge Scale in a Chinese context. In: Shek DTL, Chung PPY, Lin L, Merrick J, eds. Service Leadership education for university students. New York: Nova Science, 2017:163-88.
[15] Hwang JY, Plante T, Lackey K. The development of the Santa Clara Brief Compassion Scale: An abbreviation of Sprecher and Fehr's Compassionate Love Scale. Pastoral Psychol 2008;56:421-8.
[16] King DB, DeCicco TL. A viable model and self-report measure of spiritual intelligence. Int J Transpersonal Stud 2009;28:68-85.
[17] Wielkiewicz RM. The Leadership Attitudes and Beliefs Scale: An instrument for evaluating college students' thinking about leadership and organizations. J Coll Stud Dev 2000;41:335-47.
[18] Yukl G. Effective leadership behavior: What we know and what questions need more attention. Acad Manag Perspect 2012;26:66-85.
[19] Field AP. Discovering statistics using IBM SPSS statistics, 4th ed. London: Sage, 2013.
[20] Cohen RJ, Swerdlik ME. Psychological testing and assessment: An introduction to tests and measurement, 6th ed. New York: McGraw-Hill, 2005.
[21] Page D, Wong PTP. A conceptual framework for measuring Servant Leadership. In: Adjibolooso SBSK, ed. The human factor in shaping the course of history and development. Lanham, MD: University Press of America, 2000:69-109.
[22] Wong PTP, Page D. Servant Leadership: An opponent-process model and the Revised Servant Leadership Profile. Virginia Beach, VA: Regent University, 2003.
[23] Aycan Z, Kanungo RN, Mendonca M, Yu KC, Deller J, Stahl G, et al. Impact of culture on human resource management practices: A 10-country comparison. Appl Psychol 2000;49:192-221.
[24] Farh J-L, Cheng B-S. A cultural analysis of paternalistic leadership in Chinese organizations. In: Li JT, Tsui AS, Welden E, eds. Management and organizations in the Chinese context. London: Palgrave, 2000:84-127.
[25] Pellegrini EK, Scandura TA. Paternalistic leadership: A review and agenda for future research. J Manage 2008; 34:566-93.
[26] Aketa Y. On a framework for and measures of empathy : An organizational model of empathy by Davis, and a preliminary study of a multidimensional empathy scale (IRI-J). Psychol Rep Sophia Univ 1999;23:19-31. [Japanese]
[27] Gilet A-L, Mella N, Studer J, Grühn D, Labouvie-Vief G. Assessing dispositional empathy in adults: A French validation of the Interpersonal Reactivity Index (IRI). Can J Behav Sci 2013;45:42-8.
[28] Siu AMH, Shek DTL. Validation of the Interpersonal Reactivity Index in a Chinese context. Res Soc Work Pract 2005;15:118-26.
[29] Davis MH. Measuring individual differences in empathy: Evidence for a multidimensional approach. J Pers Soc Psychol 1983;44:113-26.
[30] Cheng CHK. The Chinese Adolescent Self-Esteem Scales (CASES): A user manual. Hong Kong: City University of Hong Kong Press, 2005.
[31] Murphy SE. The contribution of leadership experience and self-efficacy to group performance under evaluation apprehension. Dissertation. Seattle: WA: University of Washington, 1992.
[32] Hannah ST, Avolio BJ, Luthans F, Harms PD. Leadership efficacy: Review and future directions. Leadersh Q 2008;19:669-92.
[33] Tabachnick BG, Fidell LS. Using multivariate statistics, 5th ed. Boston, MA: Pearson Education, 2007.
[34] Velicer WF. Determining the number of components from the matrix of partial correlations. Psychometrika 1976;41:321-7.
[35] Courtney MGR. Determining the number of factors to retain in EFA: Using the SPSS R-Menu V 2.0 to make more judicious estimations. Pract Assess Res Eval 2013;18:1-14.
[36] Warne RT, Larsen R. Evaluating a proposed modification of the Guttman rule for determining the number of factors in an exploratory factor analysis. Psychol Test Assess Model 2014;56:104-23.

[37] Mullin EM. Scale development: Heterosexist attitudes in women's collegiate athletics. Meas Phys Educ Exerc Sci 2013;17:1-21.

[38] Shek DTL, Chung PPY, Leung H. Manufacturing economy vs. service economy: Implications for Service Leadership. Int J Disabil Hum Dev 2015;14:205-15.

[39] Shek DTL, Yu L, Ma CMS, Sun RCF, Liu TT. Development of a credit-bearing Service Leadership subject for university students in Hong Kong. Int J Adolesc Med Health 2013;25:353-61.

[40] O'Connor BP. SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. Behav Res Methods Instrum Comput 2000;32:396-402.

[41] Briggs SR, Cheek JM. The role of factor analysis in the development and evaluation of personality scales. J Pers 1986;54:106-48.

[42] Diedenhofen B, Musch J. cocor: A comprehensive solution for the statistical comparison of correlations. PLoS ONE 2015;10:e0121945. doi:10.1371/journal. pone.

[43] Steiger JH. Tests for comparing elements of a correlation matrix. Psychol Bull 1980;87:245-51.

[44] Ho J, Nesbit PL. A refinement and extension of the self-leadership scale for the Chinese context. J Manag Psychol 2009;24:450-76.

[45] MacCallum RC, Widaman KF, Zhang S, Hong S. Sample size in factor analysis. Psychol Methods 1999; 4:84-99.

[46] Preacher KJ, MacCallum RC. Exploratory factor analysis in behavior genetics research: Factor recovery with small sample sizes. Behav Genet 2002;32:153-61.

[47] MacCallum RC, Widaman KF, Preacher KJ, Hong S. Sample size in factor analysis: The role of model error. Multivariate Behav Res 2001;36:611-37.

[48] Wielkiewicz RM, Fischer DV, Stelzner SP, Overland M, Sinner AM. Leadership attitudes and beliefs of incoming first-year college students: A multi-institutional study of gender. J Leadersh Educ 2012; 11:1-25.

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