

การพัฒนาและตรวจสอบคุณภาพแบบวัดภาวะผู้นำการเปลี่ยนแปลงของผู้จัดการหน่วยบริการปฐมภูมิ The Development and Validation of a Transformational Leadership Instrument for Primary Care Managers

นิพนธ์ต้นฉบับ

Original Article

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บทคัดย่อ

วัตถุประสงค์: เพื่อพัฒนาและตรวจสอบคุณภาพแบบวัดภาวะผู้นำการเปลี่ยนแปลงของผู้จัดการหน่วยบริการปฐมภูมิ **วิธีการศึกษา:** การวิจัยเชิงปริมาณนี้สำรวจในผู้จัดการหน่วยบริการปฐมภูมิจำนวน 99 คน ในจังหวัดนครศรีธรรมราชด้วยแบบสอบถาม 60 ข้อโดยใช้วิธีการสุ่มตัวอย่างอย่างง่าย ผู้เชี่ยวชาญตรวจสอบคุณภาพของเครื่องมือได้ค่าดัชนีความสอดคล้องระหว่างข้อคำถามและวัตถุประสงค์อยู่ระหว่าง 0.80 - 1.00 การศึกษานำร่องรายงานค่าสัมประสิทธิ์อัลฟาของครอนบาคที่ 0.98 รวบรวมข้อมูลผ่านแบบสอบถามออนไลน์ วิเคราะห์ข้อมูลโดยใช้การวิเคราะห์องค์ประกอบเชิงสำรวจ (EFA) และการวิเคราะห์องค์ประกอบเชิงยืนยัน (CFA) **ผลการศึกษา:** ผลการวิจัยแสดงระดับที่ดีของการปรับโครงสร้างปัจจัยและค่าความน่าเชื่อถือเป็นที่ยอมรับได้ โครงสร้างทั้งสิ้นปัจจัยที่มี 16 ข้อแสดงค่าดัชนีทดสอบความสอดคล้องแบบสัมบูรณ์ที่ดีที่สุด ผลการทดสอบ EFA เป็นที่ยอมรับได้ ดังนี้ (a) ค่า Community มากกว่า 0.50 (b) ค่า Factor loading ของทุกข้ออยู่ระหว่าง 0.63 - 0.85 (c) ค่า Kaiser-Meyer-Olkin Measure of Sampling Adequacy เท่ากับ 0.85 (d) Variance explained เท่ากับ 71.45% และค่า Eigenvalue ในทุกองค์ประกอบมากกว่า 1 (e) การทดสอบ Bartlett's test of sphericity มีค่าน้อยกว่า 0.001 แต่ละข้อภายในปัจจัยเดียวกันมีความสัมพันธ์ที่เหมาะสม โดยความสัมพันธ์ระหว่างข้ออยู่ระหว่าง 0.44 - 0.67 สัมประสิทธิ์แอลฟาของครอนบาคแต่ละปัจจัยอยู่ระหว่าง 0.84 - 0.88 ค่า CFA จากการประเมินตอนแรกของสี่โครงสร้างให้ผลลัพธ์ที่น่าพอใจ ค่า Chi-square เท่ากับ 148.27 กับ Degrees of freedom เท่ากับ 98 อย่างมีนัยสำคัญที่ P -value < 0.001 ตัวบ่งชี้ความเหมาะสมอื่น ๆ แสดงให้เห็นว่าเป็นโครงสร้างที่ดี (CFI = 0.99, RMSEA = 0.07 และ SRMR = 0.06) **สรุป:** ข้อเสนอแนะสำหรับแบบวัดนี้คือควรนำมาประยุกต์ใช้ในการวิจัยภาวะผู้นำการเปลี่ยนแปลงของผู้จัดการหน่วยบริการปฐมภูมิตามขีดความสามารถของแบบวัดที่จะใช้ร่วมกับบริบทอื่นได้

คำสำคัญ : ภาวะผู้นำการเปลี่ยนแปลง, ผู้จัดการหน่วยบริการปฐมภูมิ, การพัฒนา, ความเที่ยงตรง

Editorial note

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Abstract

Objective: To develop and validate an instrument measuring transformational leadership for primary care managers. **Method:** This quantitative research was carried out among 99 managers at primary care units in Nakhon Si Thammarat using simple random sampling with 60-item questionnaires. The quality of the tool was tested by experts and the values of the Index of Item Objective Congruence ranged between 0.80 - 1.00. A pilot test study reported a Cronbach's alpha coefficient of 0.98. Data collection was performed via an online questionnaire. Data were analyzed using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). **Results:** Results showed good levels of adjustment to the factor structure, and the reliability values were acceptable. The four-factor structure with 16 items displayed the best absolute fit indices. The EFA test results were acceptable as follows: (a) communality was greater than 0.50, (b) factor loadings of all items were between 0.63-0.85, (c) Kaiser-Meyer-Olkin measure of sampling adequacy was 0.85, (d) the rate of explained variance was 71.45% and the eigenvalue was greater than 1, and (e) Bartlett's test of sphericity was less than 0.001. Each item within the same factor had a suitable correlation with the Inter-Item Correlation, which ranged between 0.44 - 0.67. Each factor's Cronbach's alpha coefficient was between 0.84 - 0.88. The CFA results of the original assessment of four constructs gave a satisfactory outcome. The chi-square value of 148.27 with 98 degrees of freedom was significant at P -value < 0.001. Other fit indicators showed that this was a decent fit (CFI = 0.99, RMSEA = 0.07, and SRMR = 0.06). **Conclusion:** It is strongly suggested that this measuring instrument be used within the boundaries of its generalizability in applied transformational leadership research for primary care managers.

Keywords: transformational leadership, primary care manager, development, validation

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Introduction

Internationally, especially in America, Europe, Australia, and Asia, researchers are all interested in developing a transformational leadership scale for various professional groups including educators, policemen, businessmen, and healthcare workers.¹⁻⁶ The ability to work with and through employees is the benchmark of management.⁷ This is

especially relevant in healthcare organizations, which are generally more labor-intensive than other industries. Unlike other resources that are utilized to produce services, employees have individual traits and behaviors that can either support or detract from the responsibility of achieving goals.⁷

Transformational leadership explains how a leader seeks

to satisfy followers' higher-order needs.⁸ It focuses on developing followers for the purpose of performing leadership roles in health service settings, increasing satisfaction, reducing stress and burnout, reducing turnover intention, and enhancing performance of staff.⁹ Healthcare staff with high satisfaction provides higher quality medical services, resulting in better healthcare outcomes and higher patient satisfaction.¹⁰

The purpose of evaluative tools in various countries is to analyze the internal structure of questionnaires in its own context, to know the construct validity of its dimensions, to have a questionnaire in short version, and to clarify similarities and differences of two instruments.^{1,2,6,11} The main benefit is that such tools will be used to develop the capabilities of the leaders in each profession. Most healthcare organizations examine the validity of transformational leadership questionnaires for managers whose subordinates include doctors, nurses, qualified healthcare staff, and non-healthcare staff. Most of the existing studies were on nurse managers in hospitals.^{6,12-13} Therefore, upon reviewing the literature, a lack of attention on sub-district primary care managers was noticeable.

Likewise, studies on transformational leadership in Thailand were mostly among nurse managers.¹⁴⁻¹⁶ Very few studies were interested in such leadership among primary care managers.^{4,17} Primary care managers in sub-districts have been given a heavy responsibility of ensuring that quality healthcare is provided to the rural public in Thailand.¹⁸ The nature of work in primary care units focuses on promoting public health in the community by encouraging people to participate in self-care.¹⁹ Primary care managers, therefore, were expected by people and colleagues to have an ability to coordinate, lead, and work well with the community.¹⁷ It is essential that managers do not avoid the important roles of managing the healthcare workers in primary care units to achieve goals, ensuring these workers are content, committing to their work, and sacrificing willingly with respect to their duties.¹⁷ Nakhon Si Thammarat is located in the south of Thailand, as the most populous province in this southern region of approximately 1,500,000 people.²⁰ Thus, it is necessary to have an effective leader who can motivate subordinates to work according to their goals and to be able to meet the expectations of patients receiving services in primary care units.

A transformational leadership scale in Thai primary care unit was developed where its validity was examined by experts's opinion and its reliability was tested by means of internal consistency using the Cronbach's alpha coefficient value.¹⁷ However, more advanced psychometric property tests based on factor analysis and model fitting have not been found in any works on transformational leadership items for Thai primary care managers. This research, therefore, aimed to improve validity and reliability of the existing transformational leadership questionnaire for Thai primary care managers based on the concept of Bass²¹ using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). In addition, since the existing questionnaire was of the long version type, it had an acceptable content validity as indicated by an Index of Item Objective Congruence of 0.86 and a high internal consistency reliability by a Cronbach's alpha coefficient of 0.98.¹⁷ This present study also aimed to achieve a shorter version of the transformational leadership scale. Like the previous works^{17,24}, the Bass'concept also used this present study could elevate the follower's level of maturity and ideals as well as address the concerns for achievement, self-actualization, and preservation of the well-being of others, the organization, and society.²¹ Therefore, the questionnaire from this research could be useful in the context of primary care units since it could measure unique components of a manager's behavior that are potentially strong indicators of valuable developmental and psychosocial outcomes for their subordinates. It could be highly applicable since it was short-lengthed, and readily available since it was free of charge.

Methods

In this cross-sectional survey research, the study population included 251 primary care managers in Nakhon Si Thammarat province. A sample size of 90 managers was computed from the number of four variables studied using Thorndike's formula.²² To compensate for incomplete survey responses, a 10% extra sample was added which resulted in a sample size of 99 managers. A simple random sampling technique was used by numbering the primary care units and randomly selected using the online tool (Random Number Generator).²³

Research instruments

This research applied the 60 items from a previous research on public health transformational leadership in the context of Thailand.^{17,24} The questionnaire was based on a transformational leadership theory, which consisted of the following four dimensions. First, the **Charisma Influence** dimension indicates how the leaders are admired, respected, and trusted. They are also consistent in conduct with underlying ethics, principles, and values. Second, in the **Inspirational Motivation** dimension, the leaders are assessed for their act in ways that motivate those around them by giving significance and challenge to their supporters' jobs. With high level of Inspirational Motivation, the spirit of the individual and the team is awakened. In addition, enthusiasm and optimism are also evident. Third, the **Intellectual Stimulation** dimension assesses how these leaders help followers to become more innovative and creative. Fourth, in the **Individualized Consideration** dimension, the leaders are assessed for the attention they pay to the developmental needs of followers and support and coach the development of their followers.^{21,25}

Participants were asked to indicate how often they demonstrated the leadership characteristics as listed above; for example, "how often do you behave as a role model in work responsibility." The intensity of each of characteristics was assessed using a 5-point Likert-type scale ranging from 1-very rarely, to 2-rarely, 3-occasionally 4-frequently, and 5-very frequently. The total score in each dimension was derived by summing points of each item in the given dimension.

Procedure

To ensure the aims and objectives of the present study were clear, a provincial public health executive and a district health director from Nakhon Si Thammarat province, a senior sub-district health promotion hospital manager from Surat Thani province, and two experts from the School of Public Health, Walailak University were invited to examine the relevance and validity of the questions including any ambiguities that might exist. The researcher asked the experts to investigate the congruence between the question items and research objectives by using the Index of Item Objective Congruence (IOC). The values of IOC from the experts' evaluation ranged between 0.80 - 1.00 which were in

accordance with the acceptable criterion. A pilot test study was then conducted among 30 managers in Chumphon province. Internal consistency reliability was found to be high in the pilot test with a Cronbach's alpha coefficient of 0.98 for the overall scale.

Before conducting the survey, the researchers wrote to the Provincial Public Health Office for permission to carry out the study to ensure that the assistance from the participants could be secured. Based on the mailing addresses given, a survey package was mailed to the participants. It contained a cover letter and a QR code to be scanned by the participants so that they could be directed to the internet URL of the questionnaire. The internet-based questionnaire took about 45 minutes to complete.

Ethical considerations

Ethical approval was granted by Walailak University's Research Ethics Committee in October 2018 (Approval number: WU-18-088-01).

Data analysis

Factor analysis was used as a data reduction technique to develop a reliable and valid summated scale measurement of all variables, while confirmatory factor analysis was necessary to further explore the construct validity of the factor structure.²⁶ The researcher performed exploratory factor analysis (EFA) to identify dimensions of transformational leadership and reduce the items into smaller groups using IBM SPSS Statistics 20.0 software program.

The leadership scale was examined in order to develop its dimensionality and ensure internal consistency and validity. A principal component factor analysis using varimax rotation was completed to investigate the psychometric properties, and Cronbach's alpha coefficients were used to assess the internal consistency of the overall scale and individual subscales. Confirmatory factor analysis (CFA) was used to determine whether the fit of the leadership model was confirmed using AMOS 4 software program. All fit indices used for analysis included chi-square, chi-square/degree of freedom ratio, comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR).

Results

Of a total of 99 participating managers, the majority were male and over 51 years old. Most participants possessed a Bachelor's degree, had a job tenure of more than 30 years, and earned a gross monthly income of more than 30,000 baht, which resembled the entire sample population.

Common method variance

The first step prior to performing exploratory factor analysis was to examine normality and common method variance (CMV). All items had skewness values from -0.68 to 0.13 and kurtosis values from -1.07 to 0.70. As with skewness, a kurtosis value between -2.0 to 2.0 is a sufficient indicator of normality.²⁷

CMV is a concern when self-report questionnaires are used to collect data from the same participants.²⁸ CMV threatens the validity of the conclusions regarding the constructs' association and generates bias in the research by either inflating or deflating the correlation. This research conducted Haman's Single-Factor Test, which is the most common test that is carried out to examine CMV.²⁸ The generated principle component analysis output revealed 60 distinct factors accounting for 76% of the total variance. The first unrotated factor captured only 39% of the variance in the data. No single factor arose and most of the variance was not captured by the first factor. As a result, these findings proposed that CMV was not a problem in this research.

Exploratory factor analysis (EFA)

With 99 observations, EFA was conducted to avoid reliability problems when estimating from a small sample size, where the minimum absolute sample size should be 50 observations.²⁹ The required sample size depends on the magnitude of population correlations and the number of factors. For example, if there are strong correlations and a few, distinct factors, then a small sample size is adequate.²⁶

There are basic guidelines to help check the correlations. First, the Kaiser-Meyer-Olkin (KMO) test is a measure of how suited the data is for factor analysis.²⁷ The result of the KMO test was 0.85 which was considered meritorious. Second, another measure to quantify the degree of intercorrelations among the variables is the Bartlett test of sphericity. The Bartlett test of sphericity is a statistical test to determine the presence of correlations among variables.²⁹ Test of sphericity

should be significant (P -value < 0.05) for factor analysis to be suitable.²⁹ A significant result of P -value of 0.001 was confirmed in Table 1.

The number of factors was determined by the following methods. First, factors with eigenvalues greater than 1 were determined.²⁹ Second, factors shown by the scree-plot test to have substantial amounts of common variance (i.e., factors before inflection point) were obtained.²⁹ Third, enough factors to meet a specified percentage of variance were determined to account for at least 50% of the variance.³⁰ Fourth, factors loaded with at least three variables were desirable since factors loaded with one or two variables could be hazardous, poorly defined, and unreliable.²⁶

For factor interpretation, only variables with loadings of 0.63 and above were reported and considered to be very good.²⁶ Variables should generally have communalities of greater than 0.50 to be retained in the analysis.²⁹ After deleting variables with no significant loadings and their communality deemed too low, the researcher labeled the factors. Variables with higher loadings are considered more important and have greater influence on the name or label selected to represent a factor.²⁹

The process of scale purification reduced the number of transformational leadership items from 60 to 16 (Table 1). Among these 16 items, the factor analysis extracted four factors namely charisma influence, inspirational motivation, intellectual stimulation, and individualized consideration.

Factor structure and scale reliability

In addition, the researcher considered the construction of any summated scale, conceptual definition, unidimensionality, reliability, and validity, as follows. The conceptual definition specifies the theoretical basis for the summated scale by defining the concept being represented in terms applicable to the research context.²⁹ Content validity is the assessment of the correspondence of the variables to be concluded in a summated scale and its conceptual definition.²⁹ This form of validity, also known as face validity, was evaluated by ratings by expert judges, as stated in the method section.

The test of unidimensionality specifies that each summated scale should consist of items with high loading on a single factor. If a summated scale is proposed to have multiple dimensions, each dimension should be reflected by a separate factor.²⁹ All items with loadings of more than 0.6 are considered indicative of a well-defined structure and are the

goal of any factor analysis.²⁹ In sum, the process of scale purification in this present study reduced the number of items from 60 to 16. Among these 16 items, the factor analysis extracted four factors, which included the concept of charisma influence, inspirational motivation, intellectual stimulation, and individualized consideration. The variables with high loading on the four factors could be explained based on the transformational leadership concept of Bass.²¹ The results showed that each summated scale consisted of items with high loading on a single factor (a test of unidimensionality).

Reliability is defined as consistency of the measurement results.³¹ The first measurement the researcher considered was the item-to-total correlation (the correlation of the item to the summated scale score) and the inter-item correlation (the correlation among items). The item-to-total correlation as well as the inter-item correlation was examined for all 16 items.

All items had an item-to-total correlation above 0.7 with their loaded subscales (Table 1). This correlation, which exceeded the recommended cut-off value of 0.50, indicated that it was acceptable.²⁹ The result showed that each item had a correlation with the other items that exceeded 0.30 (data not shown), indicating that the item-level validation was satisfied.

Table 1 Factor analysis results of transformational leadership (N = 99).

Code	Items	Factor loadings			
		F 1	F 2	F 3	F 4
A6	Makes decisions based on moral and ethical considerations that follow the principles of good governance	0.79			
A14	Behaves as a role model in work responsibility	0.77			
A10	Displays confidence to followers in overcoming various obstacles with knowledge and work principles	0.76			
A13	Considers common benefits over self-interest	0.73			
B7	Foresees and verbally stimulates working confidence in followers		0.79		
B10	Encourages and looks after followers either in personal or job matters		0.74		
B6	Applies participatory management principles		0.70		
B9	Shows trust in followers in regard to problem solving		0.67		
C14	Focuses on overall strength of organization for further development			0.83	
C11	Emphasizes on building teamwork			0.80	
C12	Considers problems cautiously and unanimously before issuing order			0.77	
C8	Stimulates followers' effort in operations to promote change through new ways			0.63	
D14	Assesses followers' proficiency according to their assigned duties				0.85
D11	Recognizes individual differences of followers in terms of needs, potentials, and motivations				0.81
D13	Conveys up-to-date information to followers about the work process				0.80
D12	Advises and coaches followers for each individual's need for achievement and growth				0.77
Variance Explained		71.45%			
The Kaiser-Meyer-Olkin measure of sampling adequacy		0.85			
The Bartlett's test of sphericity (significance level)		0.001			

Note: F = factor; Only factor loadings > 0.60 are shown; Only those items that loaded on the factors with eigenvalues greater than 1 are shown.

The second type of diagnostic measure is the reliability that assesses the consistency of the entire scale, with Cronbach's alpha coefficient being the most widely used measurement. The results of the reliability analysis on each of the four dimensions revealed Cronbach's alpha coefficients between 0.84 - 0.88 (Table 2), which indicated an acceptable internal consistency.²⁹ Overall Cronbach's alpha coefficient for all 16 items together was 0.91, which is interpreted as an excellent reliability. Subscales measuring the same aspect clustered onto the same factor (a test of convergent validity) and scales measuring different topics that fell on different factors (a test of discriminant validity) can be seen in Table 2.

Table 2 Psychometric property of the transformational leadership items and item analysis statistics for subscales.

Items	N = 99			Items correlation to subscales			
	α	Mean	SD	CI	IM	IS	II
Charisma Influence (CI)	0.84						
A6	0.81*	4.04	0.87	0.82	0.37	0.43	0.31
A14	0.78*	4.05	0.79	0.84	0.42	0.50	0.35
A10	0.77*	3.86	0.76	0.85	0.54	0.40	0.36
A13	0.82*	4.09	0.78	0.79	0.47	0.28	0.32
Inspirational Motivation (IM)	0.84						
B7	0.79*	3.79	0.80	0.44	0.83	0.49	0.39
B10	0.80*	3.87	0.88	0.38	0.83	0.40	0.49
B6	0.78*	4.11	0.81	0.52	0.85	0.49	0.52
B9	0.82*	4.04	0.82	0.46	0.80	0.42	0.45
Intellectual Stimulation (IS)	0.85						
C14	0.78*	3.94	0.83	0.39	0.50	0.87	0.33
C11	0.80*	3.95	0.90	0.46	0.37	0.85	0.33
C12	0.80*	3.95	0.83	0.43	0.53	0.84	0.35
C8	0.85*	3.88	0.84	0.33	0.42	0.76	0.46
Individualized Consideration (II)	0.88						
D14	0.85*	3.83	0.95	0.35	0.43	0.35	0.87
D11	0.84*	3.81	0.88	0.37	0.51	0.38	0.87
D13	0.86*	3.61	0.95	0.29	0.49	0.37	0.86
D12	0.86*	3.83	0.89	0.39	0.52	0.44	0.85

Note: N = number of respondents; * = alpha coefficient if item deleted; SD = standard deviation.

Confirmatory factor analysis

To validate all variables generated by the exploratory factor analysis (EFA) from the managers' ratings, a confirmatory factor analysis (CFA) was conducted because it provides certain advantages over exploratory factor analysis.³² CFA was conducted to assess the adequacy of the fit of model (each factor structure) to the observed data. The model contained a total of four constructs that measure charisma influence, inspirational motivation, intellectual stimulation, and individualized consideration. If the proposed model has an acceptable fit by whatever criteria applied, then the researcher has not proven the proposed model but only confirmed that it was one of several possible acceptable models.²⁹

This study has included 99 participants, which was an acceptable sample size in the analysis with CFA.²⁶ Hair et al²⁹

suggested a guideline for using fit indices based on different sample sizes. With sample sizes less than 250 cases, the statistical values are shown in Table 3. After EFA, the outcomes of the initial estimation of four constructs gave a satisfactory result. The chi-square value of 148.27 with 98 degrees of freedom was significant at P -value < 0.001 . This significant chi-square value suggested a very good fit between the model and the data.²⁹ A chi-square:degree of freedom ratio of 1.51:1 was appropriate. Usually a chi-square:degree of freedom ratio on the order of 3:1 or less is correlated with a better-fitting model.²⁹ Other fit indices also indicated a good fit (CFI = 0.99, RMSEA = 0.07, and SRMR = 0.06). No indicators were removed from the analysis. The significant chi-square values signaled a very good fit between the model and the data²⁹ as shown in Table 3.

Table 3 Fit statistics of transformational leadership model (N = 99).

Statistics	12 < m < 30	Four-factor model of 16 items
χ^2	Significant P -values even with good fit	$\chi^2 = 148.27$, $df = 98$, $\chi^2/df = 1.51$, $p < 0.001$
CFI	0.95 or better	0.99
SRMR	0.08 or less (with CFI 0.95 or higher)	0.06
RMSEA	< 0.08 with CFI 0.95 or higher	0.07

Note: m = number of observed variables; sample sizes < 250 , χ^2 = Chi-square, df = degrees of freedom, p = P -values, CFI = Comparative Fit Index, SRMR = Standardized Root Mean Square Residual, RMSEA = Root Mean Square Error of Approximation

Discussions and Conclusion

This study served to confirm this transformational leadership scale as a valid measuring instrument. Through various methods used in the study, it was possible to finally obtain a questionnaire with validity and reliability. Rigorous inspection procedures were conducted starting with data inspection, followed by an EFA test, an examination of factor structure and scale reliability by considering the conceptual definition, test of unidimensionality, reliability, and validity, and finally a CFA test to confirm the scale structure.

Consistent with the study results, it was found that the skewness and kurtosis values were sufficient indicators of normality and that the common method variance was not an issue in this study. The conceptual definition specifies the theoretical basis for the summated scale by defining the concept being represented in terms applicable to the research context. The results showed that each of the four summated subscales consisted of items with high loading on a single factor. All items had an item-to-total correlation above 0.76. The inter-item correlation matrix showed that each item had a

correlation with other items that exceeded 0.30. Cronbach's alpha coefficients of the four subscales were between 0.84 and 0.88. Subscales measuring the same aspect clustered onto the same factor. Subscales measuring different topics fell on different factors. The transformational leadership scale showed a good model fit when incorporating all four subscales.

This resulted in 4 items for each of the 4 factors, for a total of 16 items. The four dimensions of transformational leadership included charisma influence, inspirational motivation, intellectual stimulation, and individualized consideration. The variables with high loading on four factors can be explained based on the transformational leadership concept of Bass.²¹

This study defined charisma influence as when primary care managers make decisions based on moral and ethical considerations that follow the principles of good governance, consider common benefits over self-interest, behave as a role model in work responsibility, and display confidence to followers in overcoming various obstacles with knowledge and work principles.

Inspirational motivation was defined as when primary care managers foresee and verbally stimulate working confidence in followers, encourage and look after followers in regard to personal and/or job matters, apply participatory management principles, and show trust in followers in regard to problem solving.

Intellectual stimulation was applied when primary care managers focus on the overall strength of an organization for further development, emphasize on building teamwork, consider problems cautiously and unanimously before issuing order, and stimulate followers' effort in operations to promote change through new ways.

Individualized consideration meant that primary care managers assess followers' proficiency according to their assigned duties, recognize individual differences of followers in terms of needs, potentials, and motivations, convey up-to-date information to followers about the work process, and advise and coach followers for each individual's need for achievement and growth.

From the above definitions, it may be said that this measurement scale corresponds to the primary care unit context in the sub-district level of Thailand. Past research suggested that this kind of community work requires the above four leadership characteristics. This is because public health

personnels in the primary care unit have to work with many different groups in order to provide services that are appropriate to the conditions of the problem. These personnels also have to promote the participation of people in health management and continue learning how to promote health disease prevention and control for people in the community. Therefore, a manager needs to take into account the differences between people by implementing various measures including decentralization of colleagues, consistency in conduct with underlying ethics, principles, and values, assistance for followers to become more innovative and creative, and promotion of personnel to develop themselves in order to achieve their goals.^{7,16,17,33}

This tool can be compared with the one from the previous research consisting of 50 items evaluating transformational leadership in primary care managers, where overall Cronbach's alpha coefficient was 0.98.¹⁷ In this present study, despite a smaller number of only 16 items, overall Cronbach's alpha coefficient was 0.91, which was also accepted as an excellent reliability.

Certain methodological limitations were of concern. To reduce the bias of self-report questionnaires, data should be collected from multiple sources or at different points in time. For example, to assess a subsidiary-level autonomy or decision-making authority at a subsidiary level, a local poll could be used, while data supplied by a multinational office or from a local archival source could be used to appraise a subsidiary performance. If information from distinct sources was unobtainable, collecting information at different points in time was an alternative.³⁴

Another limitation of the present study was that it included a relatively small sample size of 99 primary care managers from only one province. Future research could conduct factor analysis on samples of primary care managers who work in other provincial communities or hospitals to determine whether or not they perceive the same four transformational leadership dimensions, where reliability and validity with other non-primary care managers in healthcare settings could also be examined.

The strength of the present study was the use of both EFA and CFA to evaluate construct validity. Using EFA followed by CFA to test primary care managers' data served to confirm validation of the transformational leadership instrument, since EFA allowed researchers to organize or conceptualize a set of measurements that they had obtained within the context of

a research program.³⁰ CFA procedure enabled researchers to hypothesize a particular model or factor structure that they believed underlines the variable measured in the study.³⁰ For example, a study on the validation of a leadership questionnaire which analyzed employees' data by EFA and CFA approaches³⁵ provided results showing that the dimensional leadership questionnaire was a reliable and valid instrument in a Pakistani context. As with all instruments, the transformational leadership scale needs to be tested further if used in a new context, for example, in another country.

In conclusion, this study served to confirm that this transformational leadership scale is a valid measuring instrument for use within a primary care unit context. The use of this measuring tool in applied leadership research for primary care managers is strongly recommended within the limits of its generalizability. This measuring instrument provides a useful research tool and can be used to provide empirical validation of the definition for primary care leadership. The healthcare workforce development department can use this tool as a guideline for leadership development to increase the effectiveness of primary care manager leadership behaviors in order to gain better healthcare outcomes and higher patient satisfaction.

Consequently, this 16-item short form scale could be useful when used alone as it stimulates a high response rate. It can be used together with other instruments where it could provide the possibility of more complex analyses on the self-reported behavior of primary care managers. Alternatively, this transformational leadership scale can be used by other related personnel, such as the healthcare staff and immediate supervisors of primary care managers, to evaluate primary care managers.

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References

1. Rowold J, Heinritz K. Transformational and charismatic leadership: Assessing the convergent, divergent and criterion validity of the MLQ and the CKS. *LQ* 2007;18(2):121-133.

2. Sheer VC. Transformational and paternalistic leaderships in Chinese organizations: Construct, predictive, and ecological validities compared in a Hong Kong sample. *JCS* 2010;19(1):121-140.
3. Khuangporn K, Pasiphol S. Development of 21st century transformational leadership skill scale for undergraduate students. *OJED* 2017;11(2):131-146. (in Thai)
4. Sincharoen D, Paai A, koolnaphadol T, Tritilanunt V. The development of training curriculum for the promotion of transformational leadership for directors of Tambol health promotion hospitals. *J Pol Nurse* 2014; 5(2):120-136. (in Thai)
5. Theerakarn B. Effects of transformational leadership and good governance on district health office's effectiveness: A case study in health region 3. *J Health Syst Res* 2016;10(1):80-91. (in Thai)
6. Berger R, Yepes M, Gómez Benito J, Quijano S, Brodbeck F. Validity of the human system audit transformational leadership short scale (HSA-TFL) in four European countries. *Univ Psychol* 2018;10(3):657-668.
7. Burke RE, Friedman FL. Essentials of management and leadership in public health. Ontario. Jones & Bartlett Learning, LLC, 2011: pp. 53-54.
8. Banks GC, McCauley KD, Gardner WL, Guler CE. A meta-analytic review of authentic and transformational leadership: A test for redundancy. *LQ* 2016;27(4):634-652.
9. Duggar SB. Transformational leadership assessment of nurse managers and assistant nurse managers. Ph.D. (Nursing) thesis. North Carolina. Gardner-Webb University, 2017.
10. Meng R, Li J, Zhang Y, et al. Evaluation of patient and medical staff satisfaction regarding healthcare services in Wuhan public hospitals. *Int J Environ Res Pub Health* 2018;15(769):1-17.
11. Neves LG, Coimbra JL. Evidence of the validity of the internal structure of the ethical, transformational and moral leadership scale in an educational Portuguese context. *Paidéia (Ribeirão Preto)* 2019;29:1-10.
12. Seegel ML, Herr RM, Schneider M, Schmidt B, Fischer JE. Transformational leadership and depressive symptoms in Germany: Validation of a short transformational leadership scale. *J Prev Med Pub Health* 2019;52(3):161-169.
13. Sapountzi-Krepia D, Prezerakos P, Zyga S, et al. Psychometric properties of the Greek version of the «Kuopio University Hospital Transformational Leadership Scale» (KUHTLS). *Int. J. Caring Sci* 2019; 12(1):18-29.
14. Phengchai J. Relationships between transformational leadership of head nurses, constructive organizational culture and learning organization as perceived by staff nurses in hospitals under the jurisdiction of Naval Medical Department. *Royal Thai Navy Med J* 2016;43(1):33-52. (in Thai)
15. Youwattana P, Prachusilpa G. Relationships between personal factors, workplace environments, transformational leadership of head nurses, and transcultural nursing competencies of professional nurses, private hospitals, Bangkok metropolis. *JRTAN* 2017;18(2):175-184. (in Thai)
16. Mokekhaow K, Luangamornlert S, Chintanadilok N, Sritoomma N. The relationship model among transformational leadership, knowledge creation and innovation management performance in nursing units at community hospitals. *Nurs J MOPH* 2018;27(3):163-175. (in Thai)
17. Sikkhaphan S, Atiwithayaporn C, Vattaisong A, Chullasap N. Authentic and transformational leadership model of the directors of tambon health promoting hospitals effecting to the effectiveness of Southern tambon health promoting hospitals: The interaction and invariance tests of gender factor. *J Phrapokklao Nurs College* 2015;26(1):25-38. (in Thai)
18. Mohd-Shamsudin F, Chuttipattana N. Determinants of managerial competencies for primary care managers in Southern Thailand. *J Health Organ Manag* 2012;26(2):258-280.
19. Thongphak S, On-Ubon S. Development of strategic leadership indicator of director of sub-district health promotion hospital in Chaiyaphum province. *J Nurs Educ* 2014;7(1):55-67. (in Thai)
20. Nakhon Si Thammarat Provincial Public Health Office T. General data. 2018. (Accessed on Sep 1, 2019, at <http://www.nakhonsihealth.org/2016/index.php/2015-06-04-06-54-34/2016-12-23-04-50-26>) (in Thai)
21. Bass BM. Two decades of research and development in transformational leadership. *EJWOP* 1999;8(1):9-32.
22. Belle Gv. Statistical rules of thumb. New Jersey. John Wiley & Sons, 2008: pp.126-127.
23. Motulsky H. Random number calculators. 2018. (Accessed on Nov 30, 2018, at <https://www.graphpad.com/quickcalcs/randMenu/>)
24. Niampradit S. The transformational and transactional leadership competencies of nurse director at a tertiary level hospital under the medical service department in the Bangkok metropolitan administration. M. Sc. (Nursing Management) thesis. Bangkok. Christian University, 2015. (in Thai)
25. Bass BM, Avolio BJ, Jung DI, Berson Y. Predicting unit performance by assessing transformational and transactional leadership. *J Appl Psychol* 2003;88(2):207-218.
26. Tabachnick BG, Fidell LS. Using multivariate statistics. Boston. Pearson Education, Inc., 2007: pp.607-780.
27. George D, Mallery P. SPSS for Windows step by step: A simple guide and reference, 17.0 update. 10th, Ed., Boston. Allyn & Bacon, 2010: pp. 98-99.
28. Tehseen S, Ramayah T, Sajilan S. Testing and controlling for common method variance: A review of available methods. *JMS* 2017;4(2):146-175.
29. Joseph F. Hair J, Black WC, Babin BJ, Anderson RE, Taham RL. Multivariate data analysis. 6th, Ed., Upper Saddle River. Pearson Education, Inc., 2006: pp.101-165.
30. Meyers LS, Gamst G, Guarino AJ. Applied multivariate research: Design and interpretation. Thousand Oaks. Sage Publications, 2006: pp.465-514.
31. Warner RM. Applied statistics: From bivariate through multivariate techniques. Thousand Oaks. Sage publications, Inc., 2008: pp. 830-831.
32. Bagozzi RP, Yi Y, Phillips LW. Assessing construct validity in organization research. *ASQ* 1991;36(3):421-458.

33. Ongsawang A, Nilrat N. Transformational leadership, and characteristics of followers that influence organization effectiveness in sub-district health promoting hospitals, Narathiwat province. *South Coll Net J Nurs Pub Health* 2018;5(2):272-287. (in Thai)
34. Chang S-J, Witteloostuijn Av, Eden L. From the Editors: Common method variance in international business research. *J Int Bus Stud* 2010; 41(2):178-184.
35. Akbar F, Ali Z, Ahmad I. Validation of authentic leadership questionnaire in Pakistani context: Evidence form higher education institutions of Khyber Pakhtunkhwa. *AJSS* 2019;12(1):88-99.