

Measuring leadership practices of nurses using the Leadership Practice Inventory

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ABSTRACT

Background: Originally developed for educational use, the Leadership Practice Inventory (LPI) is used to measure leadership practices in nursing research. There is limited reporting of LPI psychometric properties when used to measure leadership practices of nurses.

Objective: This study aimed to investigate psychometric properties of the LPI when used to measure the leadership practices of nurses.

Method: Data from 67 LPI-self and 347 LPI-observer respondents were used to establish LPI psychometric properties. Dimensionality of the LPI was investigated using exploratory principal components analysis, and LPI construct validity was established by exploring correlations with theoretically related concepts and a known-groups approach. The predictive validity of the LPI was investigated using regression analysis to determine whether observer-reported leadership practices of established and aspiring nurse leaders predict observer ratings of the effectiveness of the organization environment. Reliabilities of the new factor solution were explored.

Results: Factor analysis found that the identified three-factor solution has psychometric properties at least as strong as those found with the original five-factor LPI solution.

Discussion: The three-factor solution is advocated for use in nursing research because of the strong psychometric properties, lighter respondent burden, and decrease in research costs, as compared with the traditional five-factor solution. When used as an educational tool, the five-factor LPI may be preferred because it may be more useful for examining a greater number of leadership behaviors.

Keywords: factor analysis; leadership; leadership practices inventory; LPI; measurement; psychometric properties

Leadership has been defined as a process of influencing people to accomplish goals (Huber et al., 2000). Perhaps the most dominant theory of leadership over the past 25 years differentiates between two leadership styles: transactional and transformational (Burns, 1978). Transactional leadership is characterized by transactions between leaders and those being led, with leaders exchanging promises of rewards to subordinates for their contributions toward goal achievement. Transactional leadership focuses on achieving standard performance and often is found in organizations with rigid hierarchical structures (Bass, 1990).

Transformational leadership is an extension of transactional leadership. Burns (1978) postulated that transformational leaders facilitate major organizational change and higher levels of organizational performance because of the transformation in attitudes, values, and behaviors that result from interactions between leaders and followers. A transformational leader identifies and communicates a vision and organizational values, then asks followers to commit to these values as they work together toward achieving that vision. According to Bass (1998), transformational leaders are admired and emulated by followers, provide meaning to work, challenge work, question assumptions, and mentor staff.

It is likely that in the 21st century, healthcare environments will continue to be unstable and even chaotic as balance is sought among competing demands of cost-effectiveness, quality improvement, and procurement of a competent and motivated pool of healthcare providers, including nurses.

Transformational leadership has been associated with positive organizational outcomes and may contribute indirectly to the quality of nursing care and clinical expertise, regarded as desirable structures or processes of care (Stordeur, Vandenberghe, & D'Hoore, 2000). Effective nursing leadership is necessary to guide nurses and nursing care as balance is sought among these competing demands. Nurse leaders are challenged to maintain a sense of stability in unstable healthcare environments. According to Dixon (1999), nurse leader success in maintaining stability in unstable times depends on the implementation of transformational leadership behaviors and practices.

The study of leadership necessitates the measurement of leadership behaviors and practices. In healthcare research, leadership has been measured by a variety of tools. Huber et al. (2000) evaluated 18 leadership measurement instruments and found only one instrument that was awarded the highest rating possible on criteria related to both psychometric properties and ease of use: the Leadership Practices Inventory (LPI). The LPI is a leadership behavior measurement instrument that has been used extensively across organizational sectors (Kouzes & Posner, 1995), and whose use is increasingly more frequent in nursing research. The LPI purportedly measures five leadership practices consistent with transformational leadership style, including behaviors associated with challenging the process, inspiring a shared vision, enabling others to act, modeling the way, and encouraging the heart.

Table 1 Leadership Practices and Associated Strategies: Original and Newly Derived

Original Five Leadership Practices	Associated Leadership Strategies	Newly Derived Leadership Practices
Challenging the process	Search for opportunities Experiment and take risks	Cognitive
Inspiring a shared vision	Envision the future Enlist the support of others	
Enabling others to act	Foster collaboration Strengthen others	Behavioral
Modeling the way	Set the example Plan small wins	
Encouraging the heart	Recognize contributions Celebrate accomplishments	Supportive

However, there are no reports of LPI psychometric properties when the instrument is used in the healthcare sector, specifically to assess nurse leadership. This article describes the psychometric properties of the LPI when used to measure leadership practices of nurses working in healthcare organizations. This is accomplished by reviewing the development of the LPI, describing the subsequent use of the LPI in nursing research, reporting on factor analysis and other tests of validity performed with the LPI, reporting on the reliability of the LPI, and making recommendations about the use of the LPI in the context of nurses working in the healthcare sector.

Development of the LPI

The LPI was developed and revised by Kouzes and Posner (Kouzes & Posner, 1995; Posner & Kouzes, 1988; Posner & Kouzes, 1994). First, a conceptual leadership framework was developed through qualitative study involving a survey of 1,100 managers and interviews with 38 additional managers (Posner & Kouzes, 1988). Content analysis was used to analyze managers' descriptions of leader situations when they were at their personal best. Kouzes and Posner (1995) reported that whereas category labels went through several iterations, a fundamental pattern of five leadership practices and associated leadership strategies emerged when managers accomplished extraordinary things in organizations. Leadership strategies are behaviors that make up leadership practices. The five leadership practices and their two associated leadership strategies are shown in Table 1.

The second stage of LPI development involved articulating scale item indicators of what leaders do, based on the five leadership practices and related strategies. Using a sample of graduate students, leadership behavior statements underwent repeated tests of internal reliability and construct validation through factor analysis. Statements with poor loadings and those that loaded on an uninterpretable factor were discarded or rewritten.

The LPI was formally developed as a 30-item instrument with six statements reflecting each of the five leadership practices. Two parallel forms of the LPI were developed: one for self-evaluation and another for evaluation of another person. The LPI used to evaluate another person was originally named the LPI-other, but was later renamed the LPI-observer (Posner & Kouzes, 1988). The parallel self and observer tools were

identical except in their reference to self or another person being evaluated.

The original LPI was tested with a sample of 2,876 managers and subordinates. Only 22% were women, and the respondents worked in a variety of private and public sector companies. Internal reliabilities ranged between 0.70 and 0.84 for the five LPI-self subscales and between 0.81 and 0.91 for the LPI-other subscales. Test-retest reliability was 0.94. Factor analysis was completed using these pooled LPI-self and LPI-other responses. Five factors with eigenvalues of 1 or higher were extracted, which explained 59.9% of variance. These five factors were reported to be consistent with the five leadership practices developed in the previous research of Posner and Kouzes (1988) and had loadings ranging from 0.37 to 0.73.

Recently, the LPI has been revised from a 5- to a 10-point response scale to increase sensitivity to changes in leadership behavior. Again, the same five-factor structure reportedly was found through factor analysis. Kouzes and Posner (2000) provided additional evidence of LPI validity. Using a six-item Leadership Effectiveness Scale developed by Kouzes and Posner (1995), subordinates rated the effectiveness of their managers. The Cronbach alpha for this scale was reported to be 0.98. Using a subset of 514 LPI-other responses, scores for the five leadership practices and related leadership effectiveness scale scores were entered into a stepwise regression analysis to determine how well a manager leadership practices predicted that manager's effectiveness as a leader. The regression model was highly significant ($F = 318.9$; $p < .0001$), and explained 76% of variance in reported leadership effectiveness.

Kouzes and Posner (1995) have amassed a database of more than 60,000 LPI responses. When factor analysis was repeated with these data, the same five factors previously reported were extracted with eigenvalues of 1 or higher and explained 60.5% of variance. Factor loading values for items ranged from 0.37 to 0.75.

The LPI was developed originally on theoretical foundations. This theoretical framework was used to develop a measure of leadership practices and related behaviors.

Use of the LPI in nursing research

Over the past decade, the LPI has been used to measure leadership practices of nurses in at least six nursing research studies. The earliest uses of the LPI were reported by McNeese-Smith (1993, 1995), who used the LPI in two studies to investigate whether the use of leadership behaviors by managers

predicted three employee outcomes: job satisfaction, productivity, and organizational commitment. Loke (2001) replicated the McNeese-Smith studies, also using the LPI. McNeese-Smith (1993, 1995) reported the LPI internal consistencies in these two studies as ranging between .58 and .79 for the LPI-self subscales and between .84 and .85 for the LPI-other subscales. Loke (2001) did not report any reliabilities of the LPI in the latter replication study. Among the McNeese-Smith (1993, 1995) and Loke (2001) studies, there were almost no similarities in findings of the LPI's ability to predict employee outcomes, indicating only weak support for the predictive validity of the LPI.

The reports of three other studies using the LPI did not contain any information about the psychometric properties of the instrument. Bowles and Bowles (2000) used the LPI to measure transformational leadership behaviors in their investigation of the extent to which nurse managers demonstrated these behaviors. George et al. (2002) used the LPI-self in two studies to understand the processes and outcomes of participation in a Shared Leadership Concepts Program. Houser (2003) used the LPI to investigate the nature of the contemporary nursing care environment. Structural equation modeling was used to test indirect effects that leadership practices of managers had on patient outcomes mediated through two separate variables: staff expertise and staff turnover.

Although the LPI has been used in a number of nursing studies, there is little evidence of its psychometric properties when it is used in healthcare settings, particularly with nurses. To narrow this knowledge gap, this research aimed to report on LPI psychometric properties, which were used in an evaluation study investigating the effectiveness of a leadership development intervention administered to a group of established and aspiring Canadian nurse leaders.

Methods

The Study

The leadership development intervention consisted of a 5-day residency program in Toronto, Canada during August 2001 with a follow-up booster weekend 3 months later. The goals of the institute were to assist aspiring nurse leaders in developing effective leadership knowledge, skills, and attitudes, and to strengthen the leadership abilities of established nurse leaders. A detailed description of the leadership development intervention and the sample can be found elsewhere (Simpson, Skelton-Green, Scott, & O'Brien-Pallas, 2002; Tourangeau, 2003; Tourangeau, Lemonde, Luba, Dakers, & Alksnis, 2003). Data collected from participants and their peer observers at baseline are reported in this article. Ethical approval for this study was obtained from the Health Science Ethics Review Committee.

The participants in the leadership institute consisted of 73 nurses. The nurses were invited to participate in pairs consisting of an established leader and an aspiring (up-and-coming) leader. Of the 73 institute attendees, 67 participated in some or all aspects of the evaluation study. Of these, 30 were established leaders and 37 were aspiring leaders. The average age of all the

participants was 41.4 years, and 66.7% held a minimum of a nursing baccalaureate degree.

The study instruments

The participants were invited to complete three instruments: the LPI-self, the Maslach Burnout Inventory (MBI), and the Organizational Environment Assessment (OEA) questionnaire. Completed instruments were returned to the research team in prepaid postage envelopes.

The Leadership Practice Inventory

The participants completed the 30-item LPI-self choosing responses ranging from 1 (never) to 10 (always) (Kouzes & Posner, 2000). They were asked to invite up to 10 peers to evaluate their leadership practices using the LPI-observer and the effectiveness of their common work environment using the OEA. Peer observers were invited to complete the LPI-observer for the Leadership Institute participant who solicited their feedback.

The Maslach Burnout Inventory

Burnout is conceptualized as high levels of emotional exhaustion and feelings of depersonalization accompanied by low levels of personal accomplishment. The MBI is a well-established 25-item instrument that measures three dimensions of employee burnout: emotional exhaustion, personal accomplishment, and depersonalization. The participants in this study were asked to rate how frequently they experienced the job-related feelings described in each item on a 7-point scale ranging from 0 (never) to 6 (every day). Evidence of MBI reliability and validity have been well-established (Maslach, Jackson, & Leitner, 1996). In this study, interitem reliability was 0.66 for the depersonalization scale, 0.75 for personal accomplishment, and 0.91 for emotional exhaustion. The MBI subscales were used in this study to evaluate LPI construct validity.

The Organizational Environment Assessment Questionnaire

The six-item OEA was developed for use in this study to measure the work environment. This instrument also was used to evaluate LPI construct validity. In the OEA, respondents were asked to rate their agreement with each of the following statements about work environment characteristics on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree):

- People who work in this environment have shared goals.
- People working in this environment feel valued for the work they do.
- When I or others make decisions, they are supported.
- People working in this environment have opportunities for personal development.
- People working in this environment have opportunities for professional development.
- People working in this environment have flexibility to change how they organize their work.

These items were based on the characteristics of effective work environments described by Kouzes and Posner (1995). The internal consistency of this scale was 0.72 when completed by

the 67 participants and 0.82 when completed by the 320 peer observers. Observer OEA item-total correlations were acceptable, ranging between 0.30 and 0.70. Factor analysis of the six OEA items using exploratory principal analysis with varimax rotation yielded a one-factor solution including the six items that accounted for 53% of variance. Factor loadings ranged between 0.75 and 0.89 for all six items.

Sample

All of the 67 consenting institute participants completed the LPI-self, MBI, and OEA instruments at baseline. At baseline, 565 observer packages were prepared, and 347 observer responses were received, yielding a 61.4% response rate. On the average, each participant had 5.2 peer observers complete the LPI and OEA instruments. Missing data were found in 10 observer sets of responses, and these were not used in subsequent analyses.

Analyses

Analyses were completed using the Statistical Package for the Social Sciences (SPSS), Version 11.0 (SPSS, Chicago). Analyses focused on testing dimensionality, reliability, and construct validity and included the procedures described later.

Using the LPI-observer data, LPI-observer dimensionality was assessed by means of exploratory principal components analysis (PCA). An orthogonal rotation (varimax) was used to obtain as distinct and maximally interpretable solution as possible. Three criteria were used to eliminate items loaded on a factor. An item was deleted from the scale if it did not have a loading greater than .50, if it cross-loaded on two different factors and had a loading greater than .30 on a second factor, and if the item cross-loaded on a “wrong” factor; one that was conceptually unacceptable (Streiner & Norman, 1991).

Using LPI-self data, factorial structure was examined using PCA with varimax rotation. Sapnas and Zellar (2002) suggested that sample sizes as small as 25 are sufficient to infer dimensional structures using PCA. Using LPI-observer data, PCA was performed to force a five-factor solution found by Posner and Kouzes (Kouzes & Posner, 1995; Posner & Kouzes, 1993).

The three newly derived factors of the LPI-self were assessed for construct validity by exploring correlations between measures of theoretically related constructs. A known-groups approach was tested using independent t-tests to examine hypothesized differences between aspiring and established leader LPI-self scores. The construct validity of the LPI-observer scale was investigated further by using regression analysis to determine whether peer-reported leadership practices predict peer observer ratings of the effectiveness of the organizational environment as measured by the OEA. Reliabilities of the factor analysis solution were calculated.

Results

Dimensionality

The exploratory PCA with varimax rotation for LPI-observer data was first implemented. Emerging factors were evaluated on the basis of eigenvalues greater than 1 and the scree plot. Only items with loadings greater than .50 were used initially to identify factor content. Three factors with eigenvalues greater than 1 were extracted. The scree plot confirmed a three-factor solution that explained 65% of variance (Table 2).

With this three-factor solution, new Factor 1 contained 11 items from Kouzes and Posner's original two leadership practices of inspiring a shared vision and challenging the process (Kouzes & Posner, 1995; Posner & Kouzes, 1993). Of the 11 items, 10 (items 1, 2, 6, 7, 11, 12, 17, 21, 22, and 27) had loadings greater than the .50 necessary for inclusion in a factor. Item 16 had a loading of .49 and did not meet the minimum loading criteria for inclusion in a factor.

Thirteen items loaded onto new Factor 2. Of these 13 items, 12 were items from Kouzes and Posner's (2000) two leadership practices of enabling others to act and modeling the way. Item 26, “takes initiative,” was conceptualized initially by Kouzes and Posner (2000) as belonging to the original “challenging the process” factor (part of the new Factor 1), but within the current data, this item loaded at .58 in new Factor 2 and at .46 in new Factor 1. Therefore, item 26 should be deleted from the instrument because it loaded higher on a factor other than the factor to which it belongs (Streiner & Norman, 1991). Of the remaining 12 items in new Factor 2, 11 (items 3, 4, 8, 9, 13, 14, 18, 19, 23, 24, and 29) had loadings greater than the .50 necessary for inclusion in a factor. Item 28 did not meet the minimum loading criteria for inclusion in a factor.

Six items (items 5, 10, 15, 20, 25, and 30) loaded onto new Factor 3, and all had factor loadings greater than .50. These six items were identical to Kouzes and Posner's (2000) leadership practice of encouraging the heart.

The current authors propose that new Factor 1 reflects cognitive leadership activities that involve visioning the way things could be and challenging the way things are. They suggest that new Factor 2 reflects behavioral leadership activities that involve acting on and achieving the desired vision. They also propose that new Factor 3 reflects supportive leadership activities that encourage others to focus on and achieve the desired vision. These newly derived factors are named as cognitive leadership practices (new Factor 1), behavioral leadership practices (new Factor 2), and supportive leadership practices (new Factor 3).

If the minimum factor loading criteria is set at .50, this three-factor solution contains 27 items instead of the original 30 items developed by Kouzes and Posner (1995; Kouzes and Posner (2000) (Posner & Kouzes, 1993). However, if the minimum factor loading criteria is increased to .60, the three-factor solution is considerably reduced in length to 21 items.

Dimensionality of the LPI-Self

When an exploratory PCA with varimax rotation using LPI-self data set was performed, a six-factor solution was found, with most items loading on three factors. For ease of understanding, the word “self” is added after the factor numbers to indicate that these findings are associated with the use of LPI-self data. Factor 1-self was identical to new Factor 1 found with LPI-observer

Table 2 Factor Structure (Loadings) for Three Newly Derived LPI Subscales Using LPI-Observer Data (decimal points omitted)

Item Number and Brief Descriptor	New Factor 1	New Factor 2	New Factor 3	
1	Seek opportunities	55	43	13
2	Talk about future	78	15	19
6	Challenge people	65	30	33
7	Describe image	86	10	18
11	Search outside	77	21	18
12	Share dream	83	12	28
16	Ask about learning	49	40	46
17	Show others	68	26	40
21	Take risks	58	29	34
22	Enthusiastic and positive	54	34	42
27	Genuine conviction	70	27	20
3	Develop relationships	03	73	40
4	Set example	21	75	24
8	Actively listens	18	67	33
9	Time and energy	39	68	02
13	Treat others	04	71	44
14	Follow through	14	79	12
18	Support decisions	29	64	35
19	Clear philosophy	45	54	30
23	Freedom and choice	34	53	26
24	Goals and plans	52	56	08
26	Take initiative	46	58	30
28	Ensure growth	47	49	28
29	Make progress	38	69	29
5	Praise people	24	46	69
10	Let people know	44	39	62
15	Reward contributions	48	19	67
20	Public recognition	50	22	68
25	Celebrate accomplishments	47	32	63
30	Appreciate and support	26	52	71

Note. LPI_Leadership Practices Inventory. Only brief descriptions of each item in the Leadership Practices Inventory are identified because copyright of this instrument rests with James K. Kouzes and Barry Z. Posner.

data, with one exception. One additional item, Item 27, loaded in Factor 1-self. Factor 3-self was identical to new Factor 3 found with the LPI-observer data, with one exception. One additional item, Item 14, loaded in Factor 3-self. Using the LPI-self data, the remaining instrument items previously found in new Factor 2 with the LPI-observer data were spread across Factors 2-, 4-, 5-, and 6-self. Even with the small sample of 67 LPI-self data, these results show similarities between LPI-self and LPI-observer factor structures, suggesting LPI factorial stability.

Forcing the original five-factor structure of the LPI

Using LPI-observer data, PCA was again implemented in an attempt to replicate five factors, as originally found by Kouzes and Posner (1995 Kouzes and Posner (2000)). A five-factor solution was forced, which explained 66% of variance. However, Kouzes and Posner's (1995 However, Kouzes and Posner's (2000) original five factors were indistinguishable in these data, and one factor had no items loading above the minimum .50 criteria.

Construct validation testing

Construct validity for the LPI-self was assessed in two ways: (a) by testing the hypothesized relation between self-

reported leadership practices and the MBI subscales, and (b) by testing the LPI-self using a known-groups approach. It was hypothesized that self-reported leadership practices would be related positively to self-reported feelings of personal accomplishment assessed with the MBI, and that self-reported leadership practices would be related negatively to self-reported levels of emotional exhaustion and depersonalization assessed with the MBI. For these 67 aspiring and established nurse leaders, hypothesized statistically significant relations between the self-reported use of leadership practices and the MBI subscales were found for six of the nine possible correlations, demonstrating support for the construct validity of the three newly derived subscales of the LPI (Table 3).

A known-groups approach was used to evaluate LPI construct validity further. T-tests were completed between aspiring and established leaders' self-reported leadership practices in each of the three newly derived subscales. The hypotheses were supported for all three newly derived LPI subscales. Established leaders consistently reported using significantly more leadership practices in all three sub-scales. Table 4 summarizes the mean scores for established and aspiring nurse leaders for each of the three newly derived LPI scales as

Table 3 Summary of Correlations Between Three Newly Derived LPI Factors and Three Maslach Burnout Inventory Subscales Using Self-Reported Data

LPI New Factor/Subscale	Personal Accomplishment	Emotional Exhaustion	Depersonalization
New factor 1: cognitive practices	0.36 (p <.01)	-0.32 (p <.01)	-0.28 (p <.05)
New factor 2: behavioral practices	0.46 (p <.001)	-0.21 (ns)	-0.22 (ns)
New factor 3: supportive practices	0.31 (p <.01)	-0.32 (p <.01)	-0.24 (ns)

Note. LPI = leadership practices inventory; ns = not statistically significant

well as the results of the t-tests investigating differences in scores between established and aspiring nurse leaders.

The construct validity of the LPI was further evaluated by exploring whether LPI-observer scores in the three newly derived subscales predicted organizational effectiveness as measured by peer observers who completed the OEA scale. Because high scores on these six items reflect desirable work environments, it was hypothesized that observers who rated established and aspiring nurse leaders as using more leadership practices also would rate their work environments higher using the OEA. Linear multiple regression was used to regress OEA scores on LPI-observer subscale scores. The three leadership practice subscales explained more than 37% of the variance in peer observers' assessments of the effectiveness of their organizational environments ($F = 4.7$; $p = .003$). This finding supports the predictive validity of the LPI.

Reliability

The reliabilities of LPI-observer data were evaluated for the three newly derived LPI factors (Table 5). Internal reliability values for the original five LPI subscales ranged from 0.88 to 0.93. The reliabilities for new Factor 1 and new Factor 2 were higher than the reliabilities of the separated factors in the original five-factor solution.

Discussion

A three-factor solution was found instead of the traditional five-factors previously established by Kouzes and Posner. (1995 Kouzes and Posner. (2000) This three-factor solution demonstrated adequate psychometric properties, which usually were stronger than those for the five-factor solution using the same data. Considerably more variance was explained with the three-factor solution than had previously been explained by the original five-factor solution (Kouzes & Posner, 1995; Posner & Kouzes, 1988).

One possible explanation for the differences in the factor analysis findings between this study and previous work by LPI developers may relate to differences between samples. In this study, leadership practices of an almost entirely female sample (98.5%) were evaluated, and this entire sample worked in healthcare settings. This was a relatively homogeneous female and nurse sample, as compared with the large heterogeneous database sample collected over the years by Kouzes and Posner (1995).

The results point to multifactorial items that have relatively

high loadings on more than one factor, particularly the supportive leadership practices factor. It is probable that leaders effective in one leadership practice are effective in other leadership practices. Relatively high correlations of .51, .56, and .59 among the three newly derived factors confirm this proposition.

Research instruments should be succinct to minimize both respondent burden and research costs. In outcome research, more factors or predictors are not necessarily better. For example, when analytical techniques such as multiple regression are used, power is lost with the addition of predictors in the model. In this case, if leadership practices can be measured effectively and accurately by three factors rather than five, regression models using three factors will have more power than those using five factors.

If the minimum loading criteria for LPI items is increased to .60, the number of acceptable LPI items reduces to 21, decreasing respondent burden and research costs. High internal consistencies of the three new factors may indicate redundancy of items within factors. Thus, reducing the number of items from 27 to 21 may be warranted. Seven items in new Factor 1, eight items in new Factor 2, and all six items in new Factor 3 have loadings greater than .60. Using a minimum factor loading criteria of .60 yields a scale with similar numbers of items in each subscale, which is important for those who use composite scores to assess nurse leadership practices. Further testing is recommended to validate the 21-item version of the LPI.

A three-factor solution made improved conceptual sense because it was difficult to distinguish between Kouzes and Posner's (1995) original "challenging the process" and "inspiring a shared vision" factors as well as between the original "enabling others to act" and "modeling the way" factors. With the new three-factor structure proposed in this report, the distinction becomes clearer among cognitive, behavioral, and supportive leadership actions. Leadership strategies associated with each of the three newly derived leadership practices subscales are identified in Table 1.

The construct validity of the three new factors was established in a variety of ways including use of the known-groups approach. Statistically significant differences were found between aspiring and established leaders for all three leadership practices. Established leaders perceived themselves to be more effective at visioning and challenging the way things are, achieving the vision, and supporting subordinates to achieve the vision. Construct validity was established when similar factor structures were found with both LPI-observer and LPI-self data.

Research and educational needs are not always similar. When the LPI is used primarily for education reasons, having

Table 4 Mean Scores for Established and Aspiring Nurse Leaders for Three Newly Derived LPI Scales

Factor	Established Leaders, Mean (SD)	Aspiring Leaders, Mean (SD)	Differences, t-test Results
Cognitive practices	79.2 (11.5)	72.3 (9.7)	t = 2.5*
Behavioral practices	92.3 (7.1)	88.9 (6.1)	t = 2.1*
Supportive practices	49.9 (5.7)	46.2 (6.1)	t = 2.5*

Note. LPI = Leadership Practice Inventory; SD = standard deviation. Theoretical range for cognitive practices is 10–100. Theoretical range for behavioral practices is 11–110. Theoretical range for supportive practices is 6–60. *p<.05.

more LPI factors may be desirable to assist learners in developing effective leadership practices and behaviors. This tension between educational and research needs is not trivial and should be resolved, particularly when the LPI has a dual role as an educational and a research instrument.

Further research is needed to gather evidence of LPI psychometric properties in the nursing context. This instrument has a long and sound history of use for educational and research purposes across many employment sectors, but there exists little information about its use in healthcare, specifically with and about nurses. On the basis of these findings, researchers should consider using the 27 items in the three-factor solution with loadings greater than .50 when the LPI is used to measure leadership practices of established and aspiring nurse leaders. This three-factor solution has sound psychometric properties, has a lighter respondent burden, requires less research costs, and consumes less power in further analytical procedures than the traditional five-factor LPI solution.

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