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Validation of the Mongolian Version of the Multifactor Leadership Questionnaire (MLQ) in Clinical Leaders of Hospital

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Objective: Leadership is a critical determinant of healthcare quality, workforce development, and organizational performance. The Multifactor Leadership Questionnaire (MLQ-5X), based on the Full Range Leadership Theory, is widely used to evaluate transformational, transactional, and passive-avoidant leadership styles. However, a culturally validated Mongolian version has not yet been available. This study aimed to translate, culturally adapt, and validate the MLQ-5X for clinical leaders working in hospitals across Mongolia. **Methods:** A cross-sectional methodological study was conducted between March and September 2022 in 11 provinces and Ulaanbaatar. The MLQ-5X was translated using WHO translation guidelines and underwent expert panel review, pilot testing, and psychometric evaluation. A total of 1,458 clinical leaders participated. Construct validity was assessed through Exploratory and Confirmatory Factor Analyses (EFA and CFtA). Reliability was measured using Cronbach's alpha, and face validity was evaluated through participant feedback. **Results:** EFA supported the original nine-factor structure. CFA showed a good model fit (CFI = 0.93, TLI = 0.91, RMSEA = 0.056). Reliability was high across all subscales (α = 0.834–0.968), with overall reliability at 0.973. Face Validity Index scores indicated strong clarity (0.82) and comprehension (0.85). **Conclusions:** The Mongolian MLQ-5X is a valid and reliable tool for leadership assessment in healthcare settings.

Keywords: MLQ-5X, Leadership, Validation, Mongolia, Healthcare, Transformational leadership, Psychometric analysis

Introduction

Leadership plays a critical role in the delivery of healthcare services and the professional development of healthcare workers. Effective leadership not only influences clinical outcomes and organizational efficiency but also shapes job satisfaction, staff retention, and patient-centered care.[1] In the complex and rapidly evolving landscape of healthcare, particularly in hospital settings, leadership competencies are vital for managing interdisciplinary teams,

guiding change, and fostering a culture of safety and continuous improvement.[2,3]

Among various theoretical frameworks, the Full Range Leadership Theory (FRLT), developed by Bass and Avolio, has been widely adopted in healthcare due to its comprehensive model encompassing transformational, transactional, and passive-avoidant (laissez-faire) leadership styles.[4] Transformational leadership, characterized by inspirational motivation, idealized influence, intellectual stimulation, and individualized consideration, has been associated with improved team performance, higher staff morale, and enhanced patient care outcomes.[5,6] In contrast, transactional leadership, which focuses on goal setting, task completion, and contingent rewards, has shown mixed effects, often depending on context and implementation.[7] Passive-avoidant leadership, however, is generally linked to negative outcomes, including staff disengagement, low performance, and increased turnover.[8,9]

The Multifactor Leadership Questionnaire (MLQ), developed by Bass and Avolio, is one of the most widely used instruments for assessing leadership behaviors according to the FRLT model. It has been validated in numerous healthcare studies globally, demonstrating strong psychometric properties.[10] For instance, in Turkey, Yildiz, et al. validated the MLQ among nurse managers, reporting high internal consistency (Cronbach's alpha > 0.80) and confirming the three-factor structure through confirmatory factor analysis (CFA).[11] In Brazil, Castro, et al. conducted a validation study among hospital administrators, revealing that transformational leadership was the most prevalent style and significantly correlated with organizational commitment.[12] Similarly, in Germany, Rowold and Heinitz reported satisfactory validity and reliability of the MLQ in clinical settings and emphasized the model's adaptability across cultures.[13]

Numerous other studies have also confirmed the relevance of the MLQ in diverse healthcare environments. For example, research in South Africa found that transformational leadership was positively associated with nurse engagement and reduced burnout,[14] while a Canadian study confirmed that transformational leadership fosters a healthy work environment and promotes staff retention.[15] In a Norwegian context, MLQ application revealed leadership's role in fostering innovation and quality improvement.[16] These findings demonstrate the global applicability of the MLQ and its value in enhancing healthcare leadership.

Despite these validations, leadership instruments such as the MLQ must be culturally adapted to maintain semantic, conceptual, and contextual relevance. Linguistic translation alone is insufficient without a thorough examination of cultural norms, hierarchical dynamics, and contextual factors unique to the healthcare system of the target country.[17] As Beaton, et al. suggest, successful cross-cultural adaptation must follow a rigorous, multi-step methodology that includes translation, synthesis, back-translation, expert committee review, and pre-testing.[18]

Although the MLQ has been translated into several languages, no validated Mongolian version currently exists, creating a significant gap in the tools available for assessing and developing leadership in Mongolian hospitals. The need for such a tool is particularly urgent given Mongolia's ongoing healthcare reforms, which include decentralization, increased focus on quality improvement, and the empowerment of clinical leaders to drive systemic change.[19] The successful implementation of these reforms hinges on the ability to evaluate and cultivate effective leadership styles among healthcare professionals. As leadership training becomes a more integral part of professional development programs in Mongolia, a culturally validated instrument such as the MLQ would enable evidence-based leadership assessment, training, and succession planning.[20]

Therefore, the present study aims to translate, culturally adapt, and psychometrically validate the MLQ for use among hospital-based clinical leaders in Mongolia. This research will fill a critical gap in the leadership assessment literature and support the broader goal of strengthening leadership capacity in Mongolia's healthcare sector.

Material and Methods

Study Design and Settings

This was a cross-sectional, methodological study conducted from March to September 2022 across 11 provinces and Ulaanbaatar city in Mongolia. Clinical leaders, including department heads and senior medical professionals from various hospital settings, were recruited using a multistage cluster sampling method. Sampling was employed based on hospital location to ensure proportional representation and reduce sampling bias. This method was considered appropriate for capturing the structural and geographical diversity of Mongolia's public healthcare system. Participants were recruited through

coordination with the human resources departments public hospitals. Each hospital provided a staff list, from which a professional researcher randomly selected potential participants using a stratified randomly selected. Before enrollment, selected individuals were screened to confirm their eligibility. Participants were eligible for inclusion if they were employed full-time at a public hospital (a), had held their current position for at least six months (b), and voluntarily provided informed consent. No incentives were provided to participants in the study.

Instrument and Translation Process

The original MLQ-5X was translated into Mongolian following the World Health Organization's forward-backward translation guidelines. The process included two independent forward translations, reconciliation, back-translation, expert panel review, and pre-testing with a pilot group of 25 clinical leaders. The Multifactor Leadership Questionnaire (MLQ-5X), originally developed in English. The MLQ-5X consists of 45 items that assess various aspects of leadership, including transformational, transactional, and passive-avoidant leadership, along with outcomes such as effectiveness, satisfaction, and extra effort. Respondents rated each item on a 5-point Likert scale, ranging from 0 ("Not at all") to 4 ("Frequently, if not always"). This questionnaire assesses several dimensions of leadership, including transformational leadership, which is characterized by the ability to inspire and motivate employees through a shared vision, fostering innovation and commitment. Transactional leadership, on the other hand, focuses on the use of rewards and punishments to manage employee behaviors, maintaining order and achieving short-term goals. The questionnaire also measures Laissez-Faire Leadership, a style in which leaders avoid taking responsibility or making decisions, often disengaging from critical situations. Additionally, the MLQ-5X evaluates the outcomes of these leadership styles, including the effectiveness of leadership in the workplace, the level of employee satisfaction with their leaders, and the extra effort that employees are willing to put in as a result of their leaders' influence. Each of these aspects is measured through the respondents' perceptions of their leadership environment, allowing for an in-depth understanding of the leadership styles and their impact on employees in the Mongolian healthcare system.

Data Collections

Data were collected using self-administered questionnaires during regional training sessions and onsite hospital visits. The survey included demographic items and the translated MLQ-5X items.

Statistical Analysis

Descriptive statistics were used to summarize participant characteristics. The psychometric evaluation of the Mongolian version of the MLQ-5X involved assessment of face validity, internal consistency and construct validity. Construct validity was assessed through EFA (Exploratory factor analysis/PCA) and CFA (Confirmatory factor analysis/SEM) using STATA BE 18.0.

The CFA tested the hypothesized nine-factor structure of the MLQ-5X, reflecting the Full Range Leadership Theory (FRLT) dimensions. Maximum likelihood estimation was applied. The following model fit indices were used to evaluate overall model fit10: Comparative Fit Index (CFI) — values ≥ 0.90 indicated acceptable fit, and ≥ 0.95 indicated excellent fit. Tucker-Lewis Index (TLI) — values ≥ 0.90 reflected acceptable model fit. Root Mean Square Error of Approximation (RMSEA) — values ≤ 0.08 were acceptable, and ≤ 0.06 indicated good fit.

Reliability was assessed using Cronbach's alpha coefficient for each of the nine subscales (transformational leadership, transactional leadership, and passive-avoidant leadership components). A Cronbach's alpha value of ≥ 0.70 was considered acceptable, while values ≥ 0.80 were considered good indicators of internal consistency.[9]

Face validity refers to the extent to which the items of a questionnaire appear to be relevant, clear, and understandable to respondents. It is a subjective form of validity that does not require statistical analysis or expert evaluation, but instead relies on the perception of individuals assessing whether the items seem appropriate and easy to comprehend. While face validity is not sufficient to establish overall instrument validity, it plays an important role in identifying items that may be confusing or ambiguous.

In this study, sample of 22 health worker who met the inclusion criteria was invited to evaluate the face validity of the questionnaire. Participants were asked to assess each item in terms of clarity—whether the statement was clearly worded or contained ambiguities—and comprehension—whether the language used could be easily understood by the target audience. A 5-point Likert scale was used for both criteria. For clarity, the scale ranged from 1 = very vague to 5 = very clear. For comprehension, it ranged from 1 = very difficult to understand

to 5 = very easy to understand. Based on these ratings, the Face Validity Index (FVI) was calculated separately for the knowledge, attitude, and practice sections of the questionnaire to determine the degree to which the items were perceived as clear and comprehensible by the participants.

Ethical Consideration

The Mongolian National University of Medical Science's Ethical Review Board's ethical approval was sought. The research was approved by the Ethics Committee of Research of the Mongolian National University of Medical Sciences on February 18, 2022 (approval number 2022/3-02).

Results

A total of 1458 healthcare professionals participated in the study, with 33.6% from urban and 66.4% from rural areas. Most participants were female (88.8%) with a mean age of 38 ± 9.8 years; rural participants were significantly older than their urban counterparts (P = 0.0001). Similarly, the number of years in hospital was longer in rural areas (median 9 years, range 1–38) than in urban areas (median 5 years, range 1–39, P = 0.0001). Regarding professions, nurses and mid-level practitioners were the largest group (43.9%), followed by doctors (34.9%).

Table 1. Demographic outcomes.

Variables	Total	
	n	%
Age, years, mean±std╪	38±10.0	
Work experiences, years, median (min-max)‡	8.0 (1-39)	
Gender	172	11.20%
Male	1360	88.80%
Female	Female	
Education level		
Bachelor	1051	68.60%
Master	181	11.80%
Doctors	8	0.50%
Missing	292	19.10%
Levels		
Head of department	74	4.80%
Health workers	1458	95.20%
Professions		
Doctor's	534	34.90%
Nurses	673	43.90%
Lab technicians	87	5.70%
Social worker, public health researcher	19	1.20%
Pharmacist	42	2.70%
Others	12	0.80%
Missing value	165	10.80%
Total	1458	100.00%

Health workers is now working at medical units that included doctors, nursing

Construct Validity

The data were analyzed using the Kaiser–Meyer–Olkin test, and the test value was 0.87 or greater, indicating that the data were suitable for analysis. The EFA confirmed the nine-factor model of the MLQ-5X. Model fit indices met recommended thresholds: CFI = 0.93, TLI = 0.91, and RMSEA = 0.056. In the analysis, the loadings on the variable group were set to be 0.4 or higher. Also, if the loadings on other groups of variables (cross loading) were 0.4 or higher, double loading was considered (Table 2).

Table 1. Demographic outcomes.

Variables	F1	F2	F3	F4
Talks only on most important values and beliefs	0.668			
Specific importance of having a strong sense of purpose	0.719			
Considers moral & ethical consequences of decisions	0.745			
Emphasizes importance of group's mission	0.770			
Instills pride in me for being associated with her/him	0.779			
Goes beyond self-interest for the good of staff	0.640			
Have my respect	0.636			
Displays sense of power and confidence in me	0.808			
Articulates a compelling vision	0.795			
Discusses with specific terms who is responsible for achieving performance targets	0.817			
Talks optimistically about future	0.820			
Expresses confidence on goal achievement	0.826			
Raises critical assumption to question whether they appreciate or not	0.790			
Suggests new ways to completing my work	0.705			
Seeking different perspective in problem solving	0.826			
Allows me look at problems' different angles	0.841			
Spends time on training and coaching	0.726			
Treats me as individual rather than member of group	0.813			
Considers me as having different needs/abilities/aspiration	0.839			
Helps me to develop my strength	0.861			
Provides with assistants an exchange for my effort			0.820	
Clarifies my expectation when meeting perform expectation goal			0.826	
Is excited about what needs to be accomplished			0.790	
Expresses satisfaction when meeting performance			0.705	
Focuses attention on irregularities /mistake deviation from standards			0.826	
Gives all attention in dealing with mistake/complains/failure			0.841	
Keeps track of all mistakes			0.726	
Directs my attention towards failures to meet standards			0.813	
Wait for things go to wrong before taking action		0.727		
Do not fail interfere until the problem is serious		0.602		
Hospital believes in not making changes unless necessary		0.474		
Takes action only when problems become serious		0.614		
Avoids getting involved when important issues arise		0.850		
Is absent when needed		0.844		
Avoids making decisions		0.826		
Delays responding to urgent questions		0.408		
I demonstrate that I can accomplish more than expected using effective methods				0.780
I enhance motivation and desire to succeed				0.837
I encourage greater work effort				0.825
I use effective methods when working with colleagues				0.839
I enjoy working with my team				0.841
I discuss the needs my employees require to perform				0.823
I defend my employees' interests to senior leadership				0.805
I meet organizational demands effectively				0.791

F1 - Transformational, F2 - Transactional, F3 - Passive, F4-Outcome leadership

The results of the confirmatory factor analysis (CFA), as showed in Fig 1, demonstrate that all observed variables loaded significantly onto their respective latent constructs, with standardized factor loadings generally exceeding 0.5, indicating good convergent validity. The structural model further revealed several significant relationships between the latent variables. Internal communication (IC) showed a strong positive association with both effectiveness and satisfaction, with standardized regression weights of 0.755 and 0.735, respectively.

Similarly, internal support (IS) was positively related to effectiveness ($\beta = 0.631$), indicating its meaningful contribution to organizational outcomes. Motivation-related constructs, such as intrinsic motivation (IM) and integrated motivation (IIB), also demonstrated moderate to strong paths to the mediating and outcome variables, suggesting their relevance within the overall framework. Overall, the model provides support for the hypothesized structure, with well-fitting indicators and substantial path coefficients between key constructs. These findings imply that internal organizational factors, particularly communication and support, play a critical role in shaping leadership outcomes.

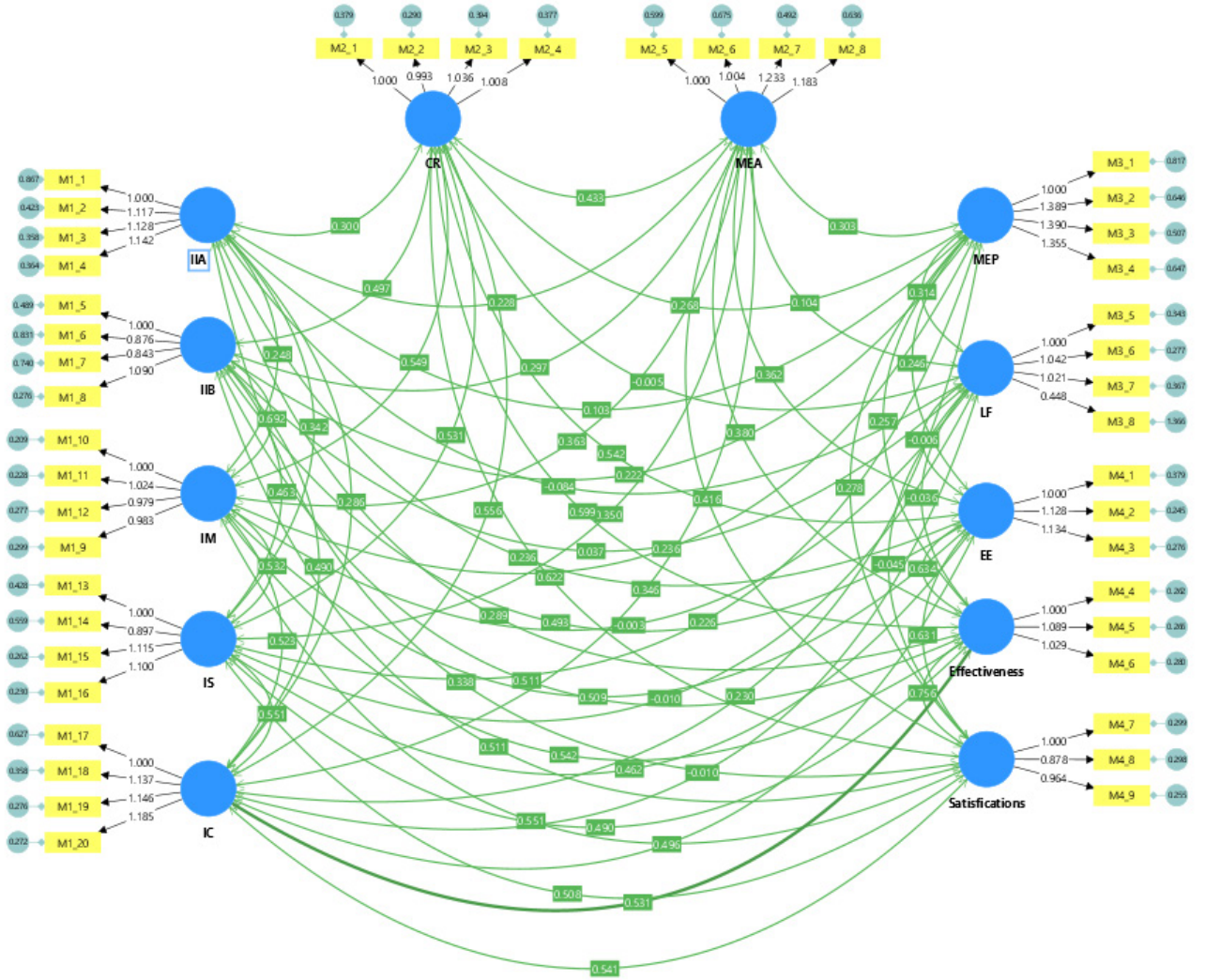

Figure 1. Confirmatory Factor Analysis (CFA). Model of the Mongolian Version of the MLQ-5X, Blue is latent variables, yellow is variable of MLQ-5X, IIA - Idealized Influence: Attributed, IIB - Idealized Influence: Behavior, IM - Inspirational Motivation, IS - Intellectual Stimulation, IC - Individual Consideration, CR - Contingent Reward, MEA - Management by Exception: Active, MEP - Management by Exception: Passive, LF - Laissez-faire, EE - Extra Effort

MLQ-5X Internal Consistency

The data were analyzed using the Cronbach's alpha test, and the test value was 0.7 or greater, indicating that the questionnaire was reliability. All subgroups are high, indicating strong reliability. Transformational Leadership (0.968) and Outcomes of Leadership (0.964) show excellent reliability, while Transactional Leadership (0.913) also has very good consistency. Laissez-Faire Leadership (0.834) is slightly lower but still acceptable. The overall Cronbach's alpha of 0.973 suggests the entire questionnaire is highly reliable, effectively measuring leadership styles and outcomes.

Table 3. Internal consistence of MLQ-5, Mongolian version

Variables	F1	F2	F3
Transformational		0.901	
(1) Idealized influence: attributed	2.51±1.03	0.840	0.881
(2) Idealized influence: behavior	2.59±0.99	0.880	0.849
(3) Inspirational motivation	2.63±1.08	0.854	0.928
(4) Intellectual stimulation	2.4±1.02	0.945	0.876
(5) Individual consideration	2.52±1.07	0.909	0.886
Transactional		0.915	
(6) Contingent Reward	2.48±1.04	0.915	0.889
(7) Management by exception: active	2.53±0.92	0.916	0.801
Passive/avoidant		0.832	
(8) Management by exception: passive	2.21±0.96	0.822	0.814
(9) Laissez –faire	1.74±1.05	0.845	0.867
Leadership outcomes		0.912	
(10) Extra Effort	2.55±1.03	0.905	0.880
(11) Effectiveness	2.53±1.07	0.921	0.897
(12) Satisfaction	2.56±1.07	0.916	0.892

Face Validity

The calculated Face Validity Index (FVI) results from 20 health workers are presented in Table 4. The FVI for clarity (FVI-Clarity) was 0.82, the FVI for comprehension (FVI-Comprehension) was 0.85, and the overall FVI was 0.80. All values exceeded the commonly accepted cutoff point of 0.50, indicating satisfactory face validity for the questionnaire items.

Table 4. Face Validity Index of MLQ-5 questionnaire

Component	FVI Score
FVI – Clarity	0.82
FVI – Comprehension	0.85
Total FVI	0.80
Cutoff Point	0.50

FVI - Face validity index

Discussion

This study evaluated the construct validity, internal consistency, and applicability of the Multifactor Leadership Questionnaire (MLQ-5X) among healthcare professionals in Mongolia, including both urban and rural settings. The findings confirm that the MLQ-5X is a valid and reliable instrument for assessing leadership behaviors and outcomes in the healthcare sector.

The demographic profile of respondents aligns with national workforce trends, showing a predominance of female healthcare workers and a high proportion in nursing and mid-level practitioner roles. Rural respondents were significantly older and had longer years of service, likely reflecting reduced mobility and stronger retention in rural assignments, consistent with earlier findings on rural health workforce stability.[21,22] Exploratory factor analysis (EFA) supported the original nine-factor model proposed by Bass and Avolio,[23] and confirmatory factor analysis (CFA) confirmed good model fit (CFI = 0.93, TLI = 0.91, RMSEA = 0.056), meeting established thresholds for structural validity.[24] Most standardized factor loadings exceeded 0.5, indicating strong convergent validity and correct clustering of items within latent constructs.

The structural model further demonstrated that internal communication and support were positively associated with leadership effectiveness and job satisfaction. These findings align with prior research emphasizing the role of organizational environment and transparent communication in fostering effective leadership.[25,26] Additionally, intrinsic and integrated motivation showed moderate to strong associations with key outcomes, supporting the relevance of self-determination theory in healthcare leadership models.[27]

Internal consistency was high across all MLQ-5X subscales, with Cronbach α values ranging from 0.834 to 0.973. The strongest internal consistency was seen in the Transformational Leadership and Leadership Outcomes subscales, mirroring results from previous MLQ-5X validations.[28,29] Face validity was confirmed by 20 healthcare professionals, with scores for clarity (0.82), comprehension (0.85), and overall FVI (0.80) all exceeding the 0.5 threshold. These results indicate that the questionnaire items were well understood, supporting its applicability in real-world clinical environments. Clear face validity is particularly important when applying psychometric tools across languages and cultures to ensure appropriate interpretation.[30]

This study's strengths include its large, nationally representative sample and rigorous methodology, combining EFA, CFA, and reliability testing. The inclusion of both urban and rural settings enhances the generalizability of findings. However, limitations include its cross-sectional design, which precludes causal inference, and the use of self-report measures, which may introduce social desirability bias. Cultural nuances may also influence how some items are interpreted despite strong face validity. Longitudinal studies and intervention-based research are needed to assess the MLQ-5X's responsiveness and predictive validity in low- and middle-income countries.

Future studies should include longitudinal study to assess how MLQ-5X–measured leadership styles impact outcomes like staff retention, burnout, and patient care quality. Interventional studies using pre- and post-leadership training assessments can test the tool's responsiveness. Qualitative studies are recommended to explore how cultural context influences leadership perceptions in Mongolia.

Conclusions

This study confirmed that the Multifactor Leadership Questionnaire (MLQ-5X) is a valid and reliable tool for evaluating leadership styles and outcomes among healthcare professionals in Mongolia. The nine-factor structure was supported through both exploratory and confirmatory factor analyses, with excellent internal consistency and strong face validity across diverse healthcare roles and geographic settings. Key leadership constructs such as internal communication, support, and motivation were positively linked to effectiveness and job satisfaction, highlighting their importance in healthcare leadership. These findings provide a solid foundation for leadership development strategies in both urban and rural healthcare environments. Future research should explore the longitudinal impact of leadership on workforce outcomes and examine cultural influences through qualitative and interventional studies to further adapt and enhance the utility of the MLQ-5X in low- and middle-income countries.

Conflict of Interest

The authors state no conflict of interest.

Authors Contribution

Buyandelger Boldbaatar: Conceptualization methodology, writing-original draft preparation, visualization

Nasantogtokh Erdenebilkeg and Yerkebulan Mukhtar: software and data curation

Sarnai Tsagaankhuu: conceptualization formal analysis visualization

Khurelbaatar Nyamdavaa and Davaalkham Dambadarjaa: editing and supervision

References

1. Cummings GG, Tate K, Lee S, et al. Leadership styles and outcome patterns for the nursing workforce and work environment: a systematic review. *Int J Nurs Stud*. 2018;85:19-60. https://doi.org/10.1016/j.ijnurstu.2009.08.006
2. Curtis EA, de Vries J, Sheerin FK. Developing leadership in nursing: exploring core factors. *Br J Nurs*. 2011;11(4):179-185. https://doi.org/10.12968/bjon.2011.20.5.306
3. Giltinane CL. Leadership styles and theories. *Nurs Stand*. 2013;27(41):35-39. https://doi.org/10.7748/ns2013.06.27.41.35.e7565
4. Bass BM, Avolio BJ. Improving Organizational Effectiveness Through Transformational Leadership. Thousand Oaks, CA: Sage Publications; 1994.
5. Wong CA, Cummings GG, Ducharme L. The relationship between nursing leadership and patient outcomes: a systematic review update. *J Nurs Manag*. 2013;21(5):709-724. https://doi.org/10.1111/jonm.12116
6. Boamah SA, Spence Laschinger HK, Wong C, et al. Effect of transformational leadership on job satisfaction and patient safety outcomes. *Nurs Outlook.* 2018;66(2):180-189. https://doi.org/10.1016/j.outlook.2017.10.004
7. McCleskey J. Situational, transformational, and transactional leadership and leadership development. *Int J Bus Soc Sci.* 2014;5(5):26-36.
8. Skogstad A, Einarsen S, Torsheim T, et al. The destructiveness of laissez-faire leadership behavior. *J Occup Health Psychol.* 2007;12(1):80-92. https://doi.org/10.1037/1076-8998.12.1.80
9. Avolio BJ, Bass BM. MLQ Manual and Sampler Set: Multifactor Leadership Questionnaire. 3rd ed. *Menlo Park, CA: Mind Garden*; 2004.
10. Antonakis J, House RJ. Instrumental leadership: measurement and extension of transformational–transactional leadership theory. *Leadersh Q*. 2014;25(6):1058-1076. http://dx.doi.org/10.1016/j.leaqua.2014.04.005
11. Yildiz A, Ayhan B, Erat S. The reliability and validity of the Turkish version of the Multifactor Leadership Questionnaire (MLQ-5X). *J Nurs Manag*. 2019;27(4):805-812.
12. Castro ML, Peres MA, Martins JT. Validation of the Multifactor Leadership Questionnaire in the Brazilian context. *Rev Bras Enferm.* 2016;69(6):994-999. https://doi.org/10.1590/0034-7167-2016-0084
13. Rowold J, Heinitz K. Transformational and charismatic leadership: assessing the convergent, divergent and criterion validity of the MLQ and the CKS. *Leadersh Q.* 2007;18(2):121-133. https://doi.org/10.1016/J.LEAQUA.2007.01.003
14. Stander MW, Rothmann S. Psychological empowerment, job insecurity and employee engagement. *J Psychol Afr.* 2010;20(2):255-265. http://dx.doi.org/10.4102/sajip.v36i1.849
15. McGuire E, Kennerly SM. Nurse managers as transformational and transactional leaders. *J Nurs Adm*. 2006;36(10):512-519.
16. Abrahamsen B. A longitudinal study of nurses' leadership roles in Norwegian nursing homes. *Int J Health Plann Manage*. 2015;30(4):389-406.
17. Chen HL, Boore JRP. Translation and back-translation in qualitative nursing research: methodological review. *J Clin Nurs*. 2010;19(1-2):234-239. https://doi.org/10.1111/j.1365-2702.2009.02896.x
18. Beaton DE, Bombardier C, Guillemin F, et al. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976). 2000;25(24):3186-3191. https://doi.org/10.1097/00007632-200012150-00014
19. Ministry of Health, Mongolia. Health Sector Strategic Master Plan 2021–2030. Ulaanbaatar, Mongolia: Ministry of Health; 2021.
20. World Health Organization, Mongolia Office. Country Cooperation Strategy 2020–2025. Ulaanbaatar, Mongolia: WHO; 2020.
21. Lehmann U, Dieleman M, Martineau T. Staffing remote rural areas in middle- and low-income countries: a literature review of attraction and retention. *BMC Health Serv Res*. 2008;8:19. https://doi.org/10.1186/1472-6963-8-19

22. World Health Organization. Increasing Access to Health Workers in Remote and Rural Areas Through Improved Retention: Global Policy Recommendations. Geneva: WHO; 2010.
23. Bass BM, Avolio BJ. Manual for the Multifactor Leadership Questionnaire (Form 5X). Redwood City, CA: Mind Garden; 1995.
24. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Modeling*. 1999;6(1):1-55. https://doi.org/10.1080/10705519909540118
25. Aarons GA, Ehrhart MG, Farahnak LR. The implementation leadership scale (ILS): development of a brief measure of unit level implementation leadership. *Implement Sci.* 2014;9:45. https://doi.org/10.1186/1748-5908-9-45
26. Al-Ali W, Singh SK, Al-Nahyan M, et al. Change management through leadership: the mediating role of organizational culture. *Int J Organ Anal*. 2017;25(4):723-739. https://doi.org/10.1108/IJOA-05-2016-1025
27. Deci EL, Ryan RM. The "what" and "why" of goal pursuits: human needs and the self-determination of behavior. *Psychol Inq*. 2000;11(4):227-268. https://doi.org/10.1207/S15327965PLI1104_01
28. Antonakis J, Avolio BJ, Sivasubramaniam N. Context and leadership: an examination of the nine-factor full-range leadership theory using the Multifactor Leadership Questionnaire. *Leadersh Q*. 2003;14(3):261-295. https://doi.org/10.1016/S1048-9843(03)00030-4
29. Judge TA, Piccolo RF. Transformational and transactional leadership: a meta-analytic test of their relative validity. *J Appl Psychol*. 2004;89(5):755-768. https://psycnet.apa.org/doi/10.1037/0021-9010.89.5.755
30. Boateng GO, Neilands TB, Frongillo EA, et al. Best practices for developing and validating scales for health, social, and behavioral research: a primer. *Front Public Health.* 2018;6:149. https://doi.org/10.3389/fpubh.2018.00149