ORIGINAL RESEARCH ARTICLE

Effect of a Multimodal LEARN-Based Metacognitive Training Program on Nurses' Clinical Belongingness: A Quasi-Experimental Study

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Abstract

Background A diminished sense of belonging among nurses within healthcare organizations has emerged as a significant challenge, underscoring the need to identify influencing factors. This study examined the effect of enhancing metacognitive beliefs via the multimodal LEARN method on nurses' clinical belongingness.

Methods This quasi-experimental, one-group pretest–posttest design included 48 nurses randomly selected from hospitals in Mahabad. Participants completed the Wells & Cartwright-Hatton Metacognition Questionnaire (1997) and the Levett-Jones et al. Clinical Belongingness Scale (2009). Inclusion criteria comprised a bachelor's degree (or higher) in nursing, current employment as a nurse, at least three years' professional experience, and absence of concurrent interventions targeting metacognitive beliefs or diagnosed psychological disorders. Data analysis was conducted in SPSS v22 using the Kolmogorov–Smirnov test, ANOVA, and independent t-test.

Results The multimodal LEARN intervention significantly increased both clinical belongingness and metacognitive belief scores among participants. ANOVA indicated that workplace unit, age, and education level had no significant effect on belongingness. The independent t-test revealed a significant gender difference, with female nurses reporting higher levels of clinical belongingness compared with male nurses.

Conclusion These findings suggest that enhancing metacognitive beliefs through the multimodal LEARN method has a positive effect on nurses' clinical belongingness. Accordingly, strategies to strengthen perceptions of professional competence, promote psychological well-being, and deliver structured educational workshops and training programs to develop metacognitive beliefs and foster supportive work environments may effectively enhance nurses' sense of belonging and overall mental health.

Keywords Belongingness, Metacognition, Learning models, Nurses

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1 Introduction

Achieving population health, universal health coverage, and equitable access to healthcare services depends on the presence of nurses with adequate capacity, competence, and quality to meet the challenges of the health sector and the evolving demands of care.[1] However, stress, anxiety, burnout, and other occupational challenges among nurses reduce their motivation and job satisfaction, often resulting in turnover and, in some cases, resignation. The average turnover rate has been estimated at approximately 15–36%.[2] Recent studies have indicated that the impact of nursing shortages has reached its highest level in recent years. In Iran, this shortage is recognized as one of the major threats to the healthcare system. As a consequence, in many healthcare centers, specialized nursing services are provided by individuals who lack the necessary professional qualifications, which may lead to serious and irreversible consequences for patient safety and care quality.[2,3] Among the strategies proposed to address these challenges, several studies have emphasized enhancing nurses' sense of belonging as a key contributing factor.[3,4]

A sense of belonging is a fundamental human need that fosters feelings of security, stability, and comfort. In general, individuals continually seek acceptance from others, as the absence of social connection may result in a range of cognitive, emotional, and behavioral consequences. Individuals with a stronger sense of belonging tend to show greater awareness of organizational goals and exert more effort to achieve them, an awareness that arises from their understanding of how knowledge is structured and shared within the organization.[3]

Nurses who experience a higher level of clinical belongingness demonstrate stronger competencies at the individual, group, and organizational levels. They are more deeply engaged in their work and actively utilize the organization's knowledge resources to support personal and professional growth.[5] Clinical belongingness among nurses is defined as the experience of being involved in a system or environment in such a way that one perceives oneself as an integral and valued part of it.[6] Conversely, a diminished sense of belonging can lead to problems such as low self-esteem, anxiety, depression, elevated stress levels, and increased tension in clinical practice.[7]

One emerging approach that seeks to explain the underlying mechanisms of nurses' anxiety, depression, and stress is metacognitive belief theory. Given its successful application across various psychological domains, it is reasonable to suggest that metacognitive interventions may help strengthen nurses' clinical belongingness.[6,8] Metacognitive beliefs, defined as individuals' beliefs about their own thinking processes, play a central role in regulating emotions and shaping nurses' sense of belonging. These beliefs are increasingly recognized as key determinants of mental health, as modifying maladaptive metacognitions can promote psychological well-being, whereas deficits in metacognitive abilities may contribute to impaired functioning, reduced belongingness, and heightened psychological distress.[9]

One of the major challenges faced by organizations today, particularly healthcare institutions, is employee retention.[10] Nurse turnover has become a critical concern in human resource management, as diminished organizational belongingness and subsequent job abandonment pose significant threats to healthcare systems.[11] Given the importance of clinical belongingness among nurses,[12] identifying the factors that influence it is essential for developing effective strategies to address workforce challenges within this profession.[13]

Among these factors, metacognitive beliefs and individual characteristics play an important role. Metacognition refers to an individual's awareness of their own thinking processes and how they acquire knowledge. Nurses who employ metacognitive strategies are better able to plan their approach to clinical situations, select appropriate methods, monitor for errors, and re-evaluate their perspectives to improve outcomes.[11] Skilled nurses use metacognitive beliefs to support professional growth; strengthening these beliefs enhances academic engagement, promotes an internal locus of control, improves performance, and enables nurses to identify problems, assess their actions, and select suitable solutions.[9]

Various methods have been developed to strengthen metacognitive beliefs, including cognitive-behavioral therapy (CBT) and metacognitive therapy (MCT). Another approach aimed at enhancing metacognitive beliefs is the multimodal LEARN method, which integrates multiple dimensions of learning and self-regulation to promote cognitive and emotional development.[12]

The multimodal LEARN intervention uses cognitive and behavioral techniques to address the cognitive, behavioral, and emotional aspects of stress, thereby supporting the modification of metacognitive beliefs.[14] Belongingness is an important factor influencing satisfaction with clinical environments, self-esteem, and self-directed learning.[3] Nurses with a strong sense of belonging tend to place greater value on learning and demonstrate higher motivation to succeed. Conversely, a lack of belongingness may lead to reduced self-esteem and job satisfaction, increased anxiety and depression, elevated stress levels, and greater tension in clinical performance.[7]

One of the most challenging aspects of hospital settings involves the interpersonal relationships between nurses and other healthcare staff. Given the increasing tendency among nurses to leave their positions, fostering a strong sense of belonging has become essential for supporting

their success, retention, and long-term engagement as valuable members of the healthcare workforce. However, this concept remains insufficiently explored within the field of nursing, and available research on nurses' belongingness is still limited.[15]

Considering the critical role of clinical belongingness in enhancing job satisfaction, learning motivation, clinical performance, and psychological well-being, identifying and strengthening the factors that influence it is vital. Despite existing evidence, studies examining the relationship between nurses' belongingness and metacognitive beliefs in hospital environments remain scarce. Furthermore, multimodal interventions such as the LEARN method, which applies cognitive and behavioral strategies to strengthen metacognitive beliefs and reduce cognitive, emotional, and behavioral stress, have not yet been systematically investigated in this context. Therefore, this study aimed to determine the effect of enhancing metacognitive beliefs through the multimodal LEARN intervention on nurses' clinical belongingness.

2 Methods

This quasi-experimental study employed a one-group pretest–posttest design without a control group. The study population included all nurses working in hospitals located in Mahabad city.

The sample size was calculated with a statistical power of 0.80 and a significance level of 0.05, using the designated formula. Variance and mean values were obtained from the previous study by Mousavi et al.[14] and, with the addition of a 10% attrition rate, the final sample size was determined to be 50 participants.

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 (S_1^2 + S_2^2)}{(\mu_1 - \mu_2)^2}$$

The sampling method used in this study was simple random sampling. Participants were selected randomly from a list of nurses who met the inclusion criteria. The inclusion criteria were: holding at least a bachelor's degree in nursing, current employment as a nurse, more than three years of work experience, not participating in other interventions that could enhance cognitive abilities, and not having any diagnosed psychological disorders. The exclusion criteria were absence from more than two sessions and lack of cooperation.

After obtaining the necessary approvals and ensuring ethical compliance, all participants provided written informed consent prior to enrollment. Participants were then randomly selected from a list of nurses working at Imam Khomeini Hospital in Mahabad.

Each participant completed three questionnaires: a demographic and social information form, a metacognition questionnaire, and a belongingness questionnaire. The first instrument collected demographic and social characteristics; the second consisted of the Wells and Cartwright-Hatton Metacognition Questionnaire; and the third assessed clinical belongingness using the Clinical Environment Belongingness Experience Scale.

The Wells and Cartwright-Hatton Metacognition Questionnaire contains 30 items scored on a four-point Likert scale. It includes five subscales:

1. Uncontrollability and Danger (items 1, 4, 6, 7, 9, 11, 14, 15, 18)
2. Positive Beliefs About Worry (items 7, 10, 20, 23, 27, 29)
3. Cognitive Awareness or Meta-Cognition (items 3, 5, 12, 13, 16, 24, 28)
4. Confidence in Memory (items 2, 8, 22, 26, 30)
5. Need to Control Thoughts (items 17, 19, 21, 25)[16]

The validity and reliability of this questionnaire have been supported through factor analysis and by assessing its correlation with the Spielberger Trait Anxiety Inventory, yielding a coefficient of 0.43. Internal consistency, measured by Cronbach's alpha, was 0.91 for the total scale. Subscale reliability coefficients were: Uncontrollability and Danger = 0.87, Positive Beliefs About Worry = 0.86, Cognitive Awareness = 0.81, Confidence in Memory = 0.80, and Need to Control Thoughts = 0.71. In the present study, the version adapted by Shahandeh and Nozarzadeh Arani was used.[17]

Belongingness was measured using the Clinical Environment Belongingness Experience Scale (BES-CPE) developed by Levett-Jones et al.[18] and adapted for use in Iran by Hasanvand et al. This questionnaire consists of 34 items rated on a six-point Likert scale ranging from one ("Never") to six ("Always"), with higher scores indicating a stronger sense of belonging. The instrument includes three subscales: self-esteem, connectedness, and efficacy. The total BES-CPE score ranges from 34 to 204, representing the nurse's level of belongingness in the clinical environment. Scores are interpreted as follows: low (34–90) indicates feelings of detachment and weak belonging; moderate (91–150) reflects relative engagement and participation in the clinical environment; and high (151–204) indicates a strong sense of belonging, full integration, and active participation in clinical processes.[19]

Content validity indices for all items exceeded 0.87, and the scale's average content validity index was 0.92. The modified Kappa value for all items was above 0.74. Reliability testing demonstrated a Cronbach's alpha of 0.92 for the total scale and above 0.80 for all subscales.[19]

The multimodal LEARN protocol was implemented to enhance metacognitive beliefs. This intervention consisted of ten one-hour sessions covering the following components: introduction and course familiarization; stress control and lifestyle strategies; principles versus techniques; understanding stress; awareness of stress-

response systems and the importance of physical activity; tension reduction and time management; assertiveness; strengthening resilience in stressful environments; and a final session for review and summary (Table 1).

Table 1 Session titles and contents of the multimodal LEARN intervention

Session	Title	Content
Session 1	Introduction and course familiarization	- Statement of objectives - Importance of stress management - Appropriate timing for beginning the program - Discussion of motivation and commitment - Identifying costs and benefits
Session 2	Stress control approach and lifestyle	- Introduction to the learn program - Lifestyle change and improvement - Mental imagery - Importance of self-monitoring - Daily stress recording - Identifying behavioral and emotional patterns
Session 3	Principles vs. techniques	- Recognizing common signs of stress - Setting realistic goals - Developing constructive attitudes
Session 4	Understanding stress	- Causes of personal stress - Stressful environments - Identifying stressors - Five principles of stress management
Session 5	Awareness of stress-response systems and the importance of physical activity	- Awareness of stress-response systems and the importance of physical activity - Self-talk - Ten characteristics of stressful thoughts - Strategies for managing stressful thoughts
Sessions 6 & 7	Tension relief and time management	- Learning tension-relief techniques - Active vs. passive tension relief - Recognizing physical and emotional tension - Deep muscle relaxation - Time management - Cognitive restructuring
Session 8	Assertiveness	- Time management and prioritization - Further development of logical thinking - Introduction to assertiveness skills
Session 9	Strengthening resilience in a stressful environment	- Challenging life events - Coping with changes - Preventing stress relapse - Regaining a sense of control
Session 10	Review and summary	- Focusing on personal achievements - Interpreting progress - Setting and achieving realistic goals - Consolidating habits - Continuing self-monitoring

Following completion of the questionnaires and coordination with participants, the LEARN intervention was delivered across 10 educational sessions to strengthen metacognitive beliefs. Each session included a 20-minute lecture followed by a group discussion in which participants' questions were addressed. One week after the intervention concluded, the metacognition and belongingness questionnaires were re-administered. The collected data were entered into SPSS version 22 for analysis. Descriptive statistics were used to summarize the data, and inferential statistics included the Kolmogorov–Smirnov test, paired t-test, ANOVA, and independent t-test.

3 Results

The findings showed that the largest proportion of participants worked in the Intensive Care Unit (33.3%). Most participants were female (66.7%), while 33.3% were male. Regarding age, 4.2% of participants were under 25 years old, and the largest group (37.5%) was aged 36–45 years. Regarding marital status, 73% of the nurses were married, and 27% (n = 13) were single. With respect to education, most nurses held a bachelor's degree (75%), while 25% had a master's degree. Analysis of work experience indicated that 37.5% of participants had 18–24 years of experience, and 12.5% had more than 25 years of experience. The income distribution showed that the majority of nurses (87.5%) reported earning less than their expenses. Additionally, most participants (75%) were employed as formal employees (Table 2).

Table 2 Demographic and professional characteristics of the participants

Variable	Category	Frequency	Percentage (%)
Gender	Female	32	66.7
	Male	16	33.3
Age	< 25 years	2	4.2
	25–35 years	13	27.1
	36–45 years	18	37.5
	≥ 4 6 years	15	31.2
Marital status	Married	35	73
	Single	13	27
Education	Bachelor's degree	36	75
	Master's degree	12	25
Work Experience in Nursing	3–10 years	16	33.3
	11–17 years	8	16.7
	18–24 years	18	37.5
	≥ 25 years	6	12.5
Income	Less than expenses	42	87.5
	Equal to expenses	6	12.5
Specialty/field	None	38	79.2
	Internal surgery	7	14.6
	Intensive care	3	6.2
Employment status	Contractual	2	4.2
	Temporary (tarh)	3	6.2
	Project-based (Peymani)	7	14.6
	Formal employee	36	75
Bachelor's university	Mahabad	35	72.9
	Urmia	12	25
	Kurdistan	1	2.1
Workplace/department	Internal medicine	15	31.3
	Surgery	10	20.8
	Intensive care	16	33.3
	Emergency	5	10.4
	Pediatrics	2	4.2

The data distribution was initially assessed using the Kolmogorov–Smirnov test. The results indicated that the dimensions of belongingness before the intervention and metacognitive beliefs after the intervention were normally distributed ($p > 0.05$), whereas metacognitive beliefs before the intervention and belongingness after the intervention were not normally distributed ($p < 0.05$). For the variables that did not follow a normal distribution, skewness and kurtosis were further examined. Since the absolute values of skewness and kurtosis were all less than 2, these variables were considered approximately normal. Detailed results are presented in Table 3.

Table 3 Assessment of data normality for study variables

Assessment Time	Variable	P-value (Kolmogorov–Smirnov)	Skewness	Kurtosis
Before Intervention	Metacognitive beliefs	0.026	0.04	1.02
	Belongingness	0.200	0.59	0.30
After Intervention	Metacognitive beliefs	0.200	0.12	0.21
	Belongingness	0.002	0.14	1.23

The results of the paired t-test indicated that the mean metacognitive beliefs score after the multimodal LEARN training was significantly higher than the mean score before the training ($p = 0.001$). These findings suggest that the intervention had a significant effect on enhancing metacognitive beliefs (Table 4).

Table 4 Comparison of metacognitive beliefs scores before and after the multimodal LEARN intervention

Variable		Mean	Standard deviation	Significance
Metacognitive beliefs	Pretest	2.58	0.4311	t = 3.439
				df = 47
	Posttest	2.86	0.3587	p = 0.001

To examine the effect of enhancing metacognitive beliefs through the multimodal LEARN method on clinical belongingness, a paired t-test was performed. Before the analysis, the assumption of normality was verified.

The results showed that the mean clinical belongingness score after the intervention was significantly higher than before the program ($p = 0.006$). These findings indicate that the intervention significantly increased nurses' clinical belongingness. In other words, training to strengthen metacognitive beliefs using the multimodal LEARN method significantly improved nurses' sense of belonging in the clinical environment (Table 5).

Table 5 Comparison of clinical belongingness scores before and after the multimodal LEARN intervention

Variable		Mean	Standard deviation	Significance
Clinical belongingness	Pretest	3.60	0.3540	t = 2.889
				df = 47
	Posttest	3.81	0.3453	p = 0.006

4 Discussion

The present study aimed to examine the effect of training designed to enhance metacognitive beliefs through the multimodal LEARN method on nurses' clinical belongingness. The results demonstrated that this training led to a significant increase in nurses' metacognitive beliefs. This finding is reasonable, as the nursing profession is inherently stressful, and chronic stress can contribute to the development of negative metacognitive beliefs. Such beliefs shape nurses' attention, information processing, and evaluations, thereby influencing strategies for regulating thoughts and emotions. Accordingly, multimodal LEARN training, by providing effective stress-management strategies, can reduce negative beliefs and strengthen nurses' cognitive abilities. These results are consistent with the findings of Mousavi et al.[14] and Jafari.[9] Furthermore, the intervention had a significant impact on nurses' clinical belongingness. Nurses' cognitive abilities, particularly in information processing and clinical decision-making, play a critical role in delivering effective care. Training aimed at enhancing metacognitive beliefs can foster more positive attitudes and improve awareness related to pain management and patient care, ultimately contributing to higher levels of clinical belongingness. This finding aligns with previous studies by Li et al.[3] Ching et al.[20] Shahmohamadi et al.[21] and Mousavi et al.[14]

Regarding the findings, positive metacognitive beliefs help nurses manage their thoughts and emotions more flexibly, thereby reducing adverse reactions to stressful situations. In other words, when nurses are able to identify and correct inaccurate or negative thoughts, their ability to communicate effectively with patients and other healthcare team members improves, ultimately enhancing their sense of belonging in the workplace. This finding aligns with metacognitive theories, which propose that an individual's thinking style and cognitive evaluations play a crucial role in behavior and clinical performance. It also suggests that targeted educational interventions can simultaneously strengthen nurses' cognitive skills and improve their professional interactions.

The main limitation of this study was the absence of a control group. Additionally, the sample size was relatively small, and approximately 10% of participants withdrew. The use of self-report instruments and the cross-sectional design are additional limitations. Therefore, future

studies should explore other approaches for enhancing metacognitive beliefs. Moreover, because the educational groups in this study had contact with each other, future research should include sampling from multiple centers to minimize the risk of program contamination. Finally, the posttest assessment was conducted only one week after the intervention; thus, future studies are encouraged to incorporate follow-up assessments at one week, one month, and six months post-intervention to examine long-term effects.

5 Conclusion

The results of this study indicate that focused training aimed at enhancing metacognitive beliefs can strengthen nurses' positive beliefs, reduce negative beliefs, and consequently improve their clinical performance and sense of belonging. The multimodal LEARN method, by reducing stress and enhancing cognitive skills, is an effective approach to promoting nurses' mental health and professional competence. The findings of this study can provide a valuable informational and statistical resource for healthcare managers in planning mental health programs and designing educational and care interventions in clinical settings. They also offer a solid foundation for future research on the effectiveness of interventions related to belongingness and metacognitive beliefs.

Declarations

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No artificial intelligence tools were used in the preparation of this manuscript.

Authors' Contributions
In this study, the authors participated in the initial ideation of the study design, data collection, and drafting of the article. All authors have read and approved the final version.

Availability of Data and Materials
The data used in this study are available upon request from the corresponding author.

Conflict of Interest
The authors declare that they have no conflicts of interest regarding the publication of this article.

Consent for Publication
Not applicable.

Ethical Considerations
This study was approved by the Research Council and the Regional Ethics Committee for Medical Research at Urmia University of Medical Sciences, with the Code of Ethics IR.UMSU.REC.1403.255.

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