



Association of Nursing Competence and Family Participation with Self-Management Behaviors in Post-Stroke Patients: A Cross-Sectional Study

Azam Jahanbakhsh¹, Mohammad Ali Mohammadi¹, Behrouz Dadkhah^{1,*}

¹ Medical-Surgical Nursing, Ardabil University of Medical Sciences, Ardabil, Iran

*Corresponding Author: Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Ardabil University of Medical Sciences, Ardabil, Iran. Email: behrouz.dadkhah@gmail.com

Received: 29 May, 2026; Revised: 28 August, 2026; Accepted: 2 September, 2026

Abstract

Background: Despite the importance of self-management in preventing post-stroke complications, the combined association of nursing care competence and family collaborative care with self-management behaviors has not been fully investigated.

Objectives: This study aimed to examine the associations between nursing competence and family participation and self-management behaviors among patients after stroke.

Methods: This descriptive, correlational, cross-sectional study was conducted from April 2025 to April 2026 at Alavi Educational and Medical Center in Ardabil, Iran. The study included 71 nurses recruited using census sampling and 306 discharged stroke patients and their primary family caregivers selected using random sampling. Data were collected using the Stroke Care Competence Questionnaire, Family Collaborative Care Questionnaire, and Stroke Self-Management Behaviors Questionnaire. Independent-samples t tests, analysis of variance, Pearson correlation, and linear regression analyses were performed using SPSS version 27.0.

Results: Most nurses (83.1%) reported a moderate level of nursing competence, and most caregivers (63.1%) reported a moderate level of family collaborative care. Family collaborative care was positively correlated with patient self-management ($r = 0.22$, $P = 0.001$). In the adjusted multiple linear regression model, family collaborative care was the strongest positive predictor of self-management ($\beta = 0.630$, $P < 0.001$), and nursing competence was also independently and positively associated with self-management ($\beta = 0.222$, $P = 0.027$). The model explained 63.3% of the variance in self-management ($R^2 = 0.633$). In the family-participation dimension model, monitoring health status was the strongest predictor ($\beta = 0.25$, $P = 0.001$). Nursing competence scores were significantly higher among nurses with a master's degree and those working in intensive care units ($P = 0.001$).

Conclusions: Family collaborative care and nursing competence were both positively associated with post-stroke self-management, with family collaborative care demonstrating the stronger association. Family-centered transitional care strategies that strengthen caregiver involvement while supporting nurses' competencies in patient and caregiver education may help improve self-management after discharge.

Keywords: Care, Competence, Family, Self-management, Stroke, Nursing

1. Background

Stroke remains a major cause of long-term disability and the second leading cause of death worldwide,

imposing a substantial socioeconomic burden on patients and health care systems (1-4). After the acute phase, sustained recovery depends substantially on patients' self-management practices (5, 6). Self-management is an active process in which patients manage medication adherence,

lifestyle changes, and psychosocial effects to reduce the risk of recurrent stroke and improve quality of life (7-9).

Achieving optimal self-management after hospital discharge remains challenging for many patients (10, 11). Current nursing models suggest that successful self-management depends on 2 fundamental pillars: the professional competence of nursing personnel and family collaborative care (12, 13). Nurses, as key members of the health care team, require clinical, educational, and communication competencies to initiate and support patient empowerment (14-17). McCarthy et al. emphasized that active family participation can facilitate the transition from clinical supervision to home-based independence (18-21).

Evidence regarding the combined associations of these factors with patient outcomes remains limited because many studies have examined them separately (22). Wang et al. (23) also highlighted the importance of family care in relation to self-management after stroke. In addition, predictive models of stroke self-management have emphasized multiple behavioral and contextual determinants (24). In the Iranian cultural and health care context, where family involvement is common, understanding these relationships may inform the development of more integrated rehabilitation programs (25).

2. Objectives

This study aimed to examine the associations of nursing competence and family participation with self-management behaviors among patients after stroke.

3. Methods

3.1. Study Design and Setting

This cross-sectional, descriptive-correlational study was conducted from April 2025 to April 2026 at Alavi Educational and Medical Center, a teaching hospital in Ardabil, Iran. The study setting included the Emergency Department, Intensive Care Unit (ICU), and Neurology Department. Participants included eligible nurses working in these units, discharged patients with stroke who had received care at the center, and their primary family caregivers.

3.2. Sample Size and Sampling

The sample size for patients and caregivers was determined using the correlation formula:

$$n = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2 \times (1 - r^2)}{r^2} + 3$$

The calculation was based on a pilot correlation coefficient of $r = 0.205$ between family participation and self-management. The pilot study involved a small group of eligible stroke patient-caregiver dyads with characteristics similar to those of the main study population and was conducted to provide a preliminary estimate for sample size determination. To improve precision and reduce the risk of type I error in this clinically important population, a 99% confidence level and 80% statistical power were used. Based on these assumptions, the minimum required sample size was estimated at 278 participants. After allowing for 10% attrition, 306 participants were recruited.

Patients were selected from the Hospital Information System medical records using a random-number table. Because the study involved patient-caregiver dyads, each enrolled patient was paired with a primary family caregiver, yielding 306 matched patient-caregiver dyads. Nurses ($n = 71$) were recruited using a census approach.

3.3. Inclusion and Exclusion Criteria

Patients were eligible if they were aged 18 years or older, had a confirmed clinical diagnosis of stroke, had been discharged from Alavi Educational and Medical Center, and were available for follow-up exactly 1 month after discharge. Written informed consent was also required. Patients were excluded if they had preexisting psychiatric disorders, incomprehensible speech, or uncorrectable hearing loss.

Primary family caregivers, including spouses, children, siblings, or parents, were eligible if they were aged 18 years or older and directly involved in the patient's care. Caregivers were excluded if they were simultaneously providing care for another patient.

Eligible nurses had at least 3 months of professional clinical experience in stroke care and provided written informed consent. Questionnaires with substantial missing data and cases in which participants withdrew from the study were excluded from the final analysis.

3.4. Data Collection and Instruments

The data collection instruments comprised 6 sections: 3 sociodemographic questionnaires designed separately for nurses (12 items), family caregivers (14 items), and patients (18 items), and 3 standardized study instruments. The nurse questionnaire included variables such as age, sex, marital status, education level, work experience, and ward of service. The caregiver questionnaire included age, sex, marital status, education level, relationship to the patient,

and employment status. The patient questionnaire included age, sex, marital status, education level, type of stroke, and disease-related characteristics.

Data collection procedures differed by participant group. Nurses completed questionnaires in person at Alavi Educational and Medical Center. Data from patients with stroke and their primary family caregivers were collected through telephone interviews conducted at least 1 month after the patient's discharge. A total of 306 patients and 306 primary family caregivers participated. Each interview lasted approximately 15 minutes and was conducted first with the primary caregiver and then with the patient.

The Stroke Care Competence Questionnaire (SCCQ) is a 41-item instrument developed by Kipinä et al. (26) to assess nurses' competence in stroke care. Items are rated on a 5-point Likert scale from 1 (poor) to 5 (excellent), with higher scores indicating greater competence. The SCCQ comprises 4 domains: 1) counseling and interaction (19 items), 2) evidence-based practice (8 items), 3) self-management and development (8 items), and 4) interdisciplinary collaboration (6 items). In the original study, Cronbach α coefficients ranged from 0.89 to 0.96 across the 4 domains. In the present study, the SCCQ demonstrated excellent internal consistency (Cronbach α = 0.97). The Persian version was prepared using forward-backward translation, and its face and content validity were confirmed by 10 faculty members in nursing and public health using the Waltz and Bausell method (content validity index [CVI] = 0.96, content validity ratio [CVR] = 0.88). For interpretation, the midpoint score was calculated using the formula (maximum - minimum)/2 + minimum.

The Family Collaborative Care Questionnaire is a 10-item instrument developed by Suwanno et al. (2023). It uses a 5-point Likert scale from 1 (not sure) to 5 (completely sure), with higher scores indicating greater family participation in collaborative care. The instrument consists of 6 dimensions: care for stabilization, continuity of follow-up, monitoring, detecting health changes, persistence in finding solutions, and symptom-relief evaluation. In the original study, internal consistency was reported as McDonald's ω = 0.87. In the present study, internal consistency was high (McDonald's ω = 0.91). The Persian version was prepared using forward-backward translation, and its face and content validity were confirmed by 10 faculty members in nursing and public health using the Waltz and Bausell method (CVI = 0.94, CVR = 0.84). For interpretation, the midpoint score was calculated using the formula (maximum - minimum)/2 + minimum.

The Stroke Self-Management Behaviors Questionnaire, developed by Lo et al. (27), is a 9-item instrument scored on a 10-point scale from 0 (very dissatisfied) to 10 (very

satisfied), with higher scores indicating better self-management behaviors. It includes 2 domains: medical management (3 items) and psychosocial management (6 items). In the original study, Cronbach α coefficients ranged from 0.65 to 0.88 across the subscales. In the present study, the instrument showed acceptable internal consistency (Cronbach α = 0.87). The Persian version was prepared using forward-backward translation, and its face and content validity were confirmed by 10 faculty members in nursing and public health using the Waltz and Bausell method (CVI = 0.96, CVR = 0.85). For interpretation, the midpoint score was calculated using the formula (maximum - minimum)/2 + minimum.

3.5. Statistical Analysis

Data were analyzed using SPSS version 27.0 (IBM Corp, Armonk, NY, USA). Descriptive statistics, including means and standard deviations (SDs), were used to summarize baseline clinical and demographic characteristics and the main study variables. Inferential analyses included one-sample *t* tests, independent-samples *t* tests, analysis of variance (ANOVA), and Pearson correlation coefficients.

Multiple linear regression analysis was used to evaluate the independent predictive capacity of family-participation subdimensions for self-management behaviors among post-stroke patients. Before conducting parametric tests and regression analyses, statistical assumptions were assessed. Normality was evaluated using the Kolmogorov-Smirnov test. Homoscedasticity and independence of residuals were assessed using residual plots and the Durbin-Watson statistic, respectively. Multicollinearity was assessed using the variance inflation factor (VIF), and all values were below the critical threshold of 10. Overall model effect size was evaluated using the coefficient of determination (R^2), and 95% confidence intervals (CIs) were calculated for unstandardized regression coefficients (B). Statistical significance was set a priori at $P < 0.05$.

3.6. Ethical Considerations

The study was approved by the Ethics Committee of Ardabil University of Medical Sciences (IR.ARUMS.REC.1404.007). Participant anonymity and the right to withdraw were protected, and written informed consent was obtained from all participants.

4. Results

This study included 306 patients with stroke, 306 family caregivers, and 71 nurses. Findings are presented for participant characteristics, the primary study variables, and the predictive relationships among the variables.

4.1. Sociodemographic Characteristics of Participants

A total of 306 patients with stroke, 71 nurses, and 306 family caregivers participated. Table 1 summarizes the demographic characteristics of the three groups. Most patients were male (53.6%), whereas most nurses (81.7%) and caregivers (63.4%) were female. The mean ages of nurses, caregivers, and patients were 35.80 ± 7.77 , 46.32 ± 13.16 , and 63.62 ± 13.00 years, respectively. In all groups, most participants were married and lived in urban areas.

Among caregivers, 96.7% had received training from medical staff, and 48% were the patients' children. Among patients, 64.4% had at least 1 comorbidity, and 94.4% were experiencing their first stroke. The most commonly reported functional impairment was maintaining body position (46.1%). Additional demographic and professional characteristics are presented in Table 1.

4.2. Status of the Main Study Variables

As shown in Table 2, nursing care competence and family collaborative care were at moderate levels, whereas patients with stroke reported a high level of self-management. Mean scores for all three variables were significantly higher than their theoretical midpoints ($P < 0.001$).

4.3. Nursing Competence According to Professional Characteristics

Nursing care competence differed significantly by education level (Table 3). The mean competence score was significantly higher among nurses with a Master's degree than among those with a Bachelor's degree (157.25 ± 17.26 vs 141.31 ± 25.21 , $P = 0.001$).

Clinical unit was also significantly associated with nursing competence. Nurses working in the ICU had the highest competence scores (157.83 ± 26.75) compared with those working in the Emergency Department (128.72 ± 20.63) and the Neurology Department (140.87 ± 20.78) ($P = 0.001$). Nurses who had attended stroke-specific workshops had higher competence scores than those who had not (144.26 ± 24.61 vs 138.44 ± 25.80), but the difference was not statistically significant ($P = 0.35$). Years of work experience were not significantly correlated with nursing competence ($r = 0.16$, $P = 0.16$).

4.4. Associations of Demographic and Clinical Characteristics with Study Variables

As shown in Table 4, patient self-management was significantly associated with educational attainment and marital status. Patients with higher educational attainment had significantly higher self-management

scores than those with lower educational attainment ($P < 0.01$). Married participants also had higher self-management scores than single or otherwise unmarried participants ($P < 0.01$). Patients with recurrent stroke had lower self-management scores than those experiencing a first stroke ($P < 0.01$). These variables were examined in bivariate analyses and should not be interpreted as independent predictors.

4.5. Predictors of Patient Self-Management

To evaluate the extent to which family participation predicted post-stroke self-management, a multiple linear regression analysis was performed (Table 5). The overall model was statistically significant ($F = 15.71$, $P = 0.001$) and explained 8.0% of the variance in self-management behaviors ($R^2 = 0.08$).

Among the dimensions of family participation, monitoring health status was the strongest predictor of patient self-management ($\beta = 0.25$, $P = 0.001$; 95% CI, 0.98 - 2.46), followed by continuity of follow-up ($\beta = 0.24$, $P = 0.001$; 95% CI, 1.02 - 2.54). Care for stabilization also showed a significant positive association with self-management ($\beta = 0.14$, $P = 0.01$; 95% CI, 0.41 - 3.39). The overall family collaborative care score remained a significant predictor ($\beta = 0.22$, $P = 0.001$; 95% CI, 0.21 - 0.57). These findings indicate that greater family participation, particularly in monitoring health status and maintaining continuity of follow-up, was associated with better self-management after stroke.

A second multiple linear regression model examined the associations of nursing competence and family collaborative care with post-stroke self-management (Table 6). The model was statistically significant ($F(2, 68) = 58.707$, $P < 0.001$) and explained 63.3% of the variance in self-management ($R^2 = 0.633$; adjusted $R^2 = 0.622$). Family collaborative care had the largest standardized coefficient ($\beta = 0.630$, $P < 0.001$), and nursing competence was also independently and positively associated with self-management ($\beta = 0.222$, $P = 0.027$).

5. Discussion

The present study examined the associations of nursing care competence and family collaborative care with self-management behaviors among patients after discharge for stroke. In the adjusted model, both family collaborative care and nursing competence were independently and positively associated with self-management, with family collaborative care showing a stronger association.

The stronger association between family collaborative care and self-management may reflect the transition from a structured inpatient environment to a less controlled

Table 1. Sociodemographic Characteristics of Nurses, Discharged Patients with Stroke, and Family Caregivers ^a

Variables	Nurses (n = 71)	Patients (n = 306)	Caregivers (n = 306)
Gender			
Male	13 (18.3)	164 (53.6)	112 (36.6)
Female	58 (81.7)	142 (46.4)	194 (63.4)
Marital Status			
Married	44 (62.0)	254 (83.0)	244 (79.7)
Single/Other	27 (38.0)	52 (17.0)	62 (20.3)
Residence			
Urban	-	281 (91.8)	282 (92.2)
Rural	-	25 (8.2)	24 (7.8)
Education			
University	71 (100)	82 (26.8)	150 (49.0)
Non-university	-	224 (73.2)	156 (51.0)
Employment			
Employed	71 (100)	107 (34.9)	128 (41.8)
Retired/Homemaker	-	199 (65.1)	178 (58.2)
Comorbidity			
Yes	-	197 (64.4)	97 (31.7)
No	-	109 (35.6)	209 (68.3)
Age (y)	35.80 ± 7.77	63.62 ± 13.00	46.32 ± 13.16

^a Values are expressed as No. (%) or mean ± SD.

Table 2. Descriptive Statistics and One-Sample T Test Results for the Main Variables

Variables	Mean ± SD	Score Range	Test-Value	t-Value	P-Value	Status
Nursing competence	142.21 ± 25.01	41 - 205	123	11.72	< 0.001	Moderate
Family participation	39.34 ± 5.39	10 - 50	30	19.05	< 0.001	Moderate
Self-management	65.68 ± 9.58	0 - 90	45	43.01	< 0.001	High

home setting. Nursing competence is primarily expressed during hospital-based care, whereas post-stroke self-management is a sustained, context-sensitive behavioral process after discharge. Family members may therefore exert a more immediate influence on daily disease-management practices. Although nursing competence also showed an independent positive association, its contribution may be expressed partly through caregiver preparation, communication, discharge education, and the transfer of practical care-related knowledge. Because this study was cross-sectional and did not include mediation analysis, causal or mediated pathways cannot be inferred.

Post-stroke self-management is also likely to be influenced by determinants beyond family collaborative care and nursing competence, including baseline cognitive status, neurological impairment severity, socioeconomic conditions, and psychological resilience. Accordingly, family collaborative care should be regarded as an

important supportive factor rather than the sole determinant of long-term self-management capacity.

5.1. Nursing Competence

Most nurses reported a moderate level of nursing competence, with the mean score significantly above the theoretical midpoint. This finding suggests that the nurses had basic competencies for stroke care but had not reached the highest level of competence. Ali and Khalifa (28) reported moderate professional competency among staff nurses. Hui et al. (29) likewise reported moderate nursing competence in the context of the COVID-19 outbreak. In contrast, Kolagari et al. (30) reported high clinical competence among ICU nurses, and Elhami et al. (31) reported a high mean level of clinical competence.

Nurses with a Master's degree and those working in specialized units, particularly ICUs, reported higher competence. This finding underscores the potential

Table 3. Comparison of Nursing Care Competence According to Professional Characteristics (N = 71)

Professional Variable	Mean $\pm$ SD	Test Value	P-Value
Gender		t = 0.34	0.73
Male	144.38 $\pm$ 18.54		
Female	141.72 $\pm$ 26.35		
Marital status		t = 0.20	0.84
Married	142.65 $\pm$ 26.22		
Single	141.48 $\pm$ 23.38		
Education level		t = -2.31	0.001
Bachelor's degree	141.31 $\pm$ 25.21		
Master's degree	157.25 $\pm$ 17.26		
Clinical unit		F = 8.12	0.001
Emergency	128.72 $\pm$ 20.63		
Neurology (male/female)	140.87 $\pm$ 20.78		
Intensive Care Unit (ICU)	157.83 $\pm$ 26.75		
Employment status		F = 0.52	0.67
Permanent	143.11 $\pm$ 24.54		
Contractual/Others	139.42 $\pm$ 24.64		
Stroke workshop		t = 0.94	0.35
Attended	144.26 $\pm$ 24.61		
Not attended	138.44 $\pm$ 25.80		
Work experience (y)	r = 0.16	-	0.16

Table 4. Relationship of Demographic and Clinical Characteristics with the Main Variables (N = 306)^a

Variables	Family Participation	P-Value	Patient Self-Management	P-Value
Marital status		0.34		< 0.01
Married	39.20 $\pm$ 5.41		71.82 $\pm$ 10.22	
Single/Other	39.91 $\pm$ 5.28		62.14 $\pm$ 9.08	
Education (patient)		0.001		< 0.01
Illiterate/Elementary	37.45 $\pm$ 4.90		64.45 $\pm$ 8.90	
Academic (higher education)	41.50 $\pm$ 5.20		72.60 $\pm$ 5.06	
Stroke frequency		-		< 0.01
First time	-		71.10 $\pm$ 9.20	
Recurrent	-		63.50 $\pm$ 10.15	
Self-rated health		0.15		< 0.01
Good	39.54 $\pm$ 5.51		73.15 $\pm$ 8.40	
Fair/Poor	38.65 $\pm$ 5.43		62.40 $\pm$ 9.80	
Comorbidity		0.001		< 0.01
No	40.04 $\pm$ 5.17		72.90 $\pm$ 8.50	
Yes	36.34 $\pm$ 5.30		65.50 $\pm$ 10.10	
Relationship		0.001		-
Spouse	39.71 $\pm$ 4.99		-	
Others (child/etc)	35.58 $\pm$ 6.45		-	

^a Values are expressed as mean $\pm$ SD.

importance of advanced education and experience in complex clinical settings. Naga et al. (32) reported improved nurses' knowledge, skills, and attitudes

following a competency-based stroke-care program. Kalani et al. (33) examined clinical competence among ICU nurses,

Table 5. Multiple Linear Regression Analysis of Family-Participation Dimensions Predicting Post-Stroke Patient Self-Management Behaviors ^a

Predictor Variables	B	SE	β	t	P-Value	95% CI [Lower, Upper]
Family collaborative care (total)	0.39	0.09	0.22	3.96	0.001	[0.21, 0.57]
Care for stabilization	1.90	0.76	0.14	2.50	0.01	[0.41, 3.39]
Continuity of follow-up	1.78	0.39	0.24	4.48	0.001	[1.02, 2.54]
Monitoring health status	1.72	0.38	0.25	4.52	0.001	[0.98, 2.46]

^a Model summary: $r = 0.22$ (total care); $R^2 = 0.08$; $F = 15.71$; $P = 0.001$.

Table 6. Multiple Linear Regression Model for Post-Stroke Self-Management Behaviors Including Nursing Competence ^a

Predictor Variables	B	SE	β	t	P-Value	95% CI [Lower, Upper]
Nursing competence	0.102	0.045	0.222	2.262	0.027	[0.012, 0.193]
Family collaborative care	0.769	0.120	0.630	6.409	< 0.001	[0.530, 1.009]
Constant	7.381	2.273	—	3.247	0.002	[2.846, 11.917]

^a Model summary: $r = 0.796$; $R^2 = 0.633$; adjusted $R^2 = 0.622$; $F(2, 68) = 58.707$; $P < 0.001$.

and Osman et al. (34) reported an association between nurses' competencies and quality of care in ICUs.

5.2. Family Collaborative Care and Self-Management

Although nursing competence was independently associated with self-management, family collaborative care showed the stronger association. Wang et al. (23) reported a positive relationship between family care and self-management behavior among older adults hospitalized for stroke, supporting the importance of psychosocial support and health education.

Most caregivers in the present study had moderate levels of participation. This finding is consistent with McCarthy et al. (18), who described family members' experiences of supporting self-management after stroke. Moderate family participation in discharge planning has also been reported by Almborg et al. (35), whereas Haley et al. (36) documented substantial caregiver engagement in stroke care. Differences among studies may reflect variation in cultural context and definitions of participation.

Higher caregiver education, being a spouse, being retired, and the absence of comorbidities were associated with greater family participation. This finding highlights the importance of caregiver availability and health status and is partly consistent with Septianingrum et al. (37), who identified factors associated with family caregiver readiness after hospital discharge.

Specific domains of family collaborative care significantly predicted post-stroke self-management.

Monitoring health status was the strongest predictor, followed by continuity of follow-up, while care for stabilization also showed a significant positive association. These findings indicate that families may support self-management through medication adherence, symptom monitoring, management of complications, and fall prevention. Systematic health monitoring and continuous caregiver follow-up may therefore be particularly important for sustaining self-management at home. These findings are conceptually consistent with reports by Wang et al. (23) and Risal et al. (38), which emphasized positive relationships between family engagement and patient outcomes.

Most patients with stroke demonstrated high levels of self-management. This may reflect family support and hospital-based education. Vemuri et al. (39) reported high self-management among a substantial proportion of stroke survivors, and Chen et al. (40) found that patient knowledge and family support were associated with self-management behaviors. Conversely, Wang et al. (23) reported more moderate self-management levels, which may reflect differences in timing and available resources. In the present study, higher education and being married were associated with better self-management. Similar associations between education, socioeconomic factors, marital support, and rehabilitation outcomes have been reported elsewhere (15, 39).

5.3. Study Limitations

Several limitations should be acknowledged. First, although both nursing competence and family

collaborative care were independently associated with self-management in the adjusted model, the cross-sectional design does not establish temporal or causal relationships. Family collaborative care showed the stronger standardized association, but the relative contributions of these factors should be confirmed in longitudinal studies.

Second, the study did not use mediation analysis, such as structural equation modeling, to test whether nursing competence may influence patient outcomes indirectly through caregiver empowerment. Any discussion of indirect pathways therefore remains theoretical and requires empirical validation.

Third, data collection methods differed across participant groups: nurse data were collected in person, whereas patient and caregiver data were obtained through telephone interviews. This difference, together with reliance on self-report measures, may introduce response bias or social desirability bias. Finally, the cross-sectional design and recruitment from a single center limit causal inference and generalizability. Future longitudinal studies using robust mediation models are recommended.

5.4. Recommendations

Nursing managers should consider specialized family-centered care training to strengthen nurses' ability to empower family support systems. Future studies should examine the direct and indirect roles of both nursing competence and family participation in patient self-management using analytical approaches such as structural equation modeling or hierarchical regression. Longitudinal studies are also needed to assess the temporal stability of self-management practices, and qualitative research may help identify sociocultural factors that facilitate or hinder family participation in post-stroke care.

5.5. Conclusions

Post-stroke self-management was positively associated with both family collaborative care and nursing competence, although family collaborative care showed the stronger association in the adjusted model. Monitoring health status was the strongest family-participation dimension associated with self-management. Interventions should therefore emphasize caregiver training in health-status monitoring, continuity of follow-up, and stabilization-related care, while also strengthening nurses' education and communication competencies during the transition from hospital to home.

These findings should be interpreted in light of differences in data-collection methods. Face-to-face data collection for nurses and telephone interviews for patients and caregivers may have affected response depth or quality.

Future studies should use more standardized data-collection procedures to reduce potential bias and further evaluate these associations.

Footnotes

AI Use Disclosure: Gemini (Google) and GapGPT, powered by OpenAI's GPT-5.6 model were used for translation in the introduction section at a Minor level.

Authors' Contribution: A. J.: Data collection, literature review, and manuscript drafting; M. M.: Study design, statistical analysis, and critical manuscript review; B. D.: Study conception and design, research supervision, interpretation of results, and final approval of the manuscript. All authors reviewed and approved the final version of the manuscript.

Conflict of Interests Statement: The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Ethical Approval: This study was approved by the Ethics Committee of Ardabil University of Medical Sciences with the ethics code IR.ARUMS.REC.1404.007. All participants provided informed consent before participation.

Funding/Support: This study was supported by the Ardabil University of Medical Sciences.

Informed Consent: All participants provided informed consent before participation.

References

1. Sakakibara BM, Kim AJ, Eng JJ. A systematic review and meta-analysis on self-management for improving risk factor control in stroke patients. *Int J Behav Med*. 2017;**24**(1):42-53. [PubMed ID: 27469998]. [PubMed Central ID: PMC5762183]. <https://doi.org/10.1007/s12529-016-9582-7>.
2. Jones F, Riazi A. Self-efficacy and self-management after stroke: a systematic review. *Disabil Rehabil*. 2011;**33**(10):797-810. [PubMed ID: 20795919]. <https://doi.org/10.3109/09638288.2010.511415>.
3. Sun X, Li X. Editorial: Aging and chronic disease: public health challenge and education reform. *Front Public Health*. 2023;**11**:1175898. [PubMed ID: 37228734]. [PubMed Central ID: PMC10203579]. <https://doi.org/10.3389/fpubh.2023.1175898>.
4. Walter K. What is acute ischemic stroke? *JAMA*. 2022;**327**(9):885. [PubMed ID: 35230392]. <https://doi.org/10.1001/jama.2022.1420>.
5. Hirtz D, Thurman DJ, Gwinn-Hardy K, Mohamed M, Chaudhuri AR, Zalutsky R. How common are the "common" neurologic disorders? *Neurology*. 2007;**68**(5):326-337. [PubMed ID: 17261678]. <https://doi.org/10.1212/01.wnl.0000252807.38124.a3>.

6. Ningrum DNA, Kung WM. Challenges and perspectives of neurological disorders. *Brain Sci.* 2023;**13**(4):676. [PubMed ID: 37190641]. [PubMed Central ID: PMC10136594]. <https://doi.org/10.3390/brainsci13040676>.
7. Mitchell AJ, Kemp S, Benito-León J, Reuber M. The influence of cognitive impairment on health-related quality of life in neurological disease. *Acta Neurol Scand.* 2010;**22**(1):2-13. <https://doi.org/10.1111/j.1601-5215.2009.00439.x>.
8. Cadilhac DA, Mahal A. Costs of neurological disorders. *Neuroepidemiology.* 2024;**58**(6):409-411. [PubMed ID: 38768584]. [PubMed Central ID: PMC11633900]. <https://doi.org/10.1159/000539370>.
9. Carod-Artal FJ, Egidio JA. Quality of life after stroke: the importance of a good recovery. *Cerebrovasc Dis.* 2009;**27**(Suppl 1):204-214. [PubMed ID: 19342853]. <https://doi.org/10.1159/000200461>.
10. Owolabi MO, Thrift AG, Martins S, Johnson W, Pandian J, Abd-Allah F, et al. The state of stroke services across the globe: report of World Stroke Organization-World Health Organization surveys. *Int J Stroke.* 2021;**16**(8):889-901. [PubMed ID: 33988062]. [PubMed Central ID: PMC8800855]. <https://doi.org/10.1177/17474930211019568>.
11. Kirkevold M. The role of nursing in the rehabilitation of acute stroke patients: toward a unified theoretical perspective. *Adv Nurs Sci.* 1997;**19**(4):55-64. [PubMed ID: 9161675]. <https://doi.org/10.1097/00012272-199706000-00005>.
12. Clare CS. Role of the nurse in stroke rehabilitation. *Nurs Stand.* 2018;**33**(7):59-66. [PubMed ID: 30132306]. <https://doi.org/10.7748/ns.2018.e11194>.
13. Jarva E, Mikkonen K, Tuomikoski A, Kääriäinen M, Meriläinen M, Karsikas E, et al. Healthcare professionals' competence in stroke care pathways: a mixed-methods systematic review. *J Clin Nurs.* 2021;**30**(9-10):1206-1235. [PubMed ID: 33350004]. <https://doi.org/10.1111/jocn.15612>.
14. Warner G, Packer T, Villeneuve M, Audulv A, Versnel J. A systematic review of the effectiveness of stroke self-management programs for improving function and participation outcomes: self-management programs for stroke survivors. *Disabil Rehabil.* 2015;**37**(23):2141-2163. [PubMed ID: 25579669]. <https://doi.org/10.3109/09638288.2014.996674>.
15. Sun Y, Liu C, Zhang N, Yang D, Ma J, Ma C, et al. Effect of self-management of stroke patients on rehabilitation based on patient-reported outcome. *Front Neurosci.* 2022;**16**: 929646. [PubMed ID: 36389220]. [PubMed Central ID: PMC9650393]. <https://doi.org/10.3389/fnins.2022.929646>.
16. Rezaei R, Zeighami Mohammadi S, Yasini F. The relationship between the perception of professional values and empathy in nursing students. *Modern Care Journal.* 2024;**21**(4). <https://doi.org/10.5812/mcj-148630>.
17. Otaghi M, Ghyasi N, Mohamadnejad S, Ehsani-Tabar P. The effect of nursing counseling on self-efficacy of family caregivers of the elderly with Alzheimer. *Archives of Neuroscience.* 2025;**12**(2). <https://doi.org/10.5812/ans-158885>.
18. McCarthy L, Kylén M, Gustavsson C, Finch T, Jones F, Elf M. Supporting someone after their stroke: family members' views and experiences of self-management. *Disabil Rehabil.* 2026;**48**(1):128-135. [PubMed ID: 40340606]. <https://doi.org/10.1080/09638288.2025.2500067>.
19. Piyarat Chaknum, Teeranut Harnirattisai, Chomchuen Somprasert, Li-Chi Chiang. Development of the family-based care model for stroke survivors to promote healthy family dynamics: participatory action research. *Pac Rim Int J Nurs Res.* 2023;**27**(2):244-259. <https://doi.org/10.60099/prijnr.2023.262033>.
20. Mohammadi E, Hassandoost F, Mozhdehipanah H. Evaluation of the "partnership care model" on quality of life and activity of daily living in stroke patients: a randomized clinical trial. *J Jpn Acad Nurs Sci.* 2022;**19**(1). e12448. [PubMed ID: 34448546]. <https://doi.org/10.1111/jjns.12448>.
21. Motie M, Azarakhsh A, Farahmandfard B. The vital role of nursing care in family-centered rehabilitation. *J Health Rep Technol.* 2026;**12**(1). e168068. <https://doi.org/10.5812/jhrt-168068>.
22. Jones F. Strategies to enhance chronic disease self-management: how can we apply this to stroke? *Disabil Rehabil.* 2006;**28**(13-14):841-847. [PubMed ID: 16777771]. <https://doi.org/10.1080/09638280500534952>.
23. Wang Z, Zhu F, Zuo J, Yang L, Lu F, Chen L, et al. Relationship between self-management behavior and family care among Chinese older adults hospitalized for stroke: the mediating role of chronic disease resource utilization. *Front Med.* 2025;**12**: 1611587. [PubMed ID: 40703278]. [PubMed Central ID: PMC12283656]. <https://doi.org/10.3389/fmed.2025.1611587>.
24. Kim SR, Kim S, Kim HY, Cho KH. Predictive model of self-management in patients with stroke based on the information-motivation-behavioral skills model. *J Cardiovasc Nurs.* 2023;**38**(2):158-167. [PubMed ID: 35030109]. <https://doi.org/10.1097/JCN.0000000000000883>.
25. Jones F, Riaz A, Norris M. Self-management after stroke: time for some more questions? *Disabil Rehabil.* 2013;**35**(3):257-264. [PubMed ID: 22691176]. <https://doi.org/10.3109/09638288.2012.691938>.
26. Kipinä P, Oikarinen A, Mikkonen K, Kääriäinen M, Tuomikoski AM, Meriläinen M, et al. Competence of healthcare professionals in stroke care pathways: a cross-sectional study. *J Vasc Nurs.* 2024;**42**(2):115-122. [PubMed ID: 38823971]. <https://doi.org/10.1016/j.jvn.2024.02.004>.
27. Lo SHS, Chau JPC, Choi KC. Development and psychometric evaluation of a questionnaire for assessing self-management behaviors in stroke survivors. *J Stroke Cerebrovasc Dis.* 2022;**31**(4). 106389. [PubMed ID: 35182947]. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2022.106389>.
28. Ali EHM, Khalifa MAG. Professional competency and moral courage among staff nurses. *BMC Nurs.* 2025;**24**(1). 557. [PubMed ID: 40389944]. [PubMed Central ID: PMC12087243]. <https://doi.org/10.1186/s12912-025-03197-4>.
29. Hui T, Zakari MA, Soltanmoradi Y, Rahimi N, Hossini Rafsanjanipoor SM, Nouroozi M, et al. Nurses' clinical competency and its correlates: before and during the COVID-19 outbreak. *BMC Nurs.* 2023;**22**(1). 156. [PubMed ID: 37149652]. [PubMed Central ID: PMC10163958]. <https://doi.org/10.1186/s12912-023-01330-9>.
30. Kolagari S, Najafi M, Brojerdi M, Modanloo M. Clinical competency of nurses working at intensive care units and its associated factors. *Journal of Research Development in Nursing and Midwifery.* 2023;**20**(2):50-53. <https://doi.org/10.61186/jgbrfm.20.2.50>.
31. Elhami S, Ban M, Mousaviasl S, Zahedi A. Self-evaluation of nurses clinical competency based on Benner theory. *Middle East J Fam Med.* 2018;**16**(3):191-197. <https://doi.org/10.5742/MEWFM.2018.93329>.
32. Naga M, Bedier N, Salem M, Ahmed H, Elhfnawy A. Effect of competency based program on nurses' knowledge, skills and attitude toward the care of patients with stroke. *Alex Sci Nurs J.* 2021;**23**(2):10-21. <https://doi.org/10.21608/asalexu.2021.219098>.
33. Kalani Z, Barkhordari-Sharifabad M, Chehelmard N. Correlation between moral distress and clinical competence in COVID-19 ICU nurses. *BMC Nurs.* 2023;**22**(1). 107. [PubMed ID: 37029367]. [PubMed Central ID: PMC10080174]. <https://doi.org/10.1186/s12912-023-01277-x>.
34. Osman M, Ibrahim M, Diab G. Relationship between nurses' competencies and quality of patient care at intensive care units. *Menoufia Nurs J.* 2019;**4**(2):1-14. <https://doi.org/10.21608/menj.2019.118373>.
35. Almborg A, Ulander K, Thulin A, Berg S. Discharge planning of stroke patients: the relatives' perceptions of participation. *J Clin Nurs.*

- 2009;**18**(6):857-865. [PubMed ID: [19239664](#)]. <https://doi.org/10.1111/j.1365-2702.2008.02600.x>.
36. Haley WE, Marino VR, Sheehan OC, Rhodes JD, Kissela B, Roth DL. Stroke survivor and family caregiver reports of caregiver engagement in stroke care. *Rehabil Nurs*. 2019;**44**(6):302-310. [PubMed ID: [31689247](#)]. <https://doi.org/10.1097/rnj.000000000000100>.
 37. Septianingrum Y, Yusuf A, Widyawati IY, Sari RY, Wardani EM, Musfirah NR, et al. Factors associated with family caregiver readiness to care for post-stroke patients after hospital discharge. *Discover Social Science and Health*. 2024;**4**(1). 4. <https://doi.org/10.1007/s44155-024-00064-6>.
 38. Risal M, Sali A. Relationship between family support and self-care among non-hemorrhagic stroke patients. *Nurs Health J Keperawatan*. 2021;**10**(2):284-291. <https://doi.org/10.36720/nhjk.v10i2.244>.
 39. Vemuri AK, Hejazian SS, Vafaei Sadr A, Zhou S, Decker K, Hakun J, et al. Self-management among stroke survivors in the United States, 2016 to 2021. *J Clin Med*. 2024;**13**(15):4338. [PubMed ID: [39124605](#)]. [PubMed Central ID: [PMC11313262](#)]. <https://doi.org/10.3390/jcm13154338>.
 40. Chen X, Samartkit N, Masingboon K. Factors associated with self-management behaviors among Chinese adults with ischemic stroke: a cross-sectional study. *Belitung Nurs J*. 2024;**10**(3):285-293. [PubMed ID: [38947297](#)]. [PubMed Central ID: [PMC11211749](#)]. <https://doi.org/10.33546/bnj.3267>.