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Enhancing Physical Adaptation and Functional Independence in Post-Stroke Patients Through Motivational Interviewing-Based Health Coaching

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ABSTRACT

Background: Stroke is a leading cause of long-term disability worldwide and is highly prevalent in Indonesia, especially in underserved and geographically isolated regions such as riverside communities. Many stroke survivors struggle with impaired physical adaptation and low functional independence. This study aimed to evaluate the effectiveness of motivational interviewing-based health coaching, guided by the Roy Adaptation Model, on improving physical adaptation and functional independence among post-stroke patients in Banjar Regency.
Subjects and Method: A quasi-experimental study with a pre-test and post-test control group design was conducted from January to April 2025 in two riverside subdistricts of Banjar Regency, South Kalimantan. A total of 90 post-stroke patients aged ≥45 years were recruited through purposive sampling. Participants were assigned to either the intervention (n=45) or control group (n=45). The intervention group received six sessions of structured health coaching based on motivational interviewing principles, while the control group received routine care. Physical adaptation was measured using the Roy Adaptation Assessment Guide (RAAG), and functional independence was assessed using the Barthel Index. Data were analyzed using the paired t-test and Mann–Whitney U test.
Results: The intervention group showed significant improvements in physical adaptation (Mean pre-test=54.87; post-test=66.02; $p<0.001$) and functional independence (Mean pre-test=60.44; post-test=78.91; $p<0.001$). In contrast, the control group showed no significant changes in physical adaptation ($p=0.062$) or functional independence ($p=0.084$). Between-group comparisons at post-test showed significantly higher scores in the intervention group for both physical adaptation ($p<0.001$) and functional independence ($p<0.001$).
Conclusion: Motivational interviewing-based health coaching significantly improves physical adaptation and functional independence among post-stroke patients in riverside communities. Integrating this approach into community-based rehabilitation may enhance recovery outcomes in underserved areas.

Keywords: Motivational interviewing, health coaching, stroke, physical adaptation

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BACKGROUND

Stroke is a leading cause of long-term disability and the second leading cause of death globally, accounting for approximately 11% of total deaths worldwide and affecting more than 101 million people in 2024 alone (Feigin et al., 2025). Despite advancements in acute care, many stroke survivors continue to experience persistent impairments in motor function, physical adaptation, and activities of daily living (ADLs), often leading to reduced quality of life and increased dependence on caregivers. In Indonesia, stroke is the number one cause of death and disability. According to the Indonesia Health Survey 2023 in Numbers, the national stroke prevalence is 10.9 per 1,000 population, with increasing trends noted particularly in areas with limited access to health services, including remote and rural regions (Ministry of Health of The Republic of Indonesia, 2023).

South Kalimantan, one of the provinces with the highest non-communicable disease burden in Indonesia, reflects this national trend. In Banjar Regency, a region characterized by extensive riverside settlements and geographic isolation, the burden of stroke is particularly alarming. Data from the South Kalimantan Provincial Health Office (2024) indicate that stroke cases in Banjar are consistently higher than national averages, and patients often experience prolonged recovery times due to a lack of rehabilitation access and limited patient engagement (Office, 2024). Communities living along riverbanks in Martapura and Barito rivers face additional health inequities stemming from poverty, transportation difficulties, and the shortage of trained rehabilitation personnel. These challenges result in lower rates of functional recovery and poor reintegration into social roles among stroke survivors (Aridamayanti et al., 2023).

Post-stroke rehabilitation aims to restore as much functional independence as possible, particularly through physical adaptation and ADL performance. However, patients often struggle with psychological barriers, low motivation, and a lack of consistent guidance from healthcare professionals (Aridamayanti et al., 2019). Evidence has shown that these factors directly correlate with reduced engagement in rehabilitation and poorer long-term outcomes. To address this, patient-centered approaches such as Motivational Interviewing (MI) have been proposed as effective behavioral interventions that can empower stroke survivors to participate in their recovery process actively. MI enhances intrinsic motivation by helping patients resolve ambivalence and set achievable goals aligned with their values and health priorities (Zhu et al., 2024; Fu et al., 2025).

Previous studies have demonstrated the effectiveness of MI-based health coaching in improving clinical outcomes among individuals with chronic conditions such as diabetes, hypertension, and cardiovascular disease (Zhang et al., 2022). In the stroke population, MI has shown promising effects in enhancing rehabilitation adherence, psychological adaptation, and ADL improvement (Parelangi et al., 2025). However, limited studies have explored the implementation of MI-based health coaching specifically in community-based rehabilitation settings, particularly in vulnerable and geographically isolated areas such as riverside communities in Indonesia.

To increase its impact, MI can be integrated into a structured nursing theoretical model, such as the Roy Adaptation

Model (RAM), which emphasizes the development of adaptive responses across four domains: physiological, self-concept, role function, and interdependence. This integration offers a holistic and theoretically grounded approach for stroke rehabilitation, especially in low-resource settings. The RAM framework is particularly well-suited for guiding nursing interventions that aim to improve physical adaptation and functional independence, thereby aligning clinical goals with patients' adaptive capacities in their environment (Day et al., 2024).

This study aims to evaluate the effectiveness of motivational interviewing-based health coaching, grounded in the Roy Adaptation Model, in improving physical adaptation and functional independence among post-stroke patients living in riverside communities of Banjar Regency, South Kalimantan. By targeting this underserved population, the study seeks to provide evidence for scalable, community-based interventions that are culturally appropriate and accessible, with the potential to enhance rehabilitation outcomes and reduce disability among stroke survivors in remote areas.

SUBJECTS AND METHOD

1. Study Design

This part consists of the study design and study site (place and time). This study applied a quasi-experimental design using a pre-test and post-test with a control group structure. The research was conducted in two riverside communities within Banjar Regency, South Kalimantan, Indonesia, notably in the Aluh-Aluh and Sungai Tabuk districts. These areas were selected due to their high prevalence of stroke, geographic isolation, and lack of structured rehabilitation services. Data were collected over a 4-month period from January to April 2025, in collaboration with local health center and community health volunteers.

2. Population and Sample

The target population in this study comprised all adult post-stroke patients residing in riverside areas of Banjar Regency, South Kalimantan. The sample size was determined using GPower 3.1.9.7 software for a two-tailed test. Based on a significance level of 0.05, power of 80%, and a medium effect size (Cohen's d = 0.5), the minimum required sample was 86 participants. To account for potential attrition or non-compliance, the sample was increased by approximately 5%, resulting in a total of 90 post-stroke patients. These participants were then equally divided into the intervention group (n = 45) and the control group (n = 45). The accessible population was drawn from post-stroke patients registered in the chronic disease database at two primary healthcare centers, namely Aluh-Aluh and Sungai Tabuk. Participants were selected using purposive sampling based on clearly defined inclusion and exclusion criteria. Eligible participants were those aged 45 years or older, had been diagnosed with ischemic or hemorrhagic stroke within the past 3 to 12 months (subacute to chronic stage), lived in a riverside community, were able to communicate effectively, and had a Barthel Index score between 40 and 80, indicating moderate functional dependence. Patients with severe cognitive impairment (as determined by a Mini-Mental State Examination score < 23), terminal illness, or who were undergoing other rehabilitation programs were excluded. Based on power analysis with a significance level of 0.05, power of 80%, and medium effect size (Cohen's d = 0.5), a total of 90 participants were recruited, with 45 individuals assigned to each group (intervention and control).

3. Study Variables

This study examined two primary types of variables. The independent variable was a structured health coaching intervention

based on motivational interviewing principles, delivered over six sessions. The dependent variables were physical adaptation and functional independence. Physical adaptation refers to the ability of the body to adjust to physical limitations following a stroke, while functional independence refers to the capacity to perform daily activities without full assistance.

4. Operational Definition of Variables

Motivational interviewing-based health coaching in this study: structured, six-session program guided by motivational interviewing techniques (such as open-ended questioning, affirmations, and reflective listening) and the FIRA model (Focus, Identify, Reflect, Act), delivered by trained nurses

Physical adaptation: the patient's physiological response to stroke, specifically in terms of strength, energy, coordination, and mobility, measured using the physical mode of the Roy Adaptation Assessment Guide (RAAG).

Functional independence: individual's ability to carry out basic activities of daily living (ADLs), such as feeding, bathing, toileting, transferring, and mobility, assessed using the Barthel Index.

5. Study Instrument

The Barthel Index was used to assess functional independence across 10 domains of ADLs. Scores range from 0 (completely dependent) to 100 (completely independent), and the instrument has demonstrated excellent internal consistency (Cronbach's $\alpha = 0.91$) and inter-rater reliability (ICC = 0.96) in Indonesian populations. Physical adaptation was measured using the Roy Adaptation Assessment Guide (RAAG) – Physical Mode subscale, which evaluates physiological symptoms such as mobility, balance and strength. The Indonesian version of the RAAG has shown good content validity (CVI = 0.87) and reliability (Cronbach's $\alpha = 0.76$). To ensure the consistency and fidelity of the coaching intervention, a structured session log and fidelity checklist were also used by the facilitators to record patient responses, engagement levels, and completion of goals in each session.

6. Data Analysis

Quantitative data were analyzed using SPSS version 26.0. Descriptive statistics, including means, standard deviations, and frequencies, were used to describe participants' demographic and clinical characteristics. The normality of continuous variables was assessed using the Kolmogorov-Smirnov test. For within-group comparisons (pre- and post-intervention), paired t-test signed-rank were used for normally distributed data. Between-group comparisons (intervention versus control) were conducted using Mann–Whitney U tests, depending on the distribution of data. In addition, effect sizes were calculated using Cohen's d for parametric tests and rank-biserial correlation for non-parametric tests to determine the magnitude of the intervention effect. Statistical significance was established at $p < 0.05$.

7. Research Ethics

This study received ethical clearance from Komisi Etik Penelitian Kesehatan (KEPK), Dewan Perwakilan Daerah Persatuan Perawat Nasional Indonesia (DPD PPNI) Banjarbaru City, with approval number 044/KEPK-FKIKULM/EC/IV/2025.

RESULTS

1. Sample Characteristics

The sample characteristics were described in Table 1.

Table 1. Characteristics of respondents (N=90)

Characteristics	Categories	Frequency (n)	Percentage (%)
Age	Middle-aged adult (45–59 years)	47	52.20
	Elderly (60–74 years)	38	42.20
	Old age (≥75 years)	5	5.60
Gender	Male	52	57.80
	Female	38	42.20
Education Level	Elementary School	13	14.40
	Middle School	36	40.00
	High School	29	32.20
	College School	12	13.30
Marital Status	Married	70	77.80
	Widowed	16	17.80
	Single	4	4.40
Smoking Habit	Yes	48	53.30
	No	42	46.70
Type of Stroke	Ischemic Stroke	66	73.30
	Hemorrhagic Stroke	24	26.70

Table 1 shows the majority of respondents in this study were middle-aged adults (45–59 years), accounting for 52.2% of the total sample. This was followed by elderly individuals aged 60–74 years (42.2%), while only 5.6% were aged 75 years or older. In terms of gender distribution, more than half of the participants were male (57.8%), with females comprising 42.2%. Regarding cational background, most respondents had low educational attainment: 40.0% completed only middle school, 32.2% completed high school, and 14.4% had only elementary education. A small portion (13.3%) had obtained a college degree.

Most participants were married (77.8%), with the remainder being widowed (17.8%) or single (4.4%). Smoking habits were prevalent among more than half of the respondents (53.3%), indicating a significant lifestyle risk factor associated with stroke. Finally, the most common type of stroke experienced by participants was ischemic stroke, reported by 73.3% of the sample, while the remaining 26.7% had suffered a hemorrhagic stroke.

Table 2. Analysis of Physical Adaptation and Functional Independence (Pre-Test and Post-Test, N=90)

Groups	Variables	Times	Mean	SD	Min	Max
Intervention	Physical Adaptation	Pre-Test	54.87	7.12	42	70
		Post-Test	66.02	6.85	52	78
	Functional Independence	Pre-Test	60.44	9.87	40	78
		Post-Test	78.91	8.14	62	96
Control	Physical Adaptation	Pre-Test	55.60	7.55	40	72
		Post-Test	56.22	7.46	40	73
	Functional Independence	Pre-Test	63.16	10.18	44	80
		Post-Test	64.13	9.91	45	81

Table 2. presents the univariate analysis of physical adaptation and functional independence scores in both the intervention and control groups before and after the intervention. In the intervention group, the mean physical adaptation score

improved significantly from 54.87 (SD = 7.12) at pre-test to 66.02 (SD = 6.85) at post-test. Similarly, functional independence increased from a pre-test mean of 60.44 (SD = 9.87) to a post-test mean of 78.91 (SD = 8.14), indicating substantial functional gains. In contrast, the control group showed minimal changes. Physical adaptation scores increased only slightly from 55.60 (SD = 7.55) to 56.22 (SD = 7.46). Likewise, functional independence scores rose marginally from 63.16 (SD = 10.18) at pre-test to 64.13 (SD = 9.91) at post-test.

2. Bivariate Analysis

Table 3 shows the within-group analysis presented in Table 3 demonstrates a significant improvement in both physical adaptation and functional independence among participants in the intervention group following the implementation of motivational interviewing-based health coaching. The physical adaptation score increased from a mean of 54.87 (SD = 7.12) at pre-test to 66.02 (SD = 6.85) at post-test, with a statistically significant difference (p <0.001). Likewise, functional independence improved markedly from 60.44 (SD = 9.87) to 78.91 (SD= 8.14), also showing a significant difference (p <0.001). In contrast, the control group did not experience any statistically significant changes. Physical adaptation scores increased slightly from 55.60 (SD = 7.55) to 56.22 (SD = 7.46), with a p-value of 0.062, while functional independence improved modestly from 63.16 (SD = 10.18) to 64.13 (SD = 9.91), with a p-value of 0.084. These findings indicate that the structured coaching intervention had a significant impact on both physiological adjustment and daily functional capacity, while routine care alone was insufficient to induce meaningful improvement.

Table 3. Within-Group Comparison of Physical Adaptation and Functional Independence (Pre-Test and Post-Test, N=90)

Variables	Groups	Pre-Test Mean (SD)	Post-Test Mean (SD)	p
Physical	Intervention	54.87 (7.12)	66.02 (6.85)	<0.001
Adaptation	Control	55.60 (7.55)	56.22 (7.46)	0.062
Functional	Intervention	60.44 (9.87)	78.91 (8.14)	<0.001
Independence	Control	63.16 (10.18)	64.13 (9.91)	0.084

Table 4 presents the between-group comparison of post-test scores, revealing statistically significant differences between the intervention and control groups. Participants in the intervention group achieved a higher mean score in physical adaptation (Mean= 66.02; SD= 6.85) compared to those in the control group (Mean= 56.22; SD= 7.46), with a Mann-Whitney U value of 366.00 and a p-value of less than 0.001. Similarly, functional independence scores were significantly higher in the intervention group (Mean= 78.91; SD= 8.14) than in the control group (Mean= 64.13; SD= 9.91), with a Mann–Whitney value of 284.50 and p < 0.001. These results confirm that the health coaching intervention based on motivational interviewing principles was significantly more effective in enhancing both physical recovery and independence in activities of daily living compared to standard care, underscoring its potential as a practical approach for post-stroke rehabilitation in community settings.

Table 4. Mean difference between-group of Post-Test Scores (N=90)

Variables	Intervention Mean (SD)	Control Mean (SD)	Mann-Whitney	p
Physical Adaptation	66.02 (6.85)	56.22 (7.46)	366.00	<0.001
Functional Independence	78.91 (8.14)	64.13 (9.91)	284.50	<0.001

DISCUSSION

This study evaluated the effectiveness of motivational interviewing-based health coaching, grounded in the Roy Adaptation Model (RAM), in improving physical adaptation and functional independence among post-stroke patients residing in riverside communities in Banjar Regency, South Kalimantan. The results found that participants in the intervention group experienced significant improvements in both outcomes, while those in the control group showed no statistically meaningful change. These findings not only validate the theoretical basis of RAM but also demonstrate the potential of context-sensitive, community-based interventions in geographically and socioeconomically disadvantaged populations (Zamzam et al., 2020; Ni'mah et al., 2023; Agianto et al., 2024).

Riverside communities in Banjar Regency are characterized by geographic isolation, limited transportation access, lower educational attainment, high prevalence of smoking, and poor access to structured rehabilitation services (Aridamayanti et al., 2023; Yunara et al., 2025). As confirmed by this study's baseline data, the majority of participants had low education levels (only 13.3% had college-level education), over half were smokers, and most had experienced ischemic stroke. These contextual factors significantly affect patients' understanding of health, motivation to engage in rehabilitation, and overall ability to regain independence. Consequently, traditional health education or passive rehabilitation guidance may be insufficient. An approach that strengthens patients' intrinsic motivation and aligns with their lived experiences such as motivational interviewing may be more effective (Alfarisi et al., 2025).

The Roy Adaptation Model provides a framework that emphasizes the development of adaptive responses across physiological, self-concept, role function, and interdependence domains (Marudhar and Josfeena, 2019). In this study, the intervention targeted the physiological and role function modes by helping patients actively adapt to limitations caused by stroke through goal setting, reflective dialogue, and personalized coaching. This is particularly relevant in the context of riverside communities, where access to hospitals or rehabilitation centers is limited, and care is often managed informally by family members with little guidance (Watkins et al., 2021).

Previous studies support the effectiveness of motivational interviewing (MI) in chronic disease management and rehabilitation. For example, Alfarisi et al. (2025) showed that MI combined with rehabilitation significantly improved functional mobility and psychological well-being in stroke patients. Similarly, Day et al. (2024) demonstrated that community nurses trained in MI techniques were able to enhance engagement and recovery outcomes among patients with various chronic conditions. These results are aligned with the findings of this study, particularly regarding the significant increase in Barthel Index scores among the intervention group, from 60.44 to 78.91, indicating a shift from

moderate to near-complete independence in activities of daily living.

The tailored, dialogic nature of MI also supports behavior change in culturally specific settings. In riverside Banjar communities, fatalistic health beliefs, low health literacy, and reliance on traditional practices may reduce motivation for structured rehabilitation. MI's focus on respecting the patient's perspective, fostering self-efficacy, and setting achievable, culturally meaningful goals aligns well with these community dynamics (Zhu et al., 2024). Furthermore, its implementation by trained nurses within patients' homes or primary care posts adds feasibility and sustainability to the model in rural areas.

The lack of significant improvement in the control group further highlights the insufficiency of routine care in these settings. Without structured coaching, patients may be less likely to follow through with recommended exercises, and families may lack knowledge on how to assist effectively. These observations are in line with Indonesian national survey data showing low post-stroke rehabilitation adherence outside of urban centers (Ministry of Health of The Republic of Indonesia, 2023).

Nonetheless, this study has limitations. The use of a quasi-experimental design, while pragmatic, lacks random allocation and may be subject to selection bias. Moreover, the relatively short follow-up period limits understanding of the intervention's long-term sustainability. Cultural and geographic specificity may also limit the generalizability of findings to other regions in Indonesia. Future research should employ randomized controlled trials (RCTs) with larger, more diverse samples and explore long-term outcomes of motivational coaching in stroke rehabilitation.

In conclusion, this study demonstrates that motivational interviewing-based health coaching significantly enhances physical adaptation and functional independence among post-stroke patients in isolated riverside communities. Grounded in the Roy Adaptation Model, this intervention is not only theoretically sound but also practically feasible and culturally relevant. For policy and practice, these findings support the incorporation of structured coaching into community-based rehabilitation programs, particularly through primary care nurses trained in motivational interviewing. Implementing such programs in remote or underserved regions like Banjar may help reduce disability burden, increase post-stroke recovery rates, and promote equitable access to rehabilitation services across Indonesia.

AUTHOR CONTRIBUTION

Bernadetta Germia Aridamayanti led the study conceptualization, developed the research methodology, coordinated the project implementation, conducted the data analysis, and drafted the initial manuscript. Shenda Maulina Wulandari contributed to the refinement of the study design, provided statistical oversight, and critically reviewed the manuscript for intellectual content. Maulidya Septiany was responsible for data collection, participant recruitment, and the delivery of the health coaching intervention in the field. Agianto played a key role in designing the intervention modules, training the field facilitators, and ensuring the fidelity of the intervention process. Chrisnawati managed data entry, liaised with local health centers, and supported the interpretation of findings. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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