Vol 2 No 1 2025 || E-ISSN 2997-7258

The Journal of Academic Science

journal homepage:
https://thejoas.com/index.php/

# Enhancing activities of daily living for stroke patients based on the self-efficacy program: A quasi-experimental study

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KEY WORDS

Activities of Daily Living, Independence, Self-Efficacy, Stroke Patients

A B S T R A C T

Self-efficacy enhancing intervention has been widely applied whereas it is essential need the program to apply all sources of self-efficacy integrated with providing information and adapted skills for continuum care and by involvement of the family caregiver. This was a quasi-experimental study aimed to investigate the effect of a self-efficacy program on self-efficacy to perform ADL and independence in ADL in stroke patients. Forty stroke patients from neurology wards engaged in the study. The participants in the experimental group received the self-efficacy program for six weeks. This involved hospital session (60-minute meetings in the two days before participants discharge) and follow-up session (10 to 20-minute discussion in week 2, 3, 4, 5, and 6). Participants were measured for self-efficacy to perform ADL by Modified Self-Efficacy Stroke Questionnaire and independence in ADL by the Functional Assessment Measure across four-time measures. A mixed-design Repeated-Measures ANOVA was used to analysis the data. The study showed that there were a significant difference in self-efficacy to perform ADL and independence in ADL between the experimental and control group and changed across four-time measures. The self-efficacy to perform ADL and independence in ADL of participants across four-time measures in the experimental group were higher than in the control group. The self-efficacy program showed its effectiveness to promote self-efficacy to perform ADL and independence in ADL for stroke patients. All interventions should apply in the continuum care of nursing practice and the findings provide advance practice nurses and research reference in neuroscience in enhancing their professional competence.

## 1. Introduction

Strokes do not only account for a high number of deaths, but also have an immense impact on psychological and physical disability. One of the psychological concerns of stroke patients is self-efficacy to function in daily life, which was related to positive and negative effects of well-being (Szczepańska-Gieracha & Mazurek, 2020) whereas physical disability affected the activities of daily living (ADL) (Ghaffari, Rostami, & Akbarfahimi, 2021). Furthermore, it can be argued that the self-efficacy and independence in ADL determined the outcomes once stroke patients encounter the difficulties in their new conditions (Amiri, Abolhassani, Alimohammadi, & Roghani, 2022).). These two elements are therefore pivotal to be enhanced and maintained in obtaining a patient's capability after stroke.

Self-efficacy describes people's belief in their ability to accomplish and succeed in an achievement or a task and high level of self-efficacy shows confidence to produce designated performance in a specific situation (Bandura, 1977, 1994, 1997). The previous studies showed that the stroke patients who had a high level of self-efficacy in mobility and ADL had the functioning better in daily activities than stroke patients who had low self-efficacy (Chau et al., 2022; Szczepańska-Gieracha & Mazurek, 2020). However, the low level of self-efficacy was found in stroke patients (Caetano et al., 2020; Ma, Hung, Lin, Chuang, & Wu, 2021; Nott et al., 2021; Szczepańska-Gieracha & Mazurek, 2020) and it affected in the performance of mobility, activities of daily living, quality of life, and well-being (Caetano et al., 2020, Gandolfi et al., 2022; Pedersen et al., 2020; Toledano-González, Labajos-Manzanares, & Romero-Ayuso, 2019).

Independence status as one of the rehabilitation goals that it refers to the individual's ability to perform and complete the activities without assistance from another (WHO, 2004). Several studies implied that the stroke had influenced negatively on the independence in ADL of stroke patients during hospitalization and in community care (Ezema et al., 2019; Ghaffari et al., 2019; Ma et al., 2021). Self-efficacy had significantly influence the uptake and maintenance of behavior to perform activities independently after a stroke (Espernberger, Fini, & Peiris, 2021). Furthermore, stroke patients reported a lack of skill in adapting activities as a primary barrier to regain their functional recovery (Meads, et al., 2020). It is, therefore, essential for stroke patients to learn the skills for promoting their confidence and independence in ADL with their limitation factors.

The self-efficacy based intervention was developed from Bandura (1977, 1994, 1997), which are enactive mastery experience, vicarious experience, verbal persuasion, and physiological and affective state. Bandura defines the sources that enactive mastery experience informs achieving experience through engaging in successful performance by using the persistence of effort in overcoming obstacles. Vicarious experience refers to observing the social model as a comparison of the capabilities as to what skills are needed to succeed in the task. Verbal persuasion refers to the encouragement for a person to complete a task or achieve a certain behavior. Physiological and affective state refers to sources of information concerning on people's somatic information conveyed by physiological and emotional states in judging their capabilities. Bandura (1997) emphasized the importance of using all four sources of self-efficacy due to the substantial contribution of each source to build the people's high self-efficacy.

Previous studies applied self-efficacy based intervention to enhance stroke patients' confidence in performing functional tasks for stroke patients, but the results were varied (Amiri et al., 2020; Caetano et al., 2020; Nott et al., 2020; Long, Ouyang, & Zhang, 2020). Nevertheless, not all previous studies were conducted by applying all the four sources of self-efficacy comprehensively. In addition, most of these studies were conducted only in chronic stroke patients and in community settings. Furthermore, it can be argued that these previous intervention studies only used an intervention in stroke patients and did

not cover all the needs of stroke patients, which are having information and learning the adapted skills (Hartford, Lear, & Nimmon, 2019), especially for ADL. These needs synchronize with self-efficacy-activated processes that Bandura (1994) stated the certain skills require an effective cognitive processing of information. By having information, people obtain knowledge to construct and weight some options to result actions (Bandura, 1994).

In stroke rehabilitation, it is essential to provide intervention begun from hospitalization to achieve better recovery in the first month after stroke (Teasel et al., 2020) and to increase the efficiency in the continuum of stroke care regarding patient needs to adapt ADL (Camicia, Lutz, Summers, , Klassman, & Vaughn, 2021). Additionally, the transition phase of stroke care from hospital to community or home setting needs the involvement of the family caregiver that showed a significant contribution for the improvement of the functional outcomes for stroke patients (Camicia et al., 2021; Teasel et al., 2020).

Advance practice nurses should develop interventions, which is needed to enhance stroke patients' confidence in performing daily tasks. Previous studies found that applying psychological support and functional training based self-efficacy theory for patients post stroke could impact stroke patients' confidence in a task and functional level (K Błaszcz, et al., 2022). Nevertheless, the interventions mostly conducted in chronic phase of stroke than in early rehabilitation and transition phase of stroke care. Furthermore, it is needed to know whether the family caregiver involvement in the stroke care could improve stroke patients' confidence to perform ADL and their functional status in the first months. Therefore, This study was designed to investigate the effect of self-efficacy enhancing ADL program on self-efficacy to perform ADL and independence in ADL in stroke patients for continuum care with the family caregiver involvement.

Therefore, this study developed a program focusing on the ADL by integrating the four sources of self-efficacy for stroke patients supported by family caregivers in the hospital and after patient discharge. The family caregivers were involved in every part of the program, especially in the activities of self-efficacy sources application. Furthermore, to evaluate the persistent and continuous effort as confirm with the developing of self-efficacy, the stroke patients were examined their self-efficacy to perform ADL and independence in ADL across four-time measures. This study investigated the effect of self-efficacy enhancing ADL program on self-efficacy to perform ADL and independence in ADL in stroke patients.

The study aimed to investigate the impact of a self-efficacy enhancing ADL (Activities of Daily Living) program on stroke patients. It hypothesized that the mean scores of self-efficacy in performing ADL and independence in ADL would be higher in stroke patients who participated in the self-efficacy enhancing ADL program compared to those who received usual care. Additionally, it was expected that the mean scores of self-efficacy and independence in ADL of the stroke patients participating in the program would change across four time measures. Lastly, the study proposed that there would be an interaction effect between the self-efficacy enhancing ADL program and time measures on self-efficacy and independence in ADL across the four time measures.

## 2. Methodology

### Participants

A purposive sampling of stroke patients in neurology ward was recruited from two tertiary hospitals in DKI Jakarta, Indonesia. The inclusion criteria of stroke patients were: (1) diagnosed with stroke with cerebral infarction [International Classification of Diseases (ICD)-10, Codes: 163], (2) age above 18 years old, (3) Glasgow Coma Scale (GCS) score 14-15, (4) Barthel Index score <75, (6) Mini-Mental State Examination (MMSE) score $\geq$ 24, (7) adequate vision and hearing, (8) able to give the verbal or written informed consent, (9) contactable by telephone or using text messaging, (10) no existing co-morbidities that contradicted

exercise/physical activity, (11) had a family caregiver who willingness to participate in the program. Stroke patients were excluded if they had the signs of intracranial pressure and unstable vital signs and neurology during the program.

G*Power 3.1.9.2 was set for the F-test (the within-between interaction of Repeated-Measured ANOVA) with the effect size (d) = .85, α error probability = .05, power = .80, number of groups = 2, number of measurements = 4, correlation among repeated measures = .05, nonsphericity correction ε = 1. This statistical power analysis yielded total sample size was 6 with actual power .99. It is determined that the necessary sample size should be a minimum of 6 subjects per group. Nevertheless, 20 participants in each group were set for this study due to increasing the power of study. Furthermore, to anticipate the sample attrition, 20 % to the sample size for each group was added. However, in the following time of data collection, eight participants dropped out due to their demise. Hence, this study obtained and analyzed 40 participants (20 participants per group).

To assign the participants who met the inclusion criteria to either the control group or the experimental group, the researcher used a lottery for the first participant. Following that, this study used the matching technique of age (± 5 years old), and gender (male and female), and Barthel Index score (± 10). The flowchart for the participants in this study is diagrammed in Figure 1.

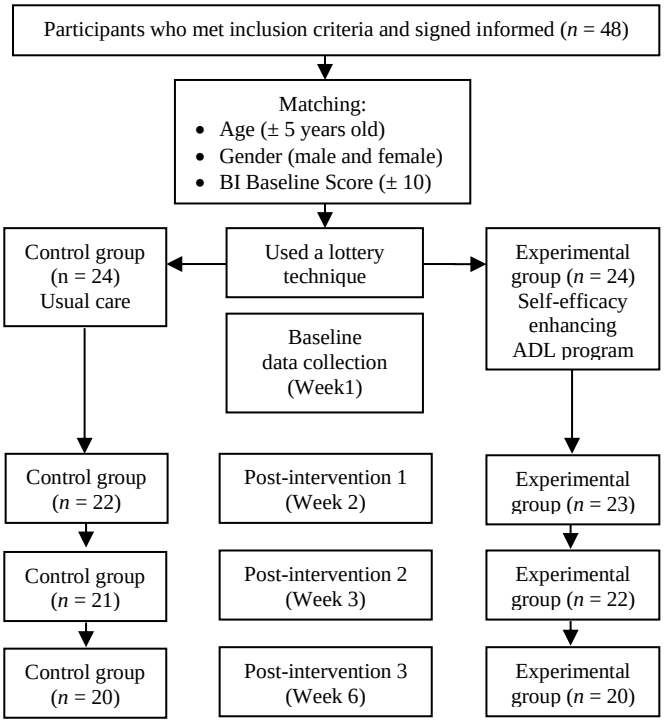


Figure 1. Recruitment and participants flow chart

**Procedure**

This program was developed by applying all sources of self-efficacy into ADL interventions. Family caregivers were involved in each self-efficacy source application. This program was conducted during six weeks divided in two parts (in-hospital program and follow-up program). In-hospital program was held during participants' hospitalization and it was divided into two sessions of 60 minutes on two separate days. The hospital program needed for two days meeting prior to participants' discharge. In the first session on first day meeting, the participants and the family caregivers were provided with information and discussion about stroke psychological aspects in stroke rehabilitation, self-advocacy, improving self-efficacy, and benefits of ADL training; assessment

of physical (pulse and breathing) and emotional status; and practicing relaxation techniques. This discussion also allowed the participants and family caregivers to understand weakness, spasticity, pain, fatigue, unbalance, fear of falling, and orthostatic intolerance during performing ADL. The second session on second day meeting was given ADL training for 60 minutes. This session was started by evaluating how participants perform the assessment of pulse, breathing rate, and emotional status. Then, the participants were asked to apply the breathing relaxation technique to gain readiness to practice ADL. In this session, the researcher provided the ADL videos with the different level of independence and encouraged the patient to observe and imitate the performance of ADL by sustained effort. In this ADL training, the researcher informed the technique and strategies in performing ADL from the simplest skills to complex ones. Furthermore, the researcher encouraged the participants to choose and learn the ADL activities by their preference, identify barriers, and make the goals and daily personal targets.

For the family caregivers, they were stimulated to encourage the participants in learning the ADL from the video and support the patient as to how much assistance was required. When participants learn to perform ADL, the researcher specified the feedback and verbal reinforcement for every the participant's achievement and convinced them that they had the capabilities to master the ADL tasks to be independent. Furthermore, the researcher encouraged the family caregivers to provide verbal persuasion both during and after training. The researcher asked participants to continue ADL training by learning and imitating the activity model from information booklet in their homes for one hour every day.

The follow up program was conducted by face-to-face meetings or telephone calls at week two until six of the program, approximately every seven days. The duration of each follow-up session was around 10 to 20 minutes. In every follow up session, either face-to-face or telephone call, the researcher began with the physical and emotional status assessment of the participants. The researcher asked the participants to report the current practices of one hour daily training of ADL task and daily personal targets. Furthermore, the researcher explored any potential barriers, identified solutions to overcome these barriers, and persuaded participants that they had the capability to perform ADL to be independent. Participants were also encouraged to identify their abilities, make a personal target of activities, and record the individual account and the strategies and personal success. The researcher awarded verbal reinforcement for every participant's achievement and every effort of ADL. In addition, the researcher involved the family caregivers in this follow up session to clarify the patient's condition and performance. The family caregivers were asked to give active support in both the physical and psychological domains. Furthermore, the participants could use text messaging to ask for further advice on physical activities, check on anything that worried them, and alter the intensity of their physical activity.

**Measures**

The participant's characteristics was required such as age, gender, educational level, the level of activities before the stroke, the stroke histories (e.g., number of strokes, side of stroke, underlying disease, family history of stroke, knowledge of receiving stroke care), and the family caregiver characteristics (e.g., age, gender, caregiver relationship, education level, frequency to take care the patient, family caregiver's knowledge and experience of ADL post stroke).

Self-efficacy to perform ADL was measred by The Modified Stroke Self-Efficacy Questionnaire (MSSEQ). The MSSEQ adapted from Stroke Self-Efficacy Questionnaire (SSEQ) developed by Jones et al. in 2008. The MSSEQ consists of 16 items to measure self-efficacy in particular domains of functioning with the response scale from 0 to 3. The 0 shows not at all confident and 3 shows very confident (Riazi et al., 2014). The total score of MSSEQ ranged from 0 to 48 and the higher score indicated the higher of self-efficacy to perform ADL. The 16-item of MSSEQ had good content validity index from three experts, .98 and high reliability with Cronbach's Alpha was .95.

Independence in ADL was measured by Functional Assessment Measure (FIM+FAM), which consists of 30 items divided into 16 items of motor function and 14 items of cognitive function. FIM + FAM has rates on seven scales to describe the stage of complete dependence (score of 1) to complete independence (score of 7) on the performance of ADL. The scores ranged from 30 (lowest) to 210 (highest), which indicate the level of functional independence. The mean of Cohen's Kappa for FIM+FAM in this study was .78 (Min-Max: .63 to 1.00), which indicated the high inter-rater reliability.

**Data collection**

Having obtained the Research Ethic Committee Approval, through the head nurse, the first author obtained the potential participants who met the inclusion criteria and were interested to participate in the program. Then the first author gave an explanation involving the purpose of the study, informed consent, procedures, risk, benefits, and confidentially and obtained the written informed consent. Then, the first author started to assign the first participants by lottery to either the experimental group or the control group. Following that, a matching technique of age, gender, and BI score were applied to participants in the both groups. The trained research assistants (RAs) started to collect the participants' demographic data and serial measures of self-efficacy to perform ADL and independence in ADL in pre-intervention on week 1, post-intervention 1 on week 2, post-intervention 2 on week 3, and post-intervention 3 on week 6. The first author was the single facilitator to conduct the program both in-hospital and in the follow-up session and trained the RAs to be data collectors.

**Ethical consideration**

The Research Ethical Committee of Faculty of Nursing, the Research Ethic Committee of hospitals, and the Research and Development Board of Indonesia Ministry of Health approved the ethical clearance of this study. The permission for data collection was obtained from the directors of the selected hospitals. The first author obtained the informed consent from every participant and used a coding system to identify the participants' anonymity and the confidentiality of all information. The first author obtained the necessary permission to use and modify the existing questionnaires from the related parties.

## 3. Result and Discussion

Descriptive statistics were used to test the equivalence of the participants' characteristics and stroke information between groups and the mean scores of self-efficacy to perform ADL and independence in ADL. The Chi-Square and Independent t-tests were used to test the equivalence of the proportion of participants' and stroke information data between the groups. A mixed design Repeated-Measures ANOVA was conducted to test the effect of self-efficacy enhancing ADL program on self-efficacy to perform ADL and independence in ADL across four-time measures. The normality assumption was met that examined by the values of the skewness and kurtosis divided by their standard errors, which are ranged ± 3. For sphericity assumption, the Greenhouse-Geisser correction was used for analyzing the self-efficacy to perform ADL and Hyynh-feldt correction for independence in ADL.

**Participants' Characteristics and Stroke Information**

This study involved 40 participants, which were 20 in each group. The participants' characteristics and stroke information of the two groups are presented in Table 1. Homogeneity test results showed that no significant differences between the two groups in pre-intervention. The age, gender, and BI score were equal proportion in the both groups resulted from a matching technique of participant assignment. In both groups, the average age of the participants was 56.63 (SD = 7.69), with the age range of 45-70 years. The proportion of the male participants was higher (65%) than female participants (35%). The average of BI score was 25.12 (SD = 6.45) in both groups. All participants had full consciousness with GCS score of 15 and the average of MMSE score was 28.70 (SD = 1.44).

| Characteristic | Experimental Group (*n* = 20) | | Control Group (*n* = 20) | | Test value | *p* |
|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | | |
| **Participants' Characteristics** | | | | | | |
| Age (Year) (*M* = 56.63, *SD* = 7.69 , *Min-Max* = 45-70 years) | | | | | .00 | 1.00 |
| ≤ 55 years | 9 | 45 | 9 | 45 | | |
| > 55 years | 11 | 55 | 11 | 55 | | |
| Gender | | | | | .00 | 1.00 |
| Female | 7 | 35 | 7 | 35 | | |
| Male | 13 | 65 | 13 | 65 | | |
| Level of activities before stroke | | | | | .96 | .62 |
| Mild (e.g., lying/cooking/driving) | 8 | 40 | 10 | 50 | | |
| Moderate (e.g., more than one home activities) | 10 | 50 | 7 | 35 | | |
| High (e.g., farming) | 2 | 10 | 3 | 15 | | |
| Personality | | | | | 1.03 | 1.00 |
| Right-handed | 20 | 100 | 19 | 95 | | |
| Left-handed | 0 | 0 | 1 | 5 | | |
| Living arrangement | | | | | .00 | 1.00 |
| Alone | 1 | 5 | 1 | 5 | | |
| Spouse/family | 19 | 95 | 19 | 95 | | |
| **Stroke Information** | | | | | | |
| GCS Score, *M* (*SD*) | 15 (.00) | | 15 (.00) | | | |
| MMSE Score, *M* (*SD*) | 29.10 (1.07) | | 28.30 (1.66) | | 1.81 | .08 |
| BI Score, *M* (*SD*) | 26.25 (7.05) | | 24.00 (5.76) | | 1.11 | .28 |
| Number of stroke | | | | | .23 | .89 |
| First | 17 | 85 | 16 | 80 | | |
| Second | 2 | 10 | 3 | 15 | | |
| More than two times | 1 | 5 | 1 | 5 | | |
| Side of stroke | | | | | .10 | .75 |
| Right | 9 | 45 | 8 | 40 | | |
| Left | 11 | 55 | 12 | 60 | | |
| Family history of stroke | | | | | .47 | .79 |
| Parent | 8 | 40 | 6 | 35 | | |
| Sibling | 2 | 10 | 2 | 10 | | |
| No history | 10 | 50 | 12 | 55 | | |
| Underlying diseases | | | | | 7.65 | .05 |
| Hypertension | 20 | 100 | 15 | 75 | | |
| Diabetes Mellitus (DM) | 0 | 0 | 1 | 5 | | |
| Heart Disease | 0 | 0 | 2 | 10 | | |
| Two or more than underlying diseases | 0 | 0 | 2 | 10 | | |
| Participants' knowledge about improving ADL | | | | | | |
| No | 17 | 85 | 19 | 95 | 1.11 | .61 |
| Yes | 3 | 15 | 1 | 5 | | |
| **Family Caregiver Characteristics** | | | | | | |
| Age of family caregiver (years), *M* (*SD*) | 43.35 (13.82) | | 40.45 (11.26) | | .73 | .47 |
| The Caregiver Relationship | | | | | 1.16 | .56 |
| Spouse | 10 | 50 | 11 | 55 | | |
| Child | 7 | 35 | 8 | 40 | | |
| Sibling | 3 | 15 | 1 | 5 | | |
| Frequency to care the patient | | | | | 1.68 | .20 |
| Full time | 14 | 70 | 10 | 50 | | |
| Part time | 6 | 30 | 10 | 50 | | |
| Family caregiver's knowledge of stroke patient's ADL | | | | | 2.50 | .24 |

| Characteristic | Experimental Group (*n* = 20) | | Control Group (*n* = 20) | | Test value | *p* |
|---|---|---|---|---|---|---|
| | *n* | % | *n* | % | | |
| No | 18 | 90 | 14 | 70 | | |
| Yes | 2 | 10 | 6 | 30 | | |
| Family caregivers' experiences of stroke patient's | | | | | .00 | 1.00 |
| ADL | 17 | 85 | 17 | 85 | | |
| No | 3 | 15 | 3 | 15 | | |
| Yes | | | | | | |

*Note. M = Mean, SD = Standard Deviation*

Table 1. Participants' Characteristics, Stroke Information, and Family Caregivers' Characteristics in the Two Groups (N = 40)

**Effect of the self-efficacy enhancing ADL program**

Table 2 shows that the mean scores of self-efficacy to perform ADL and independence in ADL for the participants were higher in the experimental group than in the control group in all post-intervention measures. Table 3 shows that the main effect comparing the experimental group and the control group for self-efficacy to perform ADL was significant, $F(1, 38) = 4.92$, $p < .05$ and independence in ADL was significant, $F(1, 38) = 13.64$, $p < .01$, indicating that self-efficacy to perform ADL and independence in ADL significantly differ between the experimental and control in Table 2 and 3 supported the acceptance of hypothesis 1 of this study.

The main effect of time measures for self-efficacy to perform and independence in ADL was shown in Table 4 that hypothesis 2 was accepted. There was a significant main effect of time measures for self-efficacy to perform ADL, $F(2.01, 76.55) = 10.29$, $p < .01$, showing an increasing for self-efficacy to perform ADL across the four-time measures regardless of both groups. The Bonferroni post hoc test showed that the mean scores of self-efficacy to perform ADL in pre-intervention, post-intervention1, and post-intervention 2 did not significantly differ (all $p < .05$), but the mean scores of self-efficacy to perform ADL in post-intervention 3 were significantly higher than other three-time measures ($p < .01$). There was a significant main effect of time measures for independence in ADL, $F(2.55, 96.79) = 87.82$, $p < .01$, showing an increasing in independence in ADL across the four-time measures regardless of the both groups. The Bonferroni post hoc test showed that all of the mean scores of independence in ADL were significantly differ for each other time measure (all $p < .01$).

| Outcomes and Time Measures | Experimental Group (*n* = 20) | | Control Group (*n* = 20) | |
|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* |
| Self-efficacy to perform ADL | | | | |
| Pre-intervention | 29.30 | 14.77 | 30.10 | 14.90 |
| Post-intervention 1 | 33.35 | 9.88 | 30.35 | 12.75 |
| Post-intervention 2 | 39.50 | 6.18 | 30.15 | 12.55 |
| Post-intervention 3 | 45.90 | 2.69 | 30.90 | 12.43 |

| | | | | |
|---|---|---|---|---|
| Independence in ADL | | | | |
| Pre-intervention | 116.60 | 22.15 | 111.25 | 25.33 |
| Post-intervention 1 | 138.45 | 29.03 | 112.85 | 27.56 |
| Post-intervention 2 | 152.75 | 27.21 | 116.75 | 26.05 |
| Post-intervention 3 | 175.75 | 19.31 | 130.45 | 28.97 |

Note. M = Mean, SD = Standard Deviation

Table 2. The Mean Scores of the Self-Efficacy to Perform ADL and Independence in ADL for Participants in the Two Groups across Four-Time Measures (N = 40)

| **Outcomes and Sources of Variation** | ***SS*** | ***df*** | ***MS*** | ***F*** | ***p*** |
|---|---|---|---|---|---|
| Self-efficacy to perform ADL | | | | | |
| Groups | 1788.91 | 1 | 1788.91 | 4.92 | .03* |
| Error | 13822.19 | 38 | 363.74 | | |
| Independence in ADL | | | | | |
| Groups | 31500.16 | 1 | 31500.16 | 13.64 | .00** |
| Error | 87755.79 | 38 | 2309.36 | | |

Note. SS = Sum of square, MS = Mean Square,
df = Degree of freedom,
F = Mixed Design Repeated-Measures ANOVA *p < .05, **p < .01

Table 3. The Main Effect of Group between the Experimental and Control Group on Self-Efficacy to Perform ADL and Independence in ADL (N = 40)

| Outcomes and Sources of Variation | *SS* | *df* | *MS* | *F* | *p* |
|---|---|---|---|---|---|
| Self-efficacy to perform ADL[a] | | | | | |
| Time | 1696.67 | 2.01 | 842.25 | 10.29 | .00** |
| Error | 6268.46 | 76.55 | 81.89 | | |
| Independence in ADL[b] | | | | | |
| Time | 32788.72 | 2.55 | 12872.55 | 87.82 | .00** |
| Error | 14188.46 | 96.79 | 146.59 | | |

Note. SS = Sum of square, MS = Mean Square, df = Degree of freedom,
F = Mixed-Design Repeated-Measured ANOVA
a = Greenhouse-Geisser correction, b = the Huynh-Feldt correction
**p < .01

Table 4. The Main Effect of Time Measures on Self-Efficacy to Perform ADL and Independence in ADL across the Four-Time Measures (N= 40)

The finding yielded that hypothesis 3 was accepted. There was significant interaction between the group program and time measures for self-efficacy to perform ADL, $F(2.01, 76.55) = 8.75$, $p < .01$ and independence in ADL, $F(2.55, 96.79) = 23.62$, $p < .01$. This interaction effect shows that four-time measure for self-efficacy to perform ADL and independence in ADL significantly different in the experimental and the control group. The effect of group program for self-efficacy to perform ADL was positive for all time measures of experimental group and negative for some time measures of the control group. The mean score of self-efficacy to perform ADL in the experimental group increased significantly and reached the highest score at post-intervention 3. Nevertheless, the mean score of self-efficacy to perform ADL in the control group was steady across four-time measures. The effect of group program was not equal across all time measures of control group, but the magnitude was the same direction. The mean scores of independence in ADL in the experimental and control group increased significantly and reached the highest score at post-intervention 3.

## Discussion

This study explored the effectiveness of the self-efficacy enhancing ADL program. The effectiveness was assessed by four-time repeated-measures, using MSSEQ and FIM mean score. The result indicated that the experimental group showed a higher improvement of MSSEQ and FIM mean score than the control group. The result of group effects supported that the participants of experimental group constructed their self-efficacy to perform ADL through interpretation information and understanding from all sources of self-efficacy. It can be argued that

the participants in the control group did not receive the structured program of self-efficacy sources to develop their self-efficacy improvement. The previous studies found that self-efficacy was often increased and higher after some interventions based sources of self-efficacy were given in the experimental group than the control group (Amiri et al., 2020; Caetano et al., 2020). It can be ascertained that the participants in the control group had limited experience for practicing the actual performance, discussing, and sharing feelings their experiences with health care professionals or other stroke patients.

The results of this study revealed that the self-efficacy to perform ADL of participants in the experimental group improved over time within six weeks. All sources of self-efficacy were applied in every session of the program in this study. This study argued that the application of all of sources of self-efficacy was important to construct high self-efficacy to perform ADL for participants of the experimental group. This finding was congruent with existing studies, which applied to all sources of self-efficacy and showed the improvement of self-efficacy to perform functional tasks for the stroke patients who participated in the self-efficacy based interventions (Amiri et al., 2020; Long, Ouyang, & Zhang, 2020). Another study in the heart failure population applied all self-efficacy sources and the results were consistent with this study, which increased self-efficacy for cardiac exercise for experimental group (Bay, Sandberg, Thilén, Wadell, & Johansson, 2018)

Most of the participants in the experimental group had had their first stroke and they lacked knowledge and experience for improving ADL after stroke. Therefore, the enactive mastery experience was a great part of the program to address their actual ADL and interpret that performance whether success or failures for independence in ADL. Beginning by asking participants to practice the assessment of physical and emotional status that similarly applied in a study by Amiri et al. (2020) and Bay et al. (2018) to evaluate the readiness and appropriateness in order to continue performing the adapted ADL. This was related closely with improving physiological and the affective state before the stroke patients underwent their enactive mastery experience. This study accentuated the techniques and strategies for performing ADL tasks beginning from the easier skills to complex ones by acquiring the process of initiation, continuation, and completion of tasks to reach independence to perform activities (Moinuddin, Faridi, Sethi, & Goel, 2022). In addition, participants were encouraged to choose and learn the ADL activities by their preference. This strategy was similarly applied in the enactive mastery experience of previous studies for the stroke patients tailored to their needs related to the specific tasks, technique, and strategies to exercise performance (Chen et al., 2019; Emerson et al., 2018; Norouzi-Gheidari et al., 2020). Furthermore, the family caregivers were involved in each participants' activity due to the low score of the Barthel Index (20 to 40 of 100). This study recognized the benefit of family caregivers' engagement to enhance enactive mastery experience to tailor participants' level assistance with level performance success and independent.

Vicarious experience of this study focused on observing the videos of successful ADL performance with different level of assistance. A similar strategy was also applied by showing a video of the walking activities technique for stroke patients to increase their self-efficacy in walking performance (Nott et al., 2021). In this study, participants were asked to observe and imitate the model in the video of ADL performances. In a study of myocardial infarct (MI) groups, improvement of self-efficacy was found with similar application by watching the tasks videos for enhancing vicarious activities of patients (Penalo, 2022).

The providing information and discussion completed the verbal persuasion activities and made it easier to convince the experimental group that they had the potential capability to solve the problem with regard to regaining ADL independence in their new condition post stroke. This lead the experimental group to explore their knowledge and previous

experience of exercise, recognize the benefits of ADL training, the barrier in activities, their capabilities and the way to overcome the problem. Verbal persuasion was applied both during and after exercise, especially when the participants had success or progressive in ADL performance. Furthermore, these activities were continued by implementing the ongoing support for the participants by telephone calls from the first researcher in regards to evaluating the progress of the independence in ADL at their home. This study advocated that verbal persuasion given by the researcher and family caregivers to the participants enhanced the participants when they were building enactive mastery experience and vicarious experience.

The applied activities of physiological and affective state gained understanding regarding effect of stroke physically and emotionally that were tailored to the participant's condition, but it was only physically. Furthermore, this study applied deep breathing and relaxation technique as therapeutic exercise that were beneficial for reconditioning and physical fitness. This study confirmed that the experimental group were more confident and ready when they knew their physical and emotional status was appropriate for performing ADL exercise and it strengthened them after they applied the deep breathing and relaxation technique.

Besides engaging in every self-efficacy source experience in the hospital session, the follow-up program ensured to increase participants' self-efficacy within six weeks. By face to face interviews or telephone calls weekly after discharge, participants in this study continued to build their confidence to perform ADL more independently. In addition, the delivered method and media of intervention contributed to the information and support satisfaction of the participants and family caregivers in this study. They preferred to have information and discussion by face to face when they were in hospital. Additionally, they preferred active delivery information such as an active discussion by telephone call and text messaging.

The implementation of source of self-efficacy integrated with the combination of ADL interventions (task-oriented training, information provision, and telerehabilitation) strengthened the power of the program of this study. Task oriented training focused on ADL and was integrated into enactive mastery experience and vicarious experience to obtain their actual experience. Task-oriented training by using an action observation of ADL videos was integrated into the activities of vicarious experience that this method was also applied by Liu, Ng, & Ng (2018). The information provided on the benefits of ADL training, technique and strategies of adapted ADL performance, and understanding stroke effects were integrated into the activities of self-efficacy sources. Telerehabilitation stroke of this study program was integrated more in follow-up sessions and enriched the active communication and stroke resources for home rehabilitation. This method, in prior studies, has shown significant improvement in self-efficacy and physical function and has been effective as a useful supplement to traditional post stroke rehabilitation (Liebe et al., 2018).

In this study, participants were encouraged to participate actively in sustaining their efforts consistently and persistently in order to master the level of independence in ADL. This revealed proactive coping of patients were also contributed to achieving a positive outcome with the self-efficacy as mediator. It was congruent with Bandura (1997) who argued that the high self-efficacy was constructed with a continuous intention to achieve successful performances. Furthermore, family caregivers in the experimental group lacked knowledge and experience of improving participants' ADL. The condition of family caregivers was unprepared for the new care situations before discharge and the first month after discharge (Hagedoorn et al., 2020). In this study, providing intervention made family caregivers more aware and prepared to be a person in charge for the participants.

This study program was conducted within a six week period for all participants and yielded the

improvement of self-efficacy to perform ADL and independence in ADL in the experimental group. In a prior study, 80% surviving stroke achieved the best ADL function within six weeks while 95% of the stroke patients reached it within 12.5 weeks (Teasell & Hussein, 2013). However, stroke patients who received therapeutic intervention had significant improvement of functional status within six weeks in other previous studies. (Dettmers et al., 2014; Noinawakul et al., 2010). It can be assured that the dosage levels for developing the self-efficacy were higher for the participants of the experimental group due to the effectiveness of the program. It can also be confirmed that participants in the control group had lower self-efficacy followed by lower independence in ADL.

This study found that self-efficacy of participants in the experimental group improved as similar increase as independence in ADL over time within six weeks. This was congruent with self-efficacy theory by Bandura who postulated that implementing the source of self-efficacy will enhance a person's self-efficacy and people who have strong or high self-efficacy regarding their capabilities will achieve the designed level performance (Bandura 1994, 1997). Nevertheless, there was a significant difference for independence in ADL over time for participants in the control group. This finding explained that participants in the control group might have additional activities for usual care, such as other physical therapies and occupational therapies on OPD or private rehabilitation clinic. However, not all participants in in the control group participated for additional activities in the OPD or rehabilitation clinic due to barrier of long distance and transportation to OPD, lack of financial support, and no family member to accompany. Furthermore, their belief of capability to perform ADL independently might also be influenced by their difficulties and disabilities post stroke when they did not obtain continuous therapeutic support.

**Limitation**

This study was lack of randomization for selections. The researcher cannot control the dosage exposure for participants to have other actual performances of ADL or tasks exercise, to observe other similar stroke patients performing ADL in OPD or in the community, to obtain verbal persuasion from others, such as other professional healthcare and their peers, and to have physical and emotional exploration from other professional health care after hospitalization regarding ADL exercise experience. In addition, this study had participants who had first stroke, second stroke or more.

## 4. Conclusion

This quasi-experimental research study with repeated measures indicated the self-efficacy and independence in ADL of participants in the experimental group was significantly higher after participating in the self-efficacy enhancing ADL program than participants in the control group. It evidenced the self-efficacy enhancing ADL program shown its effectiveness. This study provided knowledge and evidence for advance practice nurses to provide and develop the empowerment intervention for the stroke patients and family caregivers to improve the quality of continuing care in stroke rehabilitation. Further study can use a randomized-control trial and determine the participants, which are who only have low self-efficacy, who have psychological stress regarding stroke, who had only first stroke to evaluate the effectiveness of this program for broadly stroke population.

**Acknowledgement**

The authors would also like to thank specially to the research team of hospitals and research assistances. Special thanks also for stroke patients and their family caregivers who participated in this study.

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