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Relationships Between the Health Belief Model Constructs and Post-Stroke Patient Preferences in Choosing Acupuncture Therapy in Ngawi East Java

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ABSTRACT

Background: Stroke is a serious medical condition that poses a significant risk of mortality and long-term disability, making it one of the leading causes of death and disability worldwide. Selecting an appropriate therapy is crucial to enhancing the quality of life among post-stroke patients. The Health Belief Model (HBM), which emphasizes individual beliefs regarding health and illness, is thought to play a pivotal role in influencing patients' decisions when choosing therapeutic interventions. This study aims to analyze the application of the Health Belief Model in the selection of acupuncture therapy among post-stroke patients.
Subjects and Method: This study employed a cross-sectional design and was conducted in Ngawi Regency from October to December 2024. 200 samples of post-stroke patients were taken using the fixed disease sampling technique, consisting of 100 patients undergoing acupuncture and 100 patients undergoing physiotherapy. Dependent variables were the preference of acupuncture therapy and physiotherapy. Independent variables were perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. Data was collected using questionnaires and analyzed using path analysis on STATA 17.
Results: The preference for acupuncture therapy was directly influenced by self-efficacy (b=3.41; CI95%=2.59 to 4.23; p<0.001). Self-efficacy to undergo acupuncture therapy was influenced by the perceived benefits (=2.75; CI95%=1.74 to 3.75; p<0.001), perceived barrier (b=-0.94; CI95%=-1.96 to 0.80; p<0.001), and cues to action (b=3.36; CI95%=2.32 to 4.40; p<0.001). Perceived benefit was influenced by perceived severity (b=1.25; CI95%=0.62 to 1.88; p<0.001).
Conclusion: Self-efficacy directly influences the preference for acupuncture therapy. Meanwhile, the perceived benefit, the perceived barrier, and cues of action indirectly affect the preference for acupuncture therapy through self-efficacy. Perceived benefit was influenced by severity perception.

Keywords: Health Belief Model, Acupuncture, Rehabilitation, Stroke

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BACKGROUND

Stroke or Cerebrovascular Accident (CVA), according to the World Health Organization, (2019) is a serious, life-threatening medical condition that can cause death or long-term disability among the sufferer. A stroke occurs when there is a blockage in the blood supply to the brain, or when a blood vessel in the brain ruptures and bleeds. When this happens, parts of the brain cannot get the blood and oxygen they need, and brain cells die. Stroke symptoms will appear in parts of the body controlled by damaged areas of the brain (Chohan et.al., 2019).

According to data from the World Health Organization (WHO), stroke is the leading cause of death and disability worldwide. Every year, about 15 million people worldwide have a stroke. Of these, 5 million died and another 5 million suffered permanent disabilities (WHO, 2024).

Based on the Global Stroke Fact Sheet (World Stroke Organization, 2022), there are 101 million people in the world living with the impact of stroke (post-stroke), and this number has almost doubled in the last 30 years. In Indonesia, the prevalence of stroke is also relatively high. Data from the 2018 Basic Health Research (RISKESDAS) shows that the number of stroke sufferers in Indonesia in 2018 reached 2,120,362 people. The prevalence of stroke in Indonesia increased from 7 per 1,000 population in 2013, reaching 10.9 per 1,000 population in 2018. This figure shows a significant increase compared to previous years, which indicates an increasing trend of stroke cases in the community.

The prevalence of stroke cases in 2013 in East Java was 16 per 1,000 population. In 2018, the prevalence of stroke cases in East Java was 1.24 per 1,000 population, this figure has decreased significantly compared to the previous year (Ministry of Health of the Republic of Indonesia 2013; 2018). Based on data from the East Java Provincial Health Profile (2022), stroke cases are one of the most common diseases in East Java, with 30,854 cases. Data from dr. Soeroto Ngawi Hospital in 2022 states that there are 272 stroke patients recorded (Wijayanti et al., 2024).

Post-stroke patients' disabilities due to neurological deficits require a long recovery period. Therefore, post-stroke rehabilitation is crucial to restore the body's motor and sensory functions as well as the patient's independence (Li, 2023). Two popular approaches in post-stroke medical rehabilitation are acupuncture and physiotherapy. Both are included in the group of physical therapy workers, based on Law No. 17 of 2023 concerning Health.

Acupuncture, which originated in traditional Chinese medicine, has been used for 3,000 years as a treatment for a variety of ailments, and its use for post-stroke rehabilitation shows potential in improving neurological recovery and reducing pain (Rabinstein & Shulman, 2003). A study by Chavez et al., (2017) shows that acupuncture can stimulate blood circulation and improve nerve function, which is important in the post-stroke rehabilitation process. On the other hand, physiotherapy is a more conventional approach and is often used in stroke rehabilitation. Physiotherapy aims to improve muscle movement and strength through structured exercises and manual techniques (Shahid et al., 2023).

Although both therapies have their own benefits, the choice between acupuncture therapy and physiotherapy often depends on the patient's preferences, underlying medical conditions, and available resources (Gurmu, 2022). One of the

factors that influences individuals in choosing therapy is their belief in health, which is described in the Health Belief Model (HBM) (Prasetya et al., 2018).

The Health Belief Model is a psychological framework that can be used to understand an individual's health behavior based on two components: 1) the desire to avoid illness, or conversely, to recover when already sick. 2) belief that certain health measures can prevent or cure illness (Handayani, 2017).

In the context of post-stroke therapy selection, the Health Belief Model can be used to understand how individual beliefs about health and disease risk affect their decision to choose therapy (Alyafei & Easton-Carr, 2024). The Health Belief Model emphasizes that a person's decision to take health measures is influenced by their beliefs about health conditions, the benefits of the action, and the barriers they may face (Purwanto et al., 2016; Asfy and Primanita, 2024). This study aims to determine the relationship between the constructs of the Health Belief Model and the preferences of post-stroke patients in the selection of acupuncture therapy in Ngawi Regency.

SUBJECTS AND METHOD

1. Study Design

This was a cross-sectional study conducted in Ngawi Regency, Central Java, Indonesia, from October to December 2024.

2. Population and Sample

The study population was patients with post-stroke pain and undergoing recovery therapy at an independent acupuncture and physiotherapy practice in Ngawi Regency. 200 post-stroke patient samples were taken using the fixed disease sampling technique, consisting of 100 patients undergoing acupuncture and 100 patients undergoing physiotherapy.

3. Study Variables

The dependent variable in this study was the selection of acupuncture therapy and physiotherapy in post-stroke patients. Independent variables were perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.

4. Operational Definition of Variables

Therapy Selection

Physiotherapy: Post-stroke patients' decisions in choosing physiotherapy as rehabilitation therapy.

Acupuncture Therapy: Post-stroke patients' decision in choosing acupuncture therapy as rehabilitation therapy.

Perceived Severity: An individual's beliefs about how serious the consequences of a disease or health problem are

Perceived Benefits: An individual's beliefs regarding the benefits of taking preventive measures or treatment.

Perceived Barriers: An individual's perception of barriers or obstacles that may prevent them from taking treatment measures.

Cues to Action: External factors that encourage individuals to take health measures.

Self-Efficacy: An individual's belief in their ability to take the necessary actions to maintain health.

5. Study Instruments

The tool used in this study was a questionnaire that was made by the researcher based on the application of the Health Belief Model theory.

6. Data analysis

Univariate analysis was used to describe the characteristics of each research variable. Bivariate analysis was conducted using a chi-square test with the independent variables: perceived severity, perceived benefit, perceived barrier, cues to action, and self-efficacy toward the dependent variable: the selection of acupuncture

therapy and physiotherapy. Multivariate analysis was conducted using a path analysis model through STATA 17 software.

7. Research Ethics

Research ethics in the form of informed consent have been approved and signed by the study subjects consciously and without coercion. An ethical clearance has been obtained from the Research Ethics Committee of Dr. Moewardi Hospital, Surakarta City on October 18, 2024 with number 2.482/X/HREC/2024.

RESULTS

1. Sample Characteristics

Table 1 shows the characteristics of research subjects based on gender, it is identified that out of 200 study subjects, 104 study subjects (52%) were male, and 96 study subjects (48%) were female. The majority of the study subjects were at the age of 51-60 years with a total of 64 people (32%), while the least study subjects were at the age of 30-40 years (22%). Of the 200 study subjects, as many as 142 people (71%) were highly educated (senior high school at the minimum). Most of the study subjects worked as many as 145 people (72.5%).

Table 1. General characteristics of post-stroke study subjects undergoing therapy in Ngawi Regency

Variable	Frequency (n)	Percentage (%)
Gender		
Male	104	52.00
Female	96	48.00
Age		
30 – 40 years	22	11.00
41 – 50 years	33	16.50
51 – 60 years	64	32.00
61 – 70 years	58	29.00
>70 years	23	11.50
Level of education		
Low (<Senior High School)	58	29.00
High (>Senior High School)	142	71.00
Employment		
Employed	145	72.50
Unemployed	55	27.50
Stroke Frequency		
1 time	152	76.00
2 times	41	20.50
3 times	4	2.00
4 times	2	1.00
5 times	1	0.50
Post-Stroke Period		
0 – 4 weeks (1 month)	35	17.50
5 – 24 weeks (2-6 months)	49	24.50
25 – 48 weeks (7-12 months)	41	20.50
2 years	36	18.00
3 years	25	12.50
>3 years	14	7.00

The table presents the sociodemographic characteristics of the study participants (n = 200) based on gender, age, education level, and employment status. In terms of

gender, the sample consisted of slightly more males (52.00%) than females (48.00%). Regarding age distribution, the majority of respondents were aged 51–60 years (32.00%), followed by those aged 61–70 years (29.00%). Participants aged 41–50 years accounted for 16.50%, while those aged 30–40 years and over 70 years were the smallest groups, representing 11.00% and 11.50% respectively.

For educational level, a significant proportion of respondents (71.00%) had a high level of education (above senior high school), while 29.00% had a low education level (less than senior high school). In terms of employment status, the majority were employed (72.50%), and the remaining 27.50% were unemployed. These results provide a clear overview of the demographic makeup of the study sample, which is predominantly middle-aged to older adults, mostly educated beyond high school, and largely employed.

Table 2 shows that out of 200 study subjects, the most post-stroke period, ever since medical diagnosis, was in the range of 5 to 24 weeks (2 to 6 months), as many as 49 people (24.5%).

Table 4. Distribution of the study subjects based on the Health Belief Model

Variable	Frequency (n)	Percentage (%)
Perceived severity		
Low	62	31.00
High	138	69.00
Perceived benefits		
Low	84	42.00
High	116	58.00
Perceived barrier		
Low	91	45.50
High	109	54.50
Cues to Action		
Low	92	46.00
High	108	54.00
Self-efficacy		
Low	84	42.00
High	116	58.00

The table shows the distribution of study participants based on components of the Health Belief Model, which include perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. A majority of participants (69.00%) had a high perception of the severity of health issues, indicating that they viewed the health threat as serious. Similarly, 58.00% of participants perceived high benefits from taking health-related actions, suggesting a positive view of the outcomes of health behavior.

Regarding perceived barriers, 54.50% of participants reported high barriers, meaning more than half experienced obstacles that may prevent them from engaging in health-promoting behaviors. For cues to action, 54.00% of respondents had high cues, indicating external or internal factors that likely motivated them to act. Lastly, 58.00% of participants demonstrated high self-efficacy, showing that most of the study subjects believed in their ability to successfully take health-related actions. Overall, the results suggest that most participants held positive health beliefs, with high levels of perceived severity, benefits, cues to action, and self-efficacy.

2. Bivariate Analysis

The bivariate analysis in this study aimed to elucidate the relationship between the independent variables (perceived severity, perceived benefit, perceived barrier, cues to action and self-efficacy) and the dependent variable (selection of post-stroke therapy). The analytical test used in this bivariate analysis was the chi-square test with a 95% degree of confidence (p<0.05).

Table 5 Results of the chi-square test of the relationship between the Health Belief Model constructs and the selection of therapy among post-stroke patients

Variable	Therapy Selection						OR	CI 95%		p
	Acupuncture		Physiotherapy		Total			Upper Limit	Lower Limit	
	n	%	n	%	n	%				
Perceived Severity										
Low	43	69.35	19	30.65	62	100	3.21	1.70	6.08	<0.001
High	57	41.30	81	58.70	138	100				
Perceived Benefit										
Low	81	96.43	3	3.57	84	100	137.84	39.37	482.50	<0.001
High	19	16.38	97	83.62	116	100				
Perceived Barrier										
Low	29	31.87	62	68.13	91	100	0.25	0.13	0.45	<0.001
High	71	65.14	38	34.86	109	100				
Cue to Action										
Low	74	80.43	18	19.57	92	100	12.96	6.58	25.54	<0.001
High	26	24.07	82	75.93	108	100				
Self-Efficacy										
Low	75	89.29	9	10.71	84	100	30.33	13.34	68.93	<0.001
High	25	21.55	91	78.45	116	100				

Table 5 of the results of the bivariate analysis of perceived severity showed that the perceived severity had an OR value of 3.21 with p<0.001 which means that there was a relationship between perceived severity and selection of post-stroke therapy and was statistically significant. Post-stroke patients with a high perceived severity were 3.21 times more likely to choose acupuncture therapy compared to post-stroke patients with low perceived severity.

Table 5 shows that the results on the perceived benefit had an OR value of 137.84 with p<0.001, which means that there was a relationship between perceived benefit and selection of therapy and was statistically significant. Post-stroke patients with a high perceived benefit were 137.84 times more likely to choose acupuncture therapy compared to post-stroke patients with low perceived benefit.

Table 5 shows that the results on the perceived barrier had an OR value of 0.25 with p<0.001, which means that there was a relationship between the perceived barrier and the selection of therapy and was statistically significant. Post-stroke patients with high perceived barrier were 0.25 times more likely to choose acupuncture therapy compared to post-stroke patients with low perceived barrier.

Table 5 shows that the results on the cues to action had an OR value of 12.9 with p<0.001, which means that there was a relationship between the acting cue and the selection of therapy and was statistically

significant. Post-stroke patients with high cues to action were 12.9 times more likely to choose acupuncture therapy compared to post-stroke patients with low cues to action. Table 5 shows that the results on the self-efficacy variable had an OR value of 30.33 with p<0.001, which means that there was a relationship between self-efficacy and the selection of therapy and was statistically significant. Post-stroke patients with high self-efficacy were 30.33 times more likely to choose acupuncture therapy compared to post-stroke patients with low self-efficacy.

3. Path Analysis

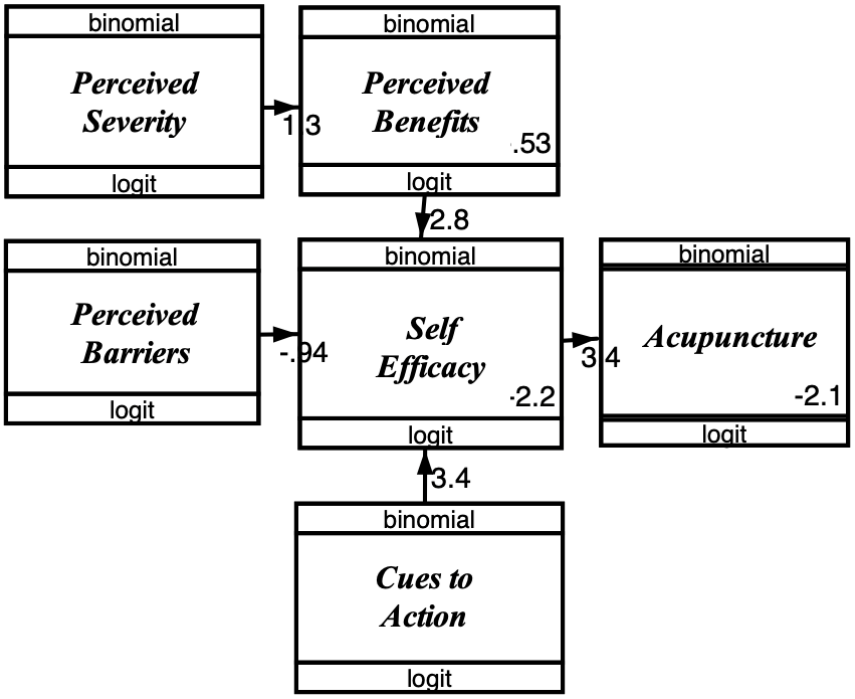

Figure 1. Structural model with an estimate of the application of the Health Belief Model in the selection of acupuncture therapy in post-stroke patients

Table 6 Results of the path analysis of the influence of the Health Belief Model constructs on the selection of acupuncture therapy among post-stroke patients in Ngawi Regency

Dependent Variable	Dependent Variable	b	CI (95%)		p
			Lower limit	Upper limit	
Direct Effect					
Acupuncture Selection	← Self-Efficacy (strong)	3.41	2.59	4.23	<0.001
Indirect Effect					
Self-Efficacy (Strong)	← Perceived Benefits (positive)	2.75	1.74	3.75	<0.001
	← Strong perceived barrier	-0.94	-1.96	0.08	0.071
	← Cues to Action (exist)	3.36	2.32	4.40	<0.001
Perceived Benefits (positive)	← Perceived severity (high)	1.25	0.62	1.88	<0.001

Table 6 shows that strong self-efficacy directly increased the likelihood of acupuncture selection (b= 3.41; 95%CI= 2.59 to 4.23; p<0.001). Acupuncture

therapy was indirectly affected by perceived benefit, percived severity, perceived barrier, and cues to action through self-efficacy. High perceived benefit benefit (b=2.75; 95% CI= 1.74 to 3.75; p<0.001) and cues to action (b= 3.36; 95%CI= 2.32 to 4.40; p<0.001) increased self-efficacy. High perceived barrier decreased self-efficacy (b= -0.94; 95% CI= -1.96 to 0.08; p=0.071). High perceived severity increased the likelihood of perceived benefit (b= 1.25; 95%CI= 0.62 to 1.88; p<0.001).

DISCUSSION

1. The relationship between perceived severity and the selection of acupuncture therapy among post-stroke patients

The results of the analysis showed that there was a direct positive relationship between self-efficacy and the choice of acupuncture therapy (b=3.41; CI95%=2.59 to 4.23; p<0.001). This study showed that post-stroke patients with strong self-efficacy were 3.41 units more likely to choose acupuncture therapy compared to post-stroke patients with weak self-efficacy.

The results of this study are in line with a study of Rahmawati *et al.* (2024) which suggests that there is a very significant relationship between perceived severity and recurrent stroke prevention behavior in post-stroke patients. The higher the severity experienced, the higher the behavior to prevent recurrent stroke.

The perceived severity and the perceived benefit in the selection of acupuncture therapy influence each other. Individuals who feel their health conditions are severe or serious and interfere with their quality of life tend to be more active in seeking treatments that they believe can provide benefits, including acupuncture (Khazaeian *et al.,* 2020). They will be more likely to consider therapies that have been proven to be beneficial for others with similar conditions. If acupuncture is considered a beneficial option, they will be more open to trying it. A study by Yam & Wilkinson (2010) states that 64% of the study subjects believe that acupuncture has the potential to improve the functional abilities of stroke patients, and most of them are willing to consider this option if available.

2. The relationship between perceived benefit and the selection of acupuncture therapy among post-stroke patients

The results of the analysis indicated that there was an indirect positive relationship between the perceived benefits and the selection of acupuncture therapy through self-efficacy (b=2.75; CI95%=1.74 to 3.75; p< 0.001). This study showed that post-stroke patients who had positive perceived benefits of acupuncture had a 2.75 unit stronger self-efficacy to undergo acupuncture than post-stroke patients with negative perceived benefits.

The perceived benefits in this study refer to the individual's belief in how effective acupuncture therapy is in addressing the health problems they face. If a person believes that acupuncture can provide significant benefits, such as reducing pain or improving quality of life, they are more likely to choose this therapy (Liu *et al.,* 2024). This is in line with a study by Ariyanti *et al.* (2020) which shows that individuals who have positive perceived benefits of acupuncture tend to be more open to trying this therapy, especially if they have heard positive experiences from others or have good knowledge of the benefits of acupuncture.

Previous positive experiences with acupuncture or other alternative therapies can also improve the perceived benefits and self-efficacy. If a person has already benefited from acupuncture, they will be

more confident to continue this therapy in the future and believe that it is effective (Cao *et al.*, 2020).

3. The relationship between perceived barriers to the selection of acupuncture therapy among post-stroke patients

The results of the analysis showed that there was an indirect negative relationship between the Perceived barriers and the selection of acupuncture therapy through self-efficacy (b= -0.94; CI95%= -1.96 to 0.08; p=0.071). This study showed that post-stroke patients who had a large perceived barrier to undergoing acupuncture had a 0.94 unit lower self-efficacy to undergo acupuncture, compared to post-stroke patients who had a small perceived barrier. From the results of this study, it was found that 54.50% of post-stroke patients had a high perceived barrier, which means that many study subjects felt that the existing obstacles were enough to influence the study subjects to choose acupuncture therapy.

Perceived barrier refers to an individual's beliefs about various factors that may prevent them from undergoing certain therapies (Rosenstock *et al.,* 1994). Perceived barrier is a perceived obstacle or self-belief that one's comfort is reduced due to ignoring unhealthy behaviors. Various negative barriers can be obstacles in health efforts, such as worries about side effects, uncertainty about treatment, the emergence of sensed hindrances such as discomfort, incompatibility, and anxiety (Putri *et al.,* 2024).

Patients may doubt how effective acupuncture is in aiding their recovery, especially if they do not have enough information or positive previous experiences. In a study by Bao *et al.,* (2018), among 593 study subjects, 41.6% (n=247) of participants lack knowledge about acupuncture treatment, which is the most common reason people do not use acupuncture. The cost of acupuncture therapy and access to a professional practitioner can also be a barrier. If patients feel that this therapy is too expensive or difficult to reach, they may be reluctant to try it (Hopton *et al.,* 2013).

Some patients may feel afraid or uncomfortable with the acupuncture procedure itself, which can prevent them from choosing this therapy. The results of a study by Liu *et al.,* (2013) show that study subjects can receive acupuncture more easily if they experience less discomfort (no or little discomfort) and are treated by a professional acupuncturist.

4. The Relationship between Cues to Action and the Selection of Acupuncture Therapy among Post-Stroke Patients

The results of the analysis showed that there was an indirect positive relationship between the cues of action and the selection of acupuncture therapy through self-efficacy (b=3.36; CI95%=2.32 to 4.40; p< 0.001). This study showed that post-stroke patients who received cues to action in undergoing acupuncture had a self-efficacy of 3.36 units stronger to undergo acupuncture than post-stroke patients who did not receive cues to action.

Cues to action refer to motivations or triggering factors that prompt individuals to take action, which can be internal, such as physical discomfort or sensing symptoms of pain, or external, such as advice from friends and family, social media, health professionals, and health promotion campaigns (Wu & Chiang, 2023).

Positive cues to action, such as recommendations from medical personnel or testimonials from other patients, can improve self-efficacy. In line with a study by Pinto *et al.,* (2022), when patients see that others are successful with acupuncture,

they may feel more confident to try this therapy. When patients feel confident that they can successfully undergo acupuncture (high self-efficacy), they are more likely to respond to the cues to action by taking the step of doing acupuncture therapy. Conversely, if self-efficacy is low, positive cues may not be enough to motivate patients to try acupuncture (Vancouver & Kendall, 2006).

Support from those closest to you can act as a cue to act. For example, if the family encourages the patient to try acupuncture, this can improve the patient's self-efficacy, so they are more likely to follow the advice (Bishop & Lewith, 2013).

5. The Relationship between Self-Efficacy and the Selection of Acupuncture Therapy in Post-Stroke Patients

The results of the analysis showed that there was an indirect positive relationship between the perceived severity and the selection of acupuncture therapy through the perceived benefits (b=1.25; CI95%=0.62 to 1.88; p< 0.001). This study showed that post-stroke patients who had a perception that stroke had a negative effect on their condition had positive perceived benefits of undergoing acupuncture therapy 1.25 units stronger than post-stroke patients with low perceived severity.

The results of this study are in accordance with a study by Klompstra *et al.,* (2018) and Alhofaian *et al.,* (2024), patients with high self-efficacy tend to be more motivated to try acupuncture. They believe that this therapy can help them in the recovery process. Conversely, if self-efficacy is low, patients may feel hesitant to try acupuncture despite positive recommendations from medical personnel. When patients have a strong belief that they can succeed with acupuncture, they are more likely to respond to recommendations from healthcare professionals.

High self-efficacy can change patients' perceptions of therapy, making them more open to taking steps to undergo acupuncture (Wang *et al.*, 2024). If patients benefit from the first acupuncture session, this can improve their self-efficacy. This positive experience creates a cycle in which self-confidence increases, encouraging patients to continue therapy (Rugg *et al.,* 2011). High self-efficacy can also help patients overcome fears or obstacles they may face (Törnblom & Hansson, 2022). Patients who believe in their ability to deal with needles or acupuncture procedures are more likely to overcome anxiety and undergo therapy.

Self-efficacy plays an important role in the selection of acupuncture therapy for post-stroke patients. Patients' confidence in their ability to successfully undergo therapy can influence their decision to try acupuncture (Krist *et al.,* 2017).

AUTHOR CONTRIBUTION

Cynthia Ayu Dian Puspitaningrum was the main researcher who chose topics and prepared study instruments, searched and collected data, and processed data. Hanung Prasetya, Argyo Demartoto, Bhisma Murti, and Revi Gama Hatta Novika conducted data analysis and reviewed study documents.

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CONFLICT OF INTEREST

There was no conflict of interest in this study.

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