ORIGINAL ARTICLE

Study on stigma and ability of daily living in stroke patients

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ABSTRACT

Objective: By analyzing the stigma and ability of daily living in stroke patients, this study examines the effectiveness of intervention programs in improving stroke patients' perception of stigma and their ability to perform daily activities.

Methods: One hundred and thirty-two inpatients with stroke from the Department of Rehabilitation at a tertiary Class A hospital were selected and, using the PERMA model as a theoretical foundation, a "modified PERMA model" intervention protocol was developed to conduct an intervention study. Sixty-six patients in the modified PERMA group were hospitalized between June and August 2022, while the other 66 patients in the conventional treatment group were hospitalized between February and May 2022. Both groups received rehabilitation therapy and standard care; the modified PERMA group additionally received a PERMA-based nursing intervention for 4 weeks, twice a week. The Stigma Scale and the Barthel Index were administered before the intervention, as well as immediately after the intervention and at 1 and 3 months.

Results: In the modified PERMA group, the pre-intervention score on the Stigma Scale was 46.53 ± 12.204; the immediate post-intervention score was 40.53 ± 12.101; the score at 1-month post-intervention was 30.70 ± 12.428; and the score at 3-month post-intervention was 21.57 ± 12.470; The Barthel Index scores for patients in the modified PERMA group were 58.05 ± 18.171 before intervention, 73.08 ± 18.018 immediately after intervention, 80.67 ± 15.877 at 1-month post-intervention, and 86.08 ± 14.616 at 3-month post-intervention. In the conventional treatment group, the pre-intervention score on the Stigma Scale was 46.12 ± 9.184; the immediate post-intervention score was 45.15 ± 9.109; the score at 1-month post-intervention was 41.47 ± 9.864; and the score at 3-month post-intervention was 39.58 ± 10.376; The Barthel Index scores for patients in the conventional treatment group were 56.02 ± 24.047 before intervention, 62.00 ± 23.843 immediately after intervention, 66.83 ± 23.415 at 1-month post-intervention, and 74.088 ± 23.280 at 3-month post-intervention. An analysis of variance (ANOVA) for repeated measures revealed that, both groups of patients showed a decrease in stigma scores and an increase in Barthel Index scores over time, with the modified PERMA group demonstrating superior outcomes in comparison to the conventional treatment group ($p <$ .05).

Conclusions: The PERMA model intervention for stroke patients can effectively reduce stigma and improve their ability of daily living.

Key Words: Stroke, PERMA model, Stigma, Activity of daily living

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1. INTRODUCTION

Stroke is the leading cause of disability in young and middle-aged adults,[1] and the incidence of stroke worldwide is showing a trend toward younger-aged groups.[2,3] As the backbone of society, young and middle-aged adults bear significant social and family responsibilities. Approximately 80% of stroke patients experience mild to moderate stigma associated with their condition.[4] This stigma leads to loneliness, social withdrawal, and isolation,[5] resulting in reduced motivation and initiative toward rehabilitation.[5] It has become a major barrier to patient recovery[6] and also places a heavy burden on families and society.

Therefore, reducing the stigma associated with stroke and improving patients' independence in daily living are the primary goals of post-stroke rehabilitation.[7] Currently, research on the stigma associated with stroke has primarily focused on reducing negative emotions,[8] with limited success, while interventions based on positive psychology have been rarely reported. The PERMA model,[9] originating from positive psychology, consists of five components: Positive Emotions (P), Engagement (E), Relationships (R), Meaning (M) and Accomplishments (A). This model is a practical framework grounded in individual strengths, advantages, potential, interests, characteristics and differences. By tapping into patients' own potential and enhancing their positive emotions, the model has demonstrated significant effectiveness in inpatients,[8] healthcare professionals,[10,11] nursing education[12] and case management.[13]

This study uses the PERMA model as its theoretical foundation to develop an intervention program and investigate its effects on the stigma associated with stroke and the activities of daily living (ADL) in stroke patients.

2. SUBJECTS AND METHODS

2.1 Subjects

By use of convenience sampling, 132 stroke patients hospitalized in the Department of Rehabilitation at a tertiary Class A hospital who met the inclusion and exclusion criteria were selected as study subjects. 66 patients admitted between February and May 2022 were assigned to the conventional treatment group, while the other 66 patients admitted between May and August 2022 were assigned to the modified PERMA group.

Inclusion criteria are listed as follows: Patients who meet all of the following conditions: (1) patients whose age $\geq$ 18 years and < 65 years;[14] (2) patients who meet the Diagnostic criteria of cerebrovascular diseases in China (version 2019);[15] (3) patients with stable clinical conditions; (4) patients whose total score on the Stroke Stigma Scale are no less than 31.25 points (moderate or higher level of stigma); (5) patients with normal cognitive function; (6) patients who have signed the informed consent to participate in this study. Exclusion criteria are listed as follows: Patients who meet any of the following conditions: (1) patients with other serious complications, such as heart failure, respiratory failure, malignant tumors, severe trauma, or other life-threatening conditions; (2) patients currently participating in other clinical trials.

Withdrawal criteria: Patients who meet any of the following conditions: (1) patients who are unable to participate in the study due to the course of their disease; (2) patients who voluntarily request to withdraw from the study for personal reasons; (3) patients who are lost to follow-up.

This study has been approved by the Institutional Review Board (IRB) (Ethics No.: 20220328004-FS01), and all patients provided informed consent.

2.2 Research methods

2.2.1 *Conventional treatment group*

The conventional treatment group received standard rehabilitation therapy and nursing care. Standard nursing care included the education on stroke-related knowledge, the prevention of common post-stroke complications, the positioning to spasticity, the medication guidance, the education on rehabilitation adherence, the discharge instructions, the dietary guidance, and the psychological counseling.

2.2.2 *Modified PERMA group*

Establishment of the research group

All members had received unified training and had their responsibilities assigned. There were 2 research supervisors (both are nursing experts in the field of chronic diseases), 1 national second-level psychological counselor, 2 rehabilitation specialist nurses (with intermediate or above professional titles), 1 rehabilitation physician (with intermediate or above professional titles), 1 rehabilitation therapist, and 2 postgraduate students enrolled at that time. Among them, the supervisor was responsible for the overall guidance and coordination of the plan for the investigated departments. The psychological counselor participated in the training of the PERMA program design and implementation of the investigation guidance words. Rehabilitation physicians were responsible for disease assessment. Rehabilitation therapists were responsible for rehabilitation guidance. Rehabilitation specialist nurses were responsible for routine care. The researcher was responsible for the data entry and statistical analysis of the questionnaires for the implementation plan (the researcher was a graduate student with the qualification of a national second-level psychological counselor), and

another graduate student gave an assistance.

Sample size calculation

By reviewing the literature and on the basis of the experimental research results from stroke stigma patients,[16] after 8 weeks of intervention, the stigma score of the modified PERMA group was 45.61 $\pm$ 7.79, and that of the conventional treatment group was 50.32 $\pm$ 8.87. Assume β = 0.1, Power = 1-β = 90%, and the significance level bilateral α = 0.05. After calculation by using Gpower3.1 software, the total sample size was 120 cases. Based on a dropout rate of 10%, 132 cases should be included, with 66 cases in the modified PERMA group and 66 cases in the conventional treatment group.

Development of the intervention plan

Based on the results of the previous investigation, in combination with literature review and the study of the PERMA model theory, the initial draft of the intervention plan was formed. To ensure the scientificity and feasibility of the intervention plan, 7 experts were invited to consult through face-to-face meetings, and the items and contents of the plan were improved and revised according to the experts' suggestions. In order to ensure the practicability and effectiveness of the plan, 10 young and middle-aged stroke patients who met the criteria were selected for the pre-trial, and the problems that occurred in the pre-trial were analyzed and sorted out and then modified in time to form the final draft of the PERMA model nursing intervention plan.

The first intervention: The theme was understanding diseases. Intervention content: (1) Self-introduction of research team members, introduction of department staff, and introduction of the environment; (2) Explained the knowledge related to stroke and rehabilitation exercises to enhance patients' confidence in disease rehabilitation and treatment; (3) Collected patient-related information, including basic information, disease information, psychological status, degree of harmony with family members, and family members' support for the patient; (4) Established a trusted relationship with patients and left contact information such as phone numbers and WeChat for each other (e.g., patients with language dysfunction can communicate with others by gestures, writing, or typing). Suggested prompts: (1) Did you know anything about stroke before? (2) If you have any questions about stroke rehabilitation, please feel free to ask; (3) If you have any psychological concerns, I'd be happy to help you. Format: One-on-one.

Second intervention: The theme was discovering positive psychological qualities (P). Intervention content: (1) Intake interview techniques were used to assess the patients' psychological and emotional state; (2) The psychological issues caused by stroke were analyzed to identify the positive aspects of the situation; (3) Nonverbal communication, such as eye contact and touch, was used to establish empathy with the patients and provide encouragement and emotional support; (4) Patients were asked to share positive and joyful experiences to uncover their positive psychological qualities; (5) For patients aged 18–44 and those with a high monthly income prior to illness, the duration or frequency of communication was appropriately increased based on the course of the session. Suggested prompts: (1) You can think of me as a friend (for patients of similar age) or a younger relative (for older patients) and share something that makes you happy; (2) It's perfectly natural to feel that way; I understand how you feel; (3) I can see that you're doing well right now—for example, as you just mentioned... and you're very positive and upbeat (for patients with speech impairments, communication can be done through writing or typing). Format: One-on-one.

Third intervention: Focused on fostering positive emotions (P). Intervention content: (1) Interviews centered on the concept and benefits of positive emotions were conducted, explaining the advantages of optimistic mindsets and positive emotions for managing the disease; (2) Positive thinking in patients were fostered to encourage a positive attitude toward their stroke experience; films were recommended with uplifting themes, such as "How The Steel Was Tempered" and "The Pursuit of Happyness," to help patients approach treatment and rehabilitation with a positive mindset and return to their families and society as soon as possible; (3) Patients were provided with access to the stroke awareness video "Time Is Brain" and videos showcasing stroke rehabilitation case studies; (4) Patients were promptly acknowledged and praised when they demonstrated positive emotions; (5) For patients with speech impairments, speech exercises were conducted to stimulate positive emotions through vocalization. Suggested prompts: (1) Tell me about some positive and happy experiences in your life; (2) Think back to some difficult situations you've faced in life, and let's try to look at them from a positive perspective; (3) Some situations are like the story of "The Old Man at the Frontier Loses a Horse"—we should try to see the silver lining; (4) In stroke awareness videos, we see that people can make good progress through active treatment and rehabilitation exercises. Format: One-on-one.

Fourth intervention: The theme was a gratitude exercise (P). Intervention content: (1) The positive effects of cultivating gratitude on improving emotional well-being and enhancing life satisfaction were explained; (2) The events in the patients' life and during their hospital stay were used as a starting point to guide them in reminiscing; (3) Patients were

encouraged to pay attention to the beautiful and joyful aspects of life, and to record three positive events that occurred each day before bedtime in a diary or social media post (these can be small or significant events; patients may also dictated them to a family member for recording); (4) Patients were helped to recognize the importance of interpersonal relationships and encouraged to maintain this practice (for at least 21 days). Suggested prompts: (1) Think about moments or people from your past or during your hospital stay that touched you deeply. If you feel comfortable sharing, please tell us about them; (2) You can write a thank-you letter, compose a WeChat message, or record a voice note and send it to the person you're grateful to; (3) You can keep a daily record of the happy and wonderful things that happen to you. Format: One-on-one.

Fifth intervention: Focused on engagement exercises (E). Intervention content: (1) The definition and positive effects of the "flow" state were explained; (2) Based on the patients' rehabilitation needs, and following an assessment of the patients' condition by a rehabilitation physician, patients were encouraged to engage in rehabilitation activities together under the guidance of a rehabilitation therapist, and to invest positive emotions and experience a sense of fulfillment. Examples included hand function rehabilitation exercises such as "picking up beans, tightening nuts and buttoning;" (3) Discussed the patients' hobbies and interests. Organized activities that combine the patients' medical condition with their personal interests, such as playing chess, reading, or listening to music. Once the patient entered the "Flow" state, their attention shifted away from their illness, leading to physical and mental relaxation, which promoted positive psychological changes. Suggested prompts: (1) What are your hobbies or interests? We can talk about them together; (2) Wouldn't it be fun if we planned rehabilitation activities together and did the exercises together? Feel free to share any ideas or suggestions with me at any time; (3) Now imagine this: You're at home, sitting in your study, reading your favorite book and listening to your favorite songs. Format: One-on-one.

Sixth intervention: Focused on building positive relationships (R). Intervention content: (1) Discussed positive communication techniques and the importance of effective communication in interpersonal relationships; (2) Conducted interviews focused on interpersonal relationships, using examples to illustrate the physical and mental benefits of healthy relationships; (3) Conducted role-playing exercises to help patients understand positive communication methods and experience positive emotions; (4) When permitted by the rehabilitation physician's assessment of the patients' condition, engaged in simple games with family members, patients, and fellow patients, such as a finger-tapping game; (5) Invited stroke patients who had made good progress to share their experiences. Suggested prompts: (1) Tell me about someone you care about, or share a difficult or joyful experience you've had together; (2) I just overheard you discussing lower-body exercise methods with another patient; it's great that you're learning from each other; (3) XXX in Bed XX is also a stroke patient. He has a cheerful personality, an optimistic outlook, and is actively engaged in rehabilitation exercises—he's making good progress. You two should talk more; I can introduce you. Format: One-on-one.

Seventh intervention: The theme is reflecting on meaning (M). Intervention content: (1) Patients were engaged in discussions about the meaning of life, the significance of existence, the purpose of daily living, the importance of loved ones, and the value of health, guiding them to develop a healthy perspective on meaning. A positive outlook on life can help patients cultivate a sense of purpose and direction; (2) The importance of each individual's role within the family and their significance to loved ones, friends, and society were discussed; (3) A sense of responsibility was fostered toward family, friends, and society; (4) Patients were guided to approach life's ups and downs with an optimistic mindset. For instance, in the case of a stroke, learning to grow through adversity is also a meaningful aspect of life; (5) Patients were guided to engage in self-reflection and articulate their own interpretations of meaning. Suggested prompts: (1) Please share a meaningful experience from your personal or professional life; (2) It seems your family is very patient with you; they rely on you greatly, and you mean a lot to them; (3) In fact, everyone faces challenges in life, but remember that after the storm comes the rainbow. Format: One-on-one.

Eighth intervention: The theme is reflecting on achievements (A). Intervention content: (1) The interviews were conducted with patients focused on their achievements, explaining the positive psychological effects that a sense of accomplishment can bring; (2) Worked with patients to develop a "rehabilitation plan;" under the guidance of a rehabilitation therapist, helped patients achieve a sense of accomplishment through functional rehabilitation exercises; (3) The achievable goals were set and, under the guidance of a rehabilitation therapist, patients were encouraged to engage in strength-based activities to gain a sense of accomplishment. Examples included dressing and undressing independently, eating on their own, and using the restroom within their capabilities; (4) Patients were promptly encouraged for their achievements; even the completion of small goals should be acknowledged and praised. Suggested prompts: (1) I saw you exercising in bed on your own—that's great! (2) The physical therapist even told me how much progress you've made.

You're doing a fantastic job—keep it up! (3) Early rehabilitation is crucial. As long as you stick with it every day, you'll create a positive cycle. Take XXX in the next room, for example—they have the same determination as you and are recovering very quickly now; (4) After you're discharged, do you have any goals you'd like to achieve? Now that you have some time, you can start planning them out. Format: One-on-one.

Application of the intervention program

The modified PERMA group received the PERMA care intervention in addition to routine care. The intervention was conducted on a one-on-one basis, beginning in the first week of hospitalization and continuing for a total of 8 sessions over 4 consecutive weeks (twice weekly). Each session focused on a single theme, with the order of themes adjusted flexibly based on the patients' progress. Sessions lasted 30–45 minutes (adjusted flexibly according to the patients' needs), with an interval of 2–4 days between sessions.

2.3 Data collection

Assessments were conducted by using standardized scales before intervention, immediately after intervention, 1 month after intervention, and 3 months after intervention. Inpatients were assessed in the Department of Rehabilitation Medicine, while discharged patients were assessed via telephone or in-person interviews (conducted at the stroke follow-up clinic).

2.4 Assessment tools

(1) **General information questionnaire**

The researchers designed the questionnaire themselves, which consisted of two sections: sociodemographic data (gender, age, marital status, educational level, occupation, monthly income, smoking, alcohol consumption, and primary caregiver) and disease-related data (coexisting chronic conditions, stroke times, and family history).

(2) **Stroke stigma scale (SSS)**

A specific scale for assessing disease-related stigma in stroke patients, developed by Zhu Minfang et al.,[17] consists of 4 dimensions and 16 items. It uses a 5-point Likert scale, where "Never" scores 1 point, "Occasionally" scores 2 points, "Sometimes" scores 3 points, and "Often" scores 4 points, "Always" scores 5 points. The total score ranges from 16 to 80 points; a higher total score indicates a higher level of disease-related stigma. The scale has a Cronbach's alpha of 0.916.[18]

(3) **Barthel Index (BI)**

It is a method used in the field of international rehabilitation to assess patients' ability to perform activities of daily living.[19] Designed by Mahoney and Barthel,[20] it consists of 10 items that evaluate patients' self-care abilities in the following areas: eating, washing, grooming, dressing, bowel and bladder control, toileting, transferring between bed and wheelchair, walking on flat ground, and climbing stairs. The higher the score, the greater the level of independence. A total score of 80–100 indicates an independence in activities of daily living; a total score of 61–79 indicates a need for assistance; a total score of 40–60 indicates a partial dependence; a total score of 20–39 indicates a significant dependence; and a total score of < 20 indicates a complete dependence,[21] Cronbach's alpha is 0.90.[22]

2.5 Statistical methods

(1) Categorical data are described by using frequency counts, while measurement data are described by using the mean $\pm$ standard deviation;

(2) The chi-square test was used to compare general data between the two groups, and the rank-sum test was used to compare ordinal data;

(3) When comparing the two groups at the same time point, if the data follow a normal distribution with homogeneous variances, it is required to use an independent samples t-test;

(4) Repeated ANOVA was used to compare changes across different time points and examine the interaction effect of time.

3. RESULTS

3.1 Comparison of general data between patients in the modified PERMA group and the conventional treatment group

A total of 132 subjects were enrolled in the study, including 66 subjects in the conventional treatment group and 66 subjects in the modified PERMA group. In the conventional treatment group, 5 subjects withdrew for personal reasons and 1 was lost to follow-up; in the modified PERMA group, 1 subject withdrew due to disease progression, 2 were lost to follow-up, and 3 withdrew for personal reasons. Ultimately, 120 subjects completed the follow-up, including 60 subjects in the conventional treatment group and 60 subjects in the modified PERMA group, with an overall response rate of 90.91%. There were no statistically significant differences in the general data between the two groups of patients; the data were comparable, as shown in Table 1.

Table 1. Comparison of general data between the modified PERMA group and the conventional treatment group of stroke patients

		Conventional Treatment Group (60)	Modified PERMA Group (60)	*t* value	*p* value
Gender	Male	42	46	0.682*	.409
	Female	18	14		
Age	18-44	9	10	0.063*	.803
	45-64	51	50		
Marital Status	Married	58	59	0.342*	.599
	Unmarried	2	1		
Educational Level	Elementary school and below	7	6	-0.372#	.710
	Junior high school	15	18		
	High school or vocational high school	23	16		
	Associate degree or higher	15	20		
Occupation	Employee	38	42	4.969*	.174
	Merchant	7	11		
	Peasant	10	3		
	Unemployed	5	4		
Monthly Income	< 1,000 yuan	11	5	-1.278#	.201
	1,000-2,999 yuan	3	2		
	3,000-4,999 yuan	14	16		
	5,000-10,000 yuan	20	22		
	> 10,000 yuan	12	15		
Smoking	No	32	27	0.834*	.361
	Yes	28	33		
Alcohol Consumption	No	37	30	1.656*	.198
	Yes	23	30		
Coexisting Chronic Conditions	No	15	16	0.043*	.835
	Yes	45	44		
Stroke Times	1	42	50	-1.655#	.098
	2	16	8		
	3	2	2		
Primary Caregiver	Families	47	45	0.710*	.701
	Care workers	2	4		
	Self-care	11	11		
Family History	No	28	23	0.853*	.356
	Yes	32	37		

Note. * represents χ^2 value, # represents *z* value

3.2 Comparison of baseline scores between the modified PERMA group and the conventional treatment group before intervention

There were no significant differences in baseline scores between the two groups before intervention ($p > .05$), indicating that they were comparable (see Table 2).

3.3 Comparison of stigma scores between the modified PERMA group and the conventional treatment group after intervention

The comparison of stigma scores at different time points after intervention revealed that the modified PERMA group had lower scores than the conventional treatment group, with statistically significant differences ($p < .05$). Repeated ANOVA was conducted on the stigma scores for patients in both groups at different time points. The results showed statistically significant differences between the two groups in terms of the time effect (F = 974.173, $p < .05$), between-group effect (F = 17.447, $p < .05$), and the ceffect between the two groups (F = 311.469, $p < .05$). The stigma scores for patients in both groups decreased over time, with the modified PERMA group showing superior results in comparison to the conventional treatment group (see Table 3).

3.4 Comparison of Barthel index scores between the modified PERMA group and the conventional treatment group after intervention

The comparison of Barthel index scores at various time points after intervention showed that the modified PERMA group scored higher than the conventional treatment group, with a statistically significant difference ($p < .05$). Repeated ANOVA was conducted on the Barthel index scores for patients in both groups at different time points, revealing statistically significant differences (F = 1284.613, $p < .05$) . There were statistically significant differences in the between-group effect (F = 7.262, $p < .05$) and the interaction effect (F = 93.672, $p < .05$). Barthel index scores in both groups increased over time, with the modified PERMA group showing superior outcomes in comparison to the conventional treatment group (see Table 4).

Table 2. Comparison of baseline scores between the modified PERMA group and the conventional treatment group (points, $\bar{x}\pm$s)

Item	Group	Mean	*t* value	*p* value
Stigma	Conventional Treatment Group (60)	46.12 ± 9.184	-0.205	.838
	Modified PERMA Group (60)	46.53 ± 12.204		
Barthel Index	Conventional Treatment Group (60)	56.02 ± 24.047	-0.518	.605
	Modified PERMA Group (60)	58.05 ± 18.171		

Table 3. Comparison of stigma scores between the modified PERMA group and the conventional treatment group after intervention (points, $\bar{x}\pm$s) (n = 60)

Group	Before intervention	Immediately after intervention	1 month after intervention	3 months after intervention	F_{Time}	$F_{Between-group}$	$F_{Intervention}$
Conventional Treatment Group	46.12 ± 9.184	45.15 ± 9.109	41.47 ± 9.864	39.58 ± 10.376	974.173	17.447	311.469
Modified PERMA Group	46.53 ± 12.204	40.53 ± 12.101	30.70 ± 12.428	21.57 ± 12.470			
t value	-0.205	2.361	5.256	8.603			
p value	.838	.02	.000	.000	.000	.000	.000

Table 4. Comparison of Barthel index scores between the modified PERMA group and the conventional treatment group after intervention (points, $\bar{x}\pm$s) (n = 60)

Group	Before intervention	Immediately after intervention	1 month after intervention	3 months after intervention	F_{Time}	$F_{Between-group}$	$F_{Intervention}$
Conventional Treatment Group	56.02 ± 24.047	62.00 ± 23.843	66.83 ± 23.415	74.08 ± 23.280	1284.613	7.262	93.672
Modified PERMA Group	58.05 ± 18.171	73.08 ± 18.018	80.67 ± 15.877	86.08 ± 14.616			
t value	-0.518	-2.873	-3.668	-3.382			
p value	.605	.005	.000	.001	.000	.008	.000

4. DISCUSSION

4.1 The PERMA intervention program can reduce the level of stigma in stroke patients

The concept of "stigma" was introduced by the American sociologist Goffman[23] and refers to the sense of shame that arises when a person is discriminated against or isolated by others because of a particular illness. Stroke patients bear significant personal, family, and social responsibilities and are at a stage in life when they are best positioned to realize their self-worth and create wealth. The sudden onset of stroke can have a significant psychological impact, leading to changes in their social roles. Stroke patients tend to experience high levels of stigma.[24] In this study, the stigma scores for both groups before intervention were at moderate or higher levels, consistent with the findings of Hou Jiakun et al.[16] The PERMA-based intervention program reduced the level of stigma in stroke patients at 3 months after intervention. In the modified PERMA group, the level of stigma decreased from a moderate or higher level (46.53 $\pm$ 12.204) to a lower level (21.57 $\pm$ 12.470), demonstrating a signifi-

cant effect. The possible reasons are as follows: Firstly, this study utilizes the five components of the PERMA model as a foundation and employs intake interview techniques to assess patients' psychological status. It analyzes the psychological issues caused by stroke, identifies patients' latent positive qualities by focusing on the positive aspects of their experiences, and further cultivates their positive thinking to foster a more positive attitude toward their stroke. Secondly, during the patient's rehabilitation activities, physical therapists and mental health counselors work together with the patient to develop a rehabilitation plan. By engaging in focused exercises alongside the patient and entering a state of "flow," they help divert attention away from the illness, which promotes positive psychological changes and alleviates the stigma. Finally, the intervention emphasizes fostering positive interpersonal relationships. Under the guidance of rehabilitation therapists and psychologists, patients engage in small-group activities with family members and fellow patients, and stroke survivors who have made good progress are invited to share their experiences. Strong relationships with family and peers can help reduce patients' stigma.

4.2 The PERMA intervention program can improve the abilities of daily living in stroke patients

The PERMA intervention program can improve patients' ability to perform activities of daily living, consistent with the findings of Zhu Ting et al.[25] in their study of 63 patients with post-stroke disabilities. In this study, the Barthel index was used for assessment; this scale is considered as an effective prognostic tool for stroke, particularly as a predictor of post-stroke recovery, the level of care required, and the duration of rehabilitation needed.[26] In this study, the Barthel index score was improved from 58.05 ± 18.171 before intervention—indicating a partial dependence in activities of daily living—to 86.08 ± 14.616 at 3 months after intervention, indicating an independence in activities of daily living. In contrast, the conventional treatment group scored 74.08 ± 23.280 at 3 months after intervention, remaining the level requiring assistance. As patients recovered from their illnesses, their abilities of daily living were improved to some extent; however, the intervention group showed significantly better outcomes than the control group. Possible reasons for this include, firstly, patients were involved in the development of their "rehabilitation prescriptions" during the intervention. By incorporating strength-based exercises into their training regimen, the intervention group was able to motivate patients to engage in rehabilitation exercises, help them fully recognize their strengths, and teach them how to apply those strengths to the daily activities, thereby boosting their confidence and interest in daily rehabilitation activities. Secondly, promptly acknowledged and encouraged patients for their small achievements. Engaged in hand function rehabilitation activities with patients, such as "picking up beans, buttoning, and tightening nuts," to help them experience the physical and emotional satisfaction from these accomplishments. This approach boosted patients' positive emotions, encouraged their participation in daily activities (such as buttoning their own clothes and wiping their faces), and improved their ability to perform activities of daily living. Finally, in the activities focused on reflecting on the meaning of life, discussions should center on the meaning of life, the significance of existence, the purpose of daily living, the importance of loved ones, and the value of health. This helped guide patients toward developing a healthy perspective on meaning, encouraging them to face ups and downs with optimism in the daily life. It helps them understand that growing through adversity is the true meaning of life, and a positive outlook on meaning helps enhance patients' initiative in their daily activities.

5. Conclusions

The PERMA intervention program has proven effective for stroke patients. This study is focused on enhancing positive emotions in stroke patients throughout the intervention process, closely aligning the intervention with the five components of the PERMA model. This approach effectively reduces patients' stigma and improves their ability to perform activities of daily living. A limitation of this study is the use of convenience sampling; it is recommended that future studies employ randomized controlled trials with larger sample sizes to enhance the accuracy of the results.

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