

Learned Helplessness and Its Associated Factors among Patients with Stroke-Related Sarcopenia: A Cross-Sectional Study

Yawen Wu^{1,a}, Binbin Yang^{1,b}, Rui Yuan^{1,c}, Xinyue Zhang^{1,d}, Houming Si^{1,e}, Xixi Niu^{1,f}, Pan Zhang^{1,g,*}

¹*College of Nursing and Rehabilitation, North China University of Science and Technology, Tangshan, China*

^a2366376989@qq.com, ^byangbinbin_2001@163.com, ^cyuanr0109@163.com,
^d16603195843@163.com, ^em18263257212@163.com, ^fniuqianqian82@163.com,
^gzhangpan0901@163.com
**Corresponding author*

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Abstract: Stroke-related sarcopenia may increase psychological vulnerability due to impaired physical function and prolonged rehabilitation. However, learned helplessness in this population remains unclear. This study aimed to investigate the level of learned helplessness and its associated factors among patients with stroke-related sarcopenia. A cross-sectional study was conducted among 228 patients with stroke-related sarcopenia. Participants completed the Learned Helplessness Scale, Hospital Anxiety and Depression Scale, Perceived Social Support Scale, and a demographic questionnaire. Multiple linear regression analysis was performed to identify factors associated with learned helplessness. The mean score of learned helplessness was 3.61 ± 0.51 , indicating a relatively high level of learned helplessness among patients with stroke-related sarcopenia. Regression analysis showed that educational level, monthly income, regular physical exercise, depression, number of comorbidities, and perceived social support were independent factors associated with learned helplessness. Higher educational attainment and greater social support were associated with lower levels of learned helplessness, whereas depressive symptoms, multiple comorbidities, and insufficient physical exercise were associated with higher levels of learned helplessness. Patients with stroke-related sarcopenia exhibit a relatively high level of learned helplessness. Early psychological screening and targeted interventions focusing on health education, exercise rehabilitation, depression management, and social support may help reduce learned helplessness and improve rehabilitation outcomes.

1. Introduction

Stroke is a leading cause of disability and mortality worldwide [1]. Following stroke, patients often experience secondary loss of skeletal muscle mass, reduced muscle strength, and impaired

physical function due to neurological deficits, limited mobility, and prolonged inactivity, resulting in stroke-related sarcopenia [2,3]. The prevalence of post-stroke sarcopenia has been reported to be 37.2% [4]. Stroke-related sarcopenia not only leads to motor dysfunction, dysphagia, and increased fall risk, but is also closely associated with psychological problems such as depression, seriously affecting patients' rehabilitation process and quality of life [5].

Learned helplessness refers to a psychological state of hopelessness and resignation that individuals develop after experiencing repeated failures or uncontrollable adverse situations [6]. In the field of chronic diseases, learned helplessness is considered an important psychological factor affecting patients' treatment adherence and prognosis [7]. Chronic stroke patients are highly susceptible to learned helplessness due to long-term physical function limitations and slow rehabilitation progress [8]. Patients with stroke-related sarcopenia may be particularly vulnerable to learned helplessness due to muscle weakness, impaired daily activities, and uncertain rehabilitation outcomes.

Previous studies have shown that gender, symptom distress, family support [9] and socioeconomic status [10] are associated with learned helplessness in stroke patients, while self-efficacy serves as an important protective factor, and negative coping styles such as resignation coping exacerbate helplessness [11]. However, research on influencing factors of learned helplessness in patients with stroke-related sarcopenia is currently lacking.

Therefore, this study aimed to investigate the level of learned helplessness and identify its associated factors among patients with stroke-related sarcopenia, with a focus on the potential roles of depression and social support. The findings may provide evidence for early identification of high-risk patients and development of targeted psychological interventions.

2. Methods

2.1 Study Design and Participants

This cross-sectional study recruited hospitalized patients with stroke-related sarcopenia from the Department of Neurology of a tertiary hospital in Hebei Province, China, between October 2025 and April 2026. Participants were recruited using convenience sampling.

The inclusion criteria were as follows: (1) a diagnosis of stroke according to the relevant diagnostic criteria, confirmed by cranial computed tomography (CT) or magnetic resonance imaging (MRI); (2) fulfillment of the diagnostic criteria for stroke-related sarcopenia; (3) age ≥ 18 years; (4) stable vital signs, clear consciousness, and the ability to cooperate with the relevant assessments; and (5) provision of informed consent and voluntary participation by the patient and family members.

The exclusion criteria were as follows: (1) severe disturbance of consciousness, cognitive impairment, or communication difficulties that prevented completion of the questionnaires; (2) a previous diagnosis of a severe psychiatric disorder; (3) malignant tumors, severe cardiac, hepatic, or renal dysfunction, or other diseases that could substantially affect muscle function; (4) severe physical disability, joint disease, or other conditions that prevented the assessment of muscle strength and physical function; and (5) incomplete clinical data.

2.2 Measures

2.2.1 General Information Questionnaire

A general information questionnaire was developed by the researchers according to the objectives of the study. It collected information on age, sex, educational level, marital status, monthly income, comorbid chronic diseases, regular physical exercise and living status.

2.2.2 Learned Helplessness

Learned helplessness was assessed using the Learned Helplessness Scale (LHS), developed by Wu et al. [12]. The scale consists of 18 items across two dimensions: helplessness and hopelessness. Items are rated on a 5-point Likert scale, with higher scores indicating greater learned helplessness. The scale demonstrated good reliability (Cronbach's $\alpha=0.930$).

2.2.3 Assessment of Anxiety and Depression

Depressive symptoms were assessed using the depression subscale of the Hospital Anxiety and Depression Scale (HADS), developed by Zigmond et al. [13]. The subscale consists of 7 items, with higher scores indicating more severe depressive symptoms. The Chinese version of the HADS depression subscale demonstrated good internal consistency (Cronbach's $\alpha = 0.791$).

2.2.4 Perceived Social Support

Perceived social support was assessed using the Perceived Social Support Scale (PSSS), developed by Zimet et al. [14]. The scale consists of 12 items across three dimensions: family support, friend support, and other support. Items are rated on a 7-point Likert scale, with higher scores indicating higher perceived social support. The Chinese version demonstrated good reliability (Cronbach's $\alpha=0.840$).

2.3 Data Collection

Before data collection, uniformly trained researchers explained the purpose, content, and completion requirements of the study to the patients and their family members. After informed consent had been obtained, the researchers administered the questionnaires and conducted the physical function assessments using standardized instructions.

Patients who were able to complete the questionnaires independently were asked to do so. For patients who were unable to write independently because of visual impairment or writing difficulties but had normal cognitive and comprehension abilities, the researchers read each item aloud and accurately recorded their responses.

After completion, each questionnaire was checked immediately for completeness. Missing or unclear responses were verified with the participants and completed when appropriate. All data were anonymized using identification codes, and personally identifiable information, such as patients' names, was not included in the statistical analysis.

2.4 Statistical Analysis

Statistical analyses were performed using SPSS 27.0. Continuous variables with normal distributions were presented as mean $\pm$ standard deviation (SD), while categorical variables were expressed as frequencies and percentages. Independent-sample t-tests or one-way analysis of variance (ANOVA) were used to compare differences in learned helplessness scores among demographic and clinical characteristics.

Pearson correlation analysis was conducted to examine the relationships among learned helplessness, depression, and perceived social support. Variables that were statistically significant in univariate analyses or significantly correlated with learned helplessness were entered into the multiple linear regression model to identify independent predictors of learned helplessness. A two-sided P value <0.05 was considered statistically significant.

2.5 Ethical Considerations

This study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Ethics Committee of North China University of Science and Technology (Approval No. 2025099).

3. Results

3.1 Descriptive Statistics of Learned Helplessness

A total of 228 patients with stroke-related sarcopenia were included in this study. The mean score of learned helplessness was 3.61 ± 0.51 . Among the two dimensions, the mean score of helplessness was 4.03 ± 0.67 , while the mean score of hopelessness was 2.52 ± 0.48 (Table 1).

Table 1. Descriptive Statistics of Learned Helplessness and Its Dimensions (n=228)

Variable	Minimum	Maximum	Mean	SD
Learned helplessness	2.67	4.61	3.61	0.51
Helplessness	2.77	5.00	4.03	0.67
Hopelessness	1.20	3.80	2.52	0.48

3.2 Differences in Learned Helplessness According to Demographic and Clinical Characteristics

Univariate analysis showed that learned helplessness scores differed significantly according to gender, living status, regular physical exercise, number of comorbidities, educational level, and monthly income ($P < 0.05$). No significant differences were observed according to age and marital status ($P > 0.05$) (Table 2).

Table 2. Learned Helplessness Scores by Demographic and Clinical Characteristics

Variable	Category	n (%)	Mean $\pm$ SD	P
Age	≤ 60	18 (7.89)	3.76 ± 0.45	0.224 ^b
	60–70	112 (49.12)	3.63 ± 0.53	
	≥ 70	98 (42.98)	3.55 ± 0.47	
Gender	Female	122 (53.51)	3.67 ± 0.52	0.048 ^a
	Male	106 (46.49)	3.54 ± 0.48	
Living status	Living alone	23 (10.09)	3.85 ± 0.42	0.016 ^a
	Living with family	205 (89.91)	3.58 ± 0.51	
Marital status	Married	204 (89.47)	3.59 ± 0.51	0.130 ^a
	Unmarried/widowed	24 (10.53)	3.76 ± 0.46	
Regular physical exercise	Yes	100 (43.86)	3.47 ± 0.51	< 0.001 ^a
	No	128 (56.14)	3.72 ± 0.48	
Number of comorbidities	0–1	149 (65.35)	3.54 ± 0.50	0.003 ^a
	≥ 2	79 (34.65)	3.74 ± 0.48	
Educational	Primary school and	99 (43.42)	3.84 ± 0.47	< 0.001 ^b

level	below			
	Junior high school	93 (40.79)	3.46±0.45	
	Senior high school	28 (12.28)	3.36±0.51	
	Bachelor's degree and above	8 (3.51)	3.35±0.47	
	Monthly income			
	≤1000	85 (37.28)	3.81±0.54	<0.001 ^b
	1000–3000	83 (36.40)	3.51±0.47	
	≥3000	60 (26.32)	3.46±0.40	

Note. N = 228. ^a Independent-sample t-test; ^b One-way analysis of variance (ANOVA).

3.3 Correlation Between Learned Helplessness, Depression, and Perceived Social Support

Pearson correlation analysis demonstrated that learned helplessness was negatively correlated with perceived social support ($r=-0.326$, $P<0.01$) and positively correlated with depression ($r=0.419$, $P<0.01$). Perceived social support was negatively correlated with depression ($r=-0.353$, $P<0.01$) (Table 3).

Table 3. Pearson Correlation Matrix of Learned Helplessness, Social Support, and Depression

Variable	Learned Helplessness	Social Support	Depression
Learned Helplessness	1	-0.326**	0.419**
Social Support	-0.326**	1	-0.353**
Depression	0.419**	-0.353**	1

Note. N = 228. Pearson correlation coefficients are shown below the diagonal. ** $P < 0.01$.

3.4 Multiple Linear Regression Analysis

Multiple linear regression analysis was performed to identify independent predictors of learned helplessness. Regular physical exercise, educational level, monthly income, depression, number of comorbidities, and perceived social support were identified as independent influencing factors ($P<0.05$). All VIF values were <2 , indicating no obvious multicollinearity (Table 4).

Table 4. Multiple Linear Regression Analysis of Factors Associated with Learned Helplessness

Variable	B	SE	β	t	P	95% CI	VIF
Constant	4.629	0.360	—	12.868	<0.001	3.920–5.337	—
Gender (1=female, 2=male)	-0.028	0.055	-0.028	-0.512	0.609	-0.136–0.080	1.065
Living status (1=living alone, 2=living with family)	-0.153	0.089	-0.091	-1.711	0.088	-0.329–0.023	1.033
Regular physical exercise (1=yes, 2=no)	0.166	0.055	0.163	3.020	0.003	0.058–0.274	1.055
Number of comorbidities (1=0–1, 2= ≥ 2)	0.116	0.057	0.110	2.043	0.042	0.004–0.229	1.047
Educational level (1=primary school or below, 2=junior high school, 3=senior high school)	-0.156	0.035	-0.248	-4.437	<0.001	-0.226–-0.087	1.130

school, 4=bachelor's degree or above)							
Monthly income (1≤1000, 2=1000–3000, 3≥3000 RMB/month)	-0.122	0.034	-0.192	-3.556	<0.001	-0.190– -0.055	1.050
Depression (continuous score)	0.024	0.006	0.236	4.049	<0.001	0.013–0.036	1.233
Perceived social support (continuous score)	-0.015	0.004	-0.206	-3.651	<0.001	-0.023– -0.007	1.151

Note: N = 228. The regression model was significant ($F(8,219)=17.828$, $P<0.001$), with $R^2=0.394$ and adjusted $R^2=0.372$. B, unstandardized coefficient; SE, standard error; β , standardized coefficient; CI, confidence interval; VIF, variance inflation factor.

4. Discussion

This study found that patients with stroke-related sarcopenia exhibited a relatively high level of learned helplessness, indicating increased psychological vulnerability in this population. Due to reduced muscle strength, impaired physical function, and difficulties in rehabilitation, these patients may face persistent functional limitations and uncertainty regarding recovery, which may reduce their perceived control over disease management and increase the risk of learned helplessness[2,6]. Furthermore, this study identified educational level, monthly income, regular physical exercise, depression, number of comorbidities, and perceived social support as independent factors associated with learned helplessness.

Educational level was negatively associated with learned helplessness, which may be explained by the fact that patients with higher educational attainment may have better disease understanding and greater confidence in disease management [15]. Monthly income was negatively associated with learned helplessness, suggesting that economic status may influence patients' access to rehabilitation resources and psychological support[10].

Lack of regular physical exercise was associated with higher levels of learned helplessness. Regular exercise not only improves physical function but may also reduce psychological distress after stroke [16]. An increased number of comorbidities may further increase disease management burden[17], making patients more likely to experience a sense of loss of control and helplessness. Depression was positively associated with learned helplessness., possibly because both involve negative cognitive patterns and emotional experiences[18]. Perceived social support was negatively associated with learned helplessness, as adequate social support may enhance coping abilities and psychological resources, thereby reducing the negative impact of disease[19].

In clinical practice, greater attention should be paid to patients with lower educational attainment, limited economic resources, insufficient physical activity, depressive symptoms, and multiple comorbidities. Comprehensive interventions integrating health education, exercise rehabilitation, psychological support, and enhancement of social support may help improve patients' psychological status and reduce learned helplessness.

Several limitations should be acknowledged. Due to the cross-sectional design, causal relationships between learned helplessness and associated factors cannot be determined. Additionally, this was a single-center study, and some variables were assessed using categorical measurements, which may limit the generalizability of the findings and the exploration of underlying mechanisms. Future multicenter longitudinal studies are needed to further validate the pathways associated with learned helplessness.

5. Conclusion

Patients with stroke-related sarcopenia exhibit a relatively high level of learned helplessness. Educational level, monthly income, regular physical exercise, depression, number of comorbidities, and perceived social support were identified as independent factors associated with learned helplessness. These findings highlight the importance of early psychological assessment and targeted interventions, including health education, exercise rehabilitation, depression management, and enhancement of social support, which may help alleviate learned helplessness and improve rehabilitation outcomes.

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