# FACTORS RELATED TO SELF-MANAGEMENT BEHAVIORS AMONG ADULTS WITH ISCHEMIC STROKE IN WENZHOU, CHINA

XIAOXIAO CHEN

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR MASTER DEGREE OF NURSING SCIENCE
(INTERNATIONAL PROGRAM)
IN ADULT NURSING PATHWAY
FACULTY OF NURSING
BURAPHA UNIVERSITY
2024

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The Thesis of Xiaoxiao Chen has been approved by the examining committee to be partial fulfillment of the requirements for the Master Degree of Nursing Science (International Program) in Adult Nursing Pathway of Burapha University

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In China, adults with ischemic stroke are becoming younger. Moreover, after a stroke, they pay insufficient attention to self-management, which seriously affects the rehabilitation process and treatment outcome. This study aimed to describe self-management behaviors and determine the relationship between stroke prevention knowledge, life stress, family relationships, and self-management behavior among adults with ischemic stroke. 125 participants were recruited by defining a collection data period and selected samples following inclusion criteria. Research instruments included the demographic questionnaire, the Stroke Self-management Behavior Scale for Young Adults, the Stroke Prevention Knowledge Questionnaire, the Perceived Stress Scale, and the Brief Family Relationship Scale. The internal consistency reliability of these instruments was .86, .90, .82, and .85, respectively.

The results of this study showed that the mean score of self-management behaviors was 88.1 out of 130 (SD=16.5). stroke prevention knowledge and family relationships had a moderate positive significant relationship with self-management behaviors (r =.39, r =.34, $p < .001$ respectively). Life stress had negative significant relationship with self-management behaviors (r = -.33, $p < .001$).

The findings of the study provided a reference for nurses to formulate nursing intervention to promote self-management behaviors for adults with stroke. Besides, from the hospital to the community by providing holistic nursing focus on educated them about stroke prevention knowledge, encourage family support, and stress management to improve self-management ability of adults with stroke.

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Xiaoxiao Chen

# TABLE OF CONTENTS

**Page**

# LIST OF TABLES

**Page**

# LIST OF FIGURES

**Page**



# CHAPTER 1
# INTRODUCTION

## Background and significance of the problems

Globally, stroke is the second-leading cause of death, and stroke was also the third-leading cause of death and disability combined in 2019 (Feigin et al., 2022; Feigin et al., 2021). There are over 7.6 million new ischemic strokes each year and over 62% of all incidents of strokes are ischemic strokes (Feigin et al., 2022). Each year, over 11% of all ischemic strokes occur in people aged 15–49 years old and 19% of people who had experienced an ischemic stroke and are currently living are people within that age (Feigin et al., 2022). In adults aged from 18 to 50, the incidence of ischemic stroke increased by 46% from 7.4 in 1998 to 10.8 per 100,000 person-years in 2010 in the Netherlands (Ekker et al., 2019). The United States, Denmark, France, and other countries have done corresponding studies on the age trend of stroke onset, and a large number of research results have proved that the incidence of ischemic stroke in adults is rising (Bejot et al., 2016; Cabral et al., 2017; Magwood et al., 2017).

China faces the greatest challenge from a stroke in the world. In the past stroke mostly occurred in the elder, however at present, patients with stroke are getting younger and younger. From 1992 to 2015, the incidence of ischemic stroke among low-income young and middle-aged people aged 35-65 years old in rural Tianjin showed an increasing trend (1/100,000) (National Center for Cardiovascular Diseases, 2020). The proportion of ischemic stroke patients under the age of 50 increased from 8.8% in 2010 to 16.1% in 2013 (Zhou & Tang, 2019). In the analysis of the epidemic trend of stroke in China from 2010 to 2017, it was found that stroke showed a younger trend (Lin et al., 2020).

According to Han's study on the changing tendency of attack age of stroke patients in Wenzhou, the proportion of adults who got stroke under 50 years old increased from 5.1% in 1990 to 12.7% in 2001 and 64.22% were ischemic stroke of all strokes (Han et al., 2004). A survey of young and middle-aged stroke patients hospitalized in the First Affiliated Hospital of Wenzhou Medical University from 2002 to 2007 showed that the proportion of young and middle-aged stroke patients was 17.8% and 63.2% were ischemic stroke of all strokes at this age (Wang et al., 2009).

In the Second Affiliated Hospital of Wenzhou Medical University, among 1221 ischemic stroke patients who were admitted to the hospital from September 2020 to October 2021, 456 patients were under 60 years old. The rate of stroke patients aged less than 60 was 37.3%. The number of adults with stroke in Wenzhou is increasing and stroke at young age has become an important health problem in Wenzhou.

Stroke is one of the leading causes of long-term disability and death, which makes a great financial burden to families and country burden (Katan & Luft, 2018; Kim et al., 2020). Disability is a major factor affecting the lifestyle and quality of life of stroke patients (Bello et al., 2021; Kariyawasam et al., 2020). According to previous studies, adult stroke is defined as someone who has had a stroke between the ages of 18 and 60 (Shen et al., 2019; Zhang & Qian, 2020). Studies have shown that most young and middle-aged patients with ischemic stroke are often accompanied by varying degrees of dysfunction, including hemiplegia, which affects patients' self-care ability and reduces their quality of life (Gao & Shang, 2021). Compared with the elderly, most adults with stroke bear important social and family responsibilities, so they are more likely to have psychological burdens and bad emotions after the occurrence of stroke, affecting the physical and mental health of patients (Boot et al., 2020; Wang et al., 2016). In addition, the recovery of the survivors after stroke is filled with obstacles that may prevent the patients from fully returning to their normal lives. This is particularly relevant among working-age stroke survivors, as well as among those with dependents such as children or elderly parents (Yahya et al., 2020).

Although strokes are far less common in young and middle-aged people than in older people, they are much more affected because they have a much longer life span (Kim et al., 2020). Sequelae of stroke in adults have specific implications in relation to their age, as adult patients are often at crossroads in their lives with young families, demanding careers, and social interactions that may remain impaired for decades to come (Ekker et al., 2019). Adults with stroke have a considerable socioeconomic impact because of high healthcare costs and loss of labor productivity (Ekker et al., 2018).

Although the situation of stroke is serious, it can be prevented and controlled through self-management behaviors. In long-term conditions such as stroke, self-management strategies are critical. It is defined as ‘the active management by

individuals of their treatment, symptoms, lifestyle and the physical and psychological consequences inherent in living with a chronic condition (Lorig & Holman, 2003). For optimal impact on mortality and morbidity rates in stroke secondary prevention, the behavioral/lifestyle change required must then not only be adopted by the individual but sustained in the longer term as a lifestyle choice (Lennon et al., 2018).

Stroke is a behavior-related disease, and poor health behavior is the main cause of stroke incidence and recurrence in adults (Liu et al., 2015; Posai & Suksatan, 2021; Zhenxiang et al., 2021). As a review reported, the 1-year recurrence rate of stroke patients in China was about 17.7% (Beilei Lin et al., 2021). More seriously, the risk of stroke recurrence rate was high, and recurrent stroke frequently carries a worse functional status than index stroke (B. Lin et al., 2021). The recurrent stroke resulted in a greater degree of limb disability than the first-ever stroke, with a 43% higher risk of myocardial infarction and vascular death (Lennon et al., 2018). Long-term healthy behaviors have been shown to reduce the incidence of stroke (Larsson et al., 2015). The improvement of bad lifestyles and the maintenance of healthy behavior can reduce the occurrence and recurrence of stroke (Shi et al., 2018).

Self-management has become an important concept in stroke rehabilitation (Satink et al., 2015). In China, stroke patients usually manage their illness at home with their families. The self-management behaviors of adults with stroke mainly include disease management, emotion management, daily life management, diet management, and rehabilitation exercise management (Xu et al., 2016). The optimal recovery period is within 6 months after the acute phase of stroke (Bernhardt et al., 2017; Bernhardt et al., 2020; Liu, 2017; Sun et al., 2022), so the self-management behavior among adults with stroke after discharge is particularly important within 6 months. Self-management during rehabilitation can better help adults with stroke return to normal life.

The study indicates that the potential causes of the increased incidence of stroke in adults aged 15 to 59 may be lifestyle changes such as smoking at an early age, insufficient physical activity, unhealthy diet, stressful lifestyles, and harmful use of alcohol (Chouhdari et al., 2021; Hill & Towfighi, 2017; Luo & Zhao, 2021). The investigation showed that enhancing the awareness of active treatment, actively controlling various risk factors, maintaining compliance with drug treatment,

increasing exercise, reasonable control of diet, and actively changing the way of life play an important role in the prevention and control of stroke, improvement the prognosis of patients and improvement the quality of life (Shi et al., 2018). It is worth mentioning that adults with stroke survivors are more likely to be affected by post-stroke psychosocial problems and require significant adjustments in their daily lives to achieve social reintegration than older stroke survivors (Rhudy et al., 2020). Compared with the elderly, physical factors and lifestyle factors influenced the incidence of stroke at a young age more (Agustiyaningsih et al., 2022). Hypertension, dyslipidaemia, diabetes, smoking, alcohol consumption, air pollution, diets low in fruit and vegetables, and high sodium intake are the most common and modifiable risk factors for stroke in China (Wu et al., 2019).

Self-management behavior plays an important role in the prevention of stroke patients (Wang, 2017). In order to effectively promote rehabilitation and prevent recurrence, stroke patients who survived treatment should adhere to health self-management after discharge. It is worth noting that strengthening self-management processes can promote participation in self-management behaviors (Ryan & Sawin, 2009). Knowledge and social support were mentioned as critical to the success of a person's ability to self-manage (Ryan & Sawin, 2009).

Knowledge is the foundation of behavior change. Successful change in health behavior was associated with interventions that addressed condition-specific knowledge and health beliefs (Ryan & Sawin, 2009). The stroke knowledge level is an important factor in self-management behavior (Guan et al., 2018). The knowledge level and self-management behavior level of first-stroke patients are at the lower level, which needs to be improved (Li, 2016; Yuan, 2018). When post-stroke patients were asked about risks related to stroke, only 22% were able to name four risk factors, and 8% were unable to name any (Taft et al., 2021). Stroke patients who are younger than 55 years old are more likely to improve their knowledge of stroke (Kang et al., 2019). However, first-ever stroke patients often lack knowledge of the disease. This suggests that education on stroke-related knowledge in adults with stroke is very important to improve their self-management behavior.

Life stress is associated with human health and disease (Slavich, 2016). Stressors appear in different areas of life (Slavich, 2019). At this active working age,

the life stress of adults with stroke may be education, work, housing, economy, disease, marriage, children, and so on. Because many patients have significant cognitive, emotional, or physical impairments, this has a significant impact on different functional areas of patients' lives. Disability which is the main cause of returning to work is a major consequence of stroke (Arwert et al., 2017). Meanwhile, physical dysfunction can increase stress in life. Due to life stress and financial burden, adults with stroke must return to work with physical dysfunction as soon as possible, often ignoring the importance of self-management behaviors after stroke, which leads to the recurrence of stroke. Stress reduction is considered to be one of the 12 tasks common to self-management across chronic disease (Ryan & Sawin, 2009). This suggests that life stress may be related to self-management behavior among adults with stroke.

Family relationship is one of the main factors affecting self-management behavior and family partnership in self-management is related to the improvement of self-management capability (Shu et al., 2019; Whitehead et al., 2018). In China, stroke care is generally undertaken by families at home. Families play an important role in supporting and promoting self-management (Whitehead et al., 2018). The individual or family assumes responsibility for the individual and family and it may occur in collaboration with healthcare professionals (Ryan & Sawin, 2009). Patients with good family relationships are more likely to receive emotional support from family members. Sufficient emotional support can make patients face diseases and difficulties positively and optimistically, promote physical and mental health, and engage in healthy self-management behaviors (Shu et al., 2019). Therefore, family relationships may be a factor associated with self-management behavior in young and middle-aged stroke patients.

Self-management interventions are effective at improving overall risk factor control, which reduce the recurrent stroke (Sakakibara et al., 2016). The stroke self-management program has been substantiated to improved recovery outcomes (Lo et al., 2018). And it is proved that self-management is significantly useful in improving post-stroke outcomes and is associated with better health outcomes and better quality of life (Nott et al., 2021). However, works of literature in China have shown that the self-management level of adults with stroke is at a low or moderate level, which needs

to be improved (Jin, 2019; Zhu, 2021). In China, studies on the relationship between these variables have focused on elderly stroke patients. Although self-management behavior has attracted more and more attention from nursing workers, there are few types of research on self-management behavior among young and middle-aged stroke patients in China. Therefore, this study will select stroke prevention knowledge, life stress, and family relationship to study whether these three factors are related to self-management behavior among adults with stroke in Wenzhou, China.

Therefore, under the guidance of the individual and family self-management theory (IFSMT), the researchers conducted this study to explore the current situation of self-management behavior among ischemic adults with stroke in Wenzhou, China, and to explore whether stroke prevention knowledge, life stress, and family relationship are related to the self-management behavior among adults with ischemic stroke. This study will provide information for healthcare providers in Wenzhou to develop advanced nursing interventions for adults with stroke, to support and guide them to carry out self-management behaviors effectively. And it will provide a new direction for secondary prevention in adults with stroke and improve their health outcomes.

## Objectives of the research

1. To describe the self-management behaviors among adults with ischemic stroke in Wenzhou, China.

2. To determine the relationship between stroke prevention knowledge, life stress, family relationship, and self-management behavior among adults with ischemic stroke in Wenzhou, China.

## Research Hypotheses

1. There was a positive correlation between stroke prevention knowledge and self-management behaviors among adults with ischemic stroke in Wenzhou, China.

2. There was a negative correlation between life stress and self-management behaviors among adults with ischemic stroke in Wenzhou, China.

3. There was a positive correlation between family relationship and self-management behaviors among adults with ischemic stroke in Wenzhou, China.

## Scope of study

This study was a descriptive correlational research design, which aimed to explore the status of self-management behaviors among adults with stroke and determined the correlations between independent variables including stroke prevention knowledge, life stress, family relationship, and self-management behaviors among adults with stroke. The data was collected in the outpatient department of the second affiliated Hospital of Wenzhou Medical University in Wenzhou, China from June to August 2022.

## Research framework

This study was based on a revised version of the Individual and family self-management theory (IFSMT) by Ryan and Sawin (Ryan & Sawin, 2009). The theory defined self-management behavior as the outcome of actual participation in the self-management process and affected by context (risk and protective factors).

IFSMT consists of three parts: context, process, and outcome. Context includes specific conditional factors, physical and social environment, as well as personal and family factors, which affect the process dimension or directly affect the outcome dimension. The process dimension of this theory refers to the self-management process of patients. The process dimension is composed of knowledge and belief (i.e., self-efficacy), self-regulation skills and ability, and social facilitation (i.e., social support), which can promote patients' participation in self-management behavior. The third dimension of the theory is the result dimension, which is divided into proximal outcome and distal outcome. The self-management behavior of patients' participation is the proximal outcome while maintaining good health and higher quality of life is the distal outcome. The context, risk, and protective factors affect each other. factors in the context dimension affect an individual's and family's ability to engage in the process dimension. Constructs in the process dimension are internally related and affect the outcome dimension (Ryan & Sawin, 2009).

In this study, life stress and family relationship belonged to the context of the IFSMT. Knowledge belonged to the process in the IFSMT. Ryan and Sawin (2009) propose that the improvement of knowledge can increase the understanding of self-management behavior and increase self-efficacy. Life stress reflects a person's ability to self-management behaviors. Family relationship can promote individuals and families to participate in self-management behavior. The IFSMT shows that the above three factors may have an association with self-management behavior. Previous studies have shown a correlation between that stroke prevention knowledge, life stress, family relationship, and stroke self-management behavior (Boutelle et al., 2000; Shu et al., 2019; Wang et al., 2013). Therefore, guided by the IFSMT, in this study, stroke prevention knowledge, life stress, and family relationship were presented as the independent variables and may be related to self-management behavior. Figure 1 depicts the relationship between all variables in this study.

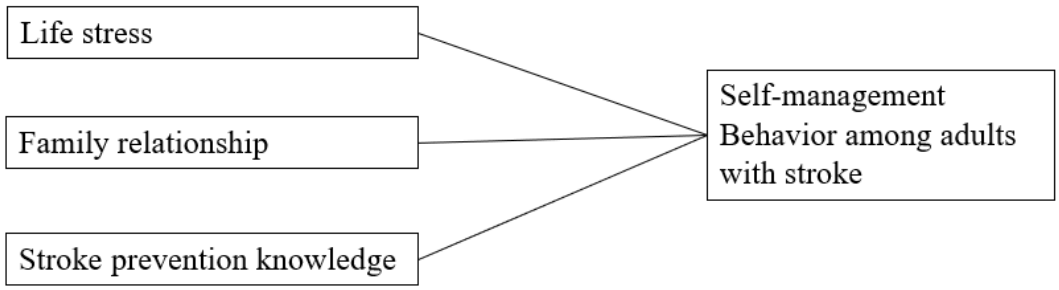


Figure 1 Conceptual framework

## Definition of terms

**Adults with stroke** are those who are aged between 18 and 60 years old and got a first-ever stroke. Moreover, they come to the outpatient department at the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China for regular follow-up.

**Self-management behaviors** refer to the activities and behaviors of adults with stroke to prevent and reduce symptoms and exacerbation, including symptom management, emotion management, daily life management, dietary management, rehabilitation management, and resource management. The Chinese version of the Stroke Self-Management Behavior Scale for Young Adults（SSMBS-YA） will be

used to measure the level of self-management behaviors among adults with stroke (Xu et al., 2016).

**Stroke prevention knowledge** refers to the comprehension of stroke and its management in adults with stroke, including warning symptoms, stroke risk factors, and health behaviors. It will be measured by the Chinese version of the Stroke Prevention Knowledge Questionnaire (SPKQ) designed and developed by Wan et al.(Wan et al., 2014).

**Life stress** refers to the perception of adults with stroke about the negative affective state that individuals may attempt to relieve or cope with through unhealthy behaviors after stroke. The Chinese version of PSS-10 will be used in this study to measure the life stress of adults with stroke (Yang et al., 2009).

**Family relationship** refers to the perception of adults with stroke about cohesion, expressiveness, and conflict in the family, which can show family support. The Chinese version of the Brief Family Relationship will be used in this study (Huang et al., 2018).

# CHAPTER 2
# LITERATURE REVIEWS

This chapter summarizes stroke, the self-management behaviors of adults with ischemic stroke, and the factors related to the self-management behaviors of adults with ischemic stroke as follows.

1. Overview of the stroke
   - 1.1. Definition of stroke
   - 1.2. Classification of stroke
   - 1.3. Pathology of ischemic stroke
   - 1.4. Risk factors of stroke
   - 1.5. Signs and symptoms of stroke
   - 1.6. Prevention and treatment of ischemic stroke
   - 1.7. The incidence trend of adults with ischemic stroke
   - 1.8. The recurrence incidence of adults with stroke
2. The impact of ischemic stroke on adults
3. The individual and family self-management theory (IFSMT)
4. Self-management behaviors among adults with ischemic stroke
   - 4.1 Definition of self-management behaviors
   - 4.2 Self-management behaviors among adults with ischemic stroke
   - 4.3 Guidelines for stroke prevention and treatment in China
5. The selected factors related to self-management behaviors among adults with stroke
   - 5.1 Stroke prevention knowledge
   - 5.2 Life stress
   - 5.3 Family relationship
6. Summary

## Overview of Stroke

Stroke is the second leading cause of death and the third leading cause of death and disability combined (as expressed by disability-adjusted life-years lost—DALYs) in the world (Feigin et al., 2022), which represents one of the primary causes of

mortality, dependency, and long-term disability in adults, proving to be highly expensive for the patients, their families, the health services, and the community as a whole (Katan & Luft, 2018; Kim et al., 2020; Soto-Cámara et al., 2020). Strokes continue to be a global health issue and a social problem, a situation expected to worsen in the coming years as the population ages (Soto-Cámara et al., 2020). Disability is a major factor affecting the lifestyle and quality of life of stroke patients (Bello et al., 2021; Kariyawasam et al., 2020). In China, stroke is one of the major diseases endangering people's health, with high incidence, high disability rate and high characteristics of mortality, and high recurrence rate.

1.1 Definition of stroke

Stroke was defined by WHO clinical criteria as the rapidly developing clinical signs of (usually focal) disturbance of cerebral function lasting more than 24 hours or leading to death (Aho et al., 1980). American Heart Association/ American Stroke Association (AHA/ASA) updated their endorsed definition of stroke to one that includes silent infarctions (inclusive of cerebral, spinal, and retinal) and silent hemorrhages (Sacco et al., 2013).

1.2 Classification of stroke

Stroke is divided into ischemic stroke and hemorrhagic stroke. Ischemic stroke accounts for about 81% of strokes and hemorrhagic stroke 19% of strokes, and the proportion of ischemic stroke is higher than that of hemorrhagic stroke in all countries (Krishnamurthi et al., 2018; National Health Commission of the People's Republic of China, 2021; Suwanwela & Poungvarin, 2016).

1.3 Pathology of ischemic stroke

Ischemic stroke is caused by deficient blood and oxygen supply to the brain (Kuriakose & Xiao, 2020). The common pathway of ischemic stroke is lack of sufficient blood flow to perfuse cerebral tissue, due to narrowed or blocked arteries leading to or within the brain. Ischemic strokes can be broadly subdivided into thrombotic and embolic strokes. Ischemic occlusion generates thrombotic and embolic conditions in the brain (Musuka et al., 2015). In thrombosis, the blood flow is affected by the narrowing of vessels due to atherosclerosis. The build-up of plaque will eventually constrict the vascular chamber and form clots, causing a thrombotic stroke. In an embolic stroke, decreased blood flow to the brain region causes an embolism; the

blood flow to the brain reduces, causing severe stress and untimely cell death (necrosis) (Kuriakose & Xiao, 2020).

1.4 Risk factors of stroke

The risk factors include non-interventional factors and interventional factors. With the recent increase in traditional cardiovascular risk factors among adults, together with the parallel increase in myocardial infarction among adults, aggressive preventive measures targeting adults become more important than ever (Yahya et al., 2020). Active and effective interventions on the risk factors related to stroke can significantly reduce the incidence of stroke and reduce the disease burden (National Health Commission of the People's Republic of China, 2021).

**Age.** The age-specific prevalence of stroke and all pathological types of strokes increased with increasing age in both men and women, with a particularly marked increase in those 50 years or older. The age-specific mortality of stroke increases with increasing age as well (W. Wang et al., 2017).

**Gender.** The incidence of stroke overall and of all stroke pathological types was numerically higher in men than women across all ages. In people aged 60 and above, the age-specific mortality rates of stroke in men were statistically significantly greater than that in women (W. Wang et al., 2017). The age-adjusted incidence of stroke (primarily ischemic stroke) in men is approximately 30% higher than in women (Howard et al., 2019).

**Ethnicity.** One study indicates that age-standardized annual first-ever stroke incidence was more variable and somewhat higher among Chinese than white populations for ages 45 to 74 years old (Tsai et al., 2013). In the United States, for both men and women, the risk of stroke is three times higher for blacks between the ages of 45 and 64 than for whites (Howard et al., 2019).

**Genetic factors.** Those with a high genetic risk had a 35 percent higher incidence of stroke than those with a low genetic risk (Rutten-Jacobs et al., 2018). Evidence from stroke family history studies suggests that genetic factors greatly influence stroke susceptibility (Chauhan & Debette, 2016).

**Hypertension.** Hypertension is an independent risk factor for stroke. The number of hypertensive patients among middle-aged and young people is increasing year by year, which may be closely related to unhealthy lifestyles, excessive work, and

mental pressure (Luo et al., 2016). In Wenzhou, the standardized prevalence of hypertension among adult residents was 18.23% (Zhang et al., 2020).

**Hyperlipidemia.** Hyperlipidemia is associated with a 28% increased risk of ischemic stroke, placing it as a key risk factor for stroke and identifying it as an important therapeutic target for risk modification (Brooks & Schindler, 2019). About 50% to 60% of adults with stroke have dyslipidemia, which is slightly more common in men than in women (Boot et al., 2020).

**Hyperglycemia.** Disorders of glucose metabolism are major risk factors for stroke, including type 1 and type 2 diabetes mellitus (Guzik & Bushnell, 2017). Diabetes is associated with a substantially increased risk of death in Chinese adults, especially from cerebrovascular disease, with almost half of the deaths due to stroke (J. Wang et al., 2017).

**Poor lifestyles.** Poor lifestyle (0 or 1 healthy lifestyle factor) was associated with a 66 percent increased risk of stroke compared with a good lifestyle (3 or 4 healthy lifestyle factors) (Rutten-Jacobs et al., 2018). Various lifestyle factors have been associated with increasing the risk of stroke. These include lack of exercise, alcohol, diet, obesity, smoking, drug use, and stress.

**Smoking.** Smokers are more likely to have a stroke than non-smokers and the risk increased by 12% for each increment of 5 cigarettes per day (Pan et al., 2019). In addition, exposure to second-hand smoke is also associated with stroke (Hill & Towfighi, 2017). 27.7% of Chinese adults smoke, and the male smoking rate is a staggering 52.1% (Guo & Quan, 2020). Although complete smoking cessation is the goal, smoking fewer cigarettes may reduce the risk of ischemic stroke in adults (Jamal et al., 2018).

**Alcohol consumption.** The mortality, recurrence, and dependency rates at 12 months after stroke were significantly higher in patients who previously consumed alcohol than in those without previous alcohol consumption (all $P < 0.005$) in a 12-month follow-up study recruited 3830 acute ischemic stroke patients from Tianjin, China, between 2016 and 2018 (Wang et al., 2021).

**Physical exercise.** Physical Activity and Exercise can help improve the function of affected limbs and reduce the risk of stroke (Hill & Towfighi, 2017). A

sedentary lifestyle is one risk factor for stroke (Prior & Suskin, 2018), which can be caused by life stress (Ashdown-Franks et al., 2018).

**Diet.** Poor quality diet and nutrition are strongly associated with the risk of first stroke (English et al., 2021). Increasing the intake of fruits, vegetables, and whole grains and minimizing or avoiding the intake of meat and processed foods has been associated with decreased prevalence of obesity, hypertension, dyslipidemia, and diabetes (Campbell, 2017).

1.5 Signs and symptoms of stroke

The five common signs and symptoms of a stroke are sudden numbness or weakness of the face, arm, or leg; sudden confusion or trouble speaking or trouble understanding others; sudden trouble seeing in one or both eyes; sudden dizziness, trouble walking, or loss of balance or coordination; and sudden severe headache with no known cause (CDC, 2020). Sometimes the warning signs may last a short time and go away. These brief episodes, known as transient ischemic attacks or TIAs, are sometimes called “mini-strokes” (NINDS, 2021). Although stroke is a disease of the brain, it can affect the entire body. A common disability that results from stroke is complete paralysis on one side of the body, called hemiplegia. A related disability that is not as debilitating as paralysis is one-sided weakness or hemiparesis. Stroke may cause problems with thinking, awareness, attention, learning, judgment, and memory. Stroke survivors often have problems with miss understanding or cannot speak. A stroke can lead to emotional problems. Stroke patients may have difficulty controlling their emotions or may express inappropriate emotions. Many stroke patients experience depression. Stroke survivors may also have numbness or strange sensations. The pain is often worse in the hands and feet and is made worse by movement and temperature changes, especially cold temperatures (NINDS, 2021).

1.6 Prevention and treatment of ischemic stroke

There are three treatment stages for stroke: prevention, therapy immediately after the stroke, and post-stroke rehabilitation in general. Therapies to prevent a first or recurrent stroke are based on treating an individual's underlying risk factors for stroke, such as hypertension, atrial fibrillation, and diabetes. Acute stroke therapies try to stop a stroke while it is happening by quickly dissolving or removing the blood clot causing an ischemic stroke or by stopping the bleeding of a hemorrhagic stroke. Post-

stroke rehabilitation helps individuals overcome disabilities that result from stroke damage. Medication or drug therapy is the most common treatment for stroke. The most popular classes of drugs used to prevent or treat stroke are antithrombotic (antiplatelet agents and anticoagulants) and drugs that break up or dissolve blood clots, called thrombolytics (National Health Commission of the People's Republic of China, 2021; NINDS, 2021).

**Blood pressure control.** About 70% of patients with ischemic stroke have elevated blood pressure during the acute phase. The AHA/ASA recommends a 15% reduction in blood pressure within 24 hours of onset in patients with systolic blood pressure ≥200mmHg or diastolic blood pressure ≥110mmHg, who have not received intravenous thrombolysis or intravascular therapy, and who have no serious comorbidities requiring emergency hypotension (Powers et al., 2018). For patients preparing thrombolysis and bridging intravascular thrombectomy, blood pressure should be controlled at systolic pressure < 180 mmHg and diastolic pressure < 100 mmHg. The blood pressure management of patients who have not received intravenous thrombolysis and plan to receive intra-arterial therapy can refer to this standard, and control the postoperative blood pressure level according to the situation of vascular opening to avoid overperfusion or hypoperfusion. For patients receiving intravenous thrombolytic therapy with RT-PA, active control of systolic blood pressure at 130 – 140 mmHg is safe (National Health Commission of the People's Republic of China, 2021). When the condition is stable after stroke with the blood pressure persisting ≥ 140 /90 mmHg and there are no other contraindications, the antihypertensive drugs taken before the onset can be resumed or antihypertensive therapy can be started several days after the onset of the disease.

**Blood glucose control.** Insulin treatment can be given when blood glucose exceeds 10mmol/L. Blood glucose monitoring should be strengthened to control blood glucose in patients with hyperglycemia. When blood glucose is less than 3.3 mmol/L, a 10% - 20% glucose injection can be given orally or in injection therapy, the goal is to achieve normal blood glucose (National Health Commission of the People's Republic of China, 2021).

**Rehabilitation.** Stroke rehabilitation is an indispensable key link in the overall treatment of stroke, which can prevent complications, minimize functional

disability and improve prognosis. In the case of a stable condition, rehabilitation treatment should be started as soon as possible. Patients with mild to moderate stroke can carry out bedside rehabilitation and early out-of-bed rehabilitation training 24 hours after the onset, including sitting, standing, walking, and other activities. Bedridden patients should pay attention to good limb placement when the condition permits (Kuriakose & Xiao, 2020; National Health Commission of the People's Republic of China, 2021).

**Secondary prevention.** In order to reduce the recurrence rate of stroke, secondary prevention of stroke should be initiated as soon as possible. Antihypertensive therapy reduces the risk of both ischemic and hemorrhagic stroke. More important than the class of antihypertensive is to achieve the blood pressure targets (<140/90 mm Hg in nondiabetics and <130/80 mm Hg in diabetics) (Diener & Hankey, 2020). Antihypertensive treatment lowers the risk of recurrent stroke by about one-quarter (Xie et al., 2016). The 2019 European Society of Cardiology and European Atherosclerosis Society guidelines now recommend a target LDL cholesterol of 1.4 mmol/l for high-vascular-risk patients (Mach et al., 2019). In a meta-analysis of 3 RCTs involving 4,980 stroke patients with insulin resistance, pre-diabetes, and diabetes mellitus, pioglitazone was associated with a lower risk of recurrent stroke (HR: 0.68; 95% CI: 0.50 to 0.92) and major vascular events (HR: 0.75; 95% CI: 0.64 to 0.87) (Lee et al., 2017). The main aim of the treatment of diabetes mellitus continues to be weight loss through diet and regular exercise (Diener & Hankey, 2020). In the longer term, antiplatelet therapy with (predominantly) aspirin reduces the risk of stroke by about 19% in 3 years (Antithrombotic Trialists' Collaboration, 2002).

**Lifestyle.** Lifestyle modification is identified as a core component of risk factor management that should be implemented as part of comprehensive post-stroke care (Bailey, 2018). Recurrent stroke and modifiable risk factors for cardiovascular disease are common in stroke patients. These risk factors are often uncontrolled, leading to an increased risk of death and disability. Clinical guidelines recognize that lifestyle changes should be a priority in the management of risk factors after stroke. Improving diet, increasing physical activity, quitting smoking, and reducing alcohol consumption are specific health behaviors that should be targeted because of their

impact on multiple cardiovascular risk factors (Bailey, 2018; National Health Commission of the People's Republic of China, 2021; Prior & Suskin, 2018). Although behavior change is difficult, using self-management theory, implementing cognitive and behavioral strategies, and improving processes may promote patients to prevent a second stroke through lifestyle changes.

1.7 The incidence trend of adults with ischemic stroke

The incidence of cerebrovascular diseases in the young group is gradually younger due to the high life stress, unscientific diet, and irregular life and rest (Huang et al., 2022). Each year, over 11% of all ischemic strokes occur in people aged 15–49 years old and 19% of people who had experienced an ischemic stroke and are currently living are people within that age (Feigin et al., 2022). More than 11 million ischemic strokes occur worldwide each year, of which more than half occur in low- and middle-income countries. Although the incidence of ischemic stroke increases with age, an estimated 10% to 20% of these events occur in adults aged 18 to 50 years (Boot et al., 2020).

In China, In the analysis of the epidemic trend of stroke from 2010 to 2017, it was found that stroke showed a younger trend (Lin et al., 2020). The proportion of stroke patients under the age of 50 increased from 8.76% in 2010 to 16.09% in 2013 (Zhou & Tang, 2019). From 1992 to 2015, the incidence of ischemic stroke among low-income young and middle-aged people aged 35-65 years old in rural Tianjin showed an increasing trend (1/100,000) (National Center for Cardiovascular Diseases, 2020). The proportion of ischemic stroke patients under the age of 50 increased from 8.8% in 2010 to 16.1% in 2013 (Zhou & Tang, 2019). In the analysis of the epidemic trend of stroke in China from 2010 to 2017, it was found that stroke showed a younger trend (Lin et al., 2020).

1.8 The recurrence incidence of adults with stroke

Among recurrent stroke patients, the mortality rate is approximately 56%, which is much higher than for initial stroke patients (Ruksakulpiwat & Zhou, 2021). A meta-analysis of stroke recurrence rates showed that the co-recurrence rate of stroke was 7.7% at 3 months, 9.5% at 6 months, 10.4% at 1 year, 16.1% at 2 years, 16.7% at 3 years after the initial stroke (B. Lin et al., 2021). The 5-year cumulative recurrence rate of nonfatal or fatal ischemic stroke in adults was 9.4% (Smajlovic, 2015). In a

Dutch study of 970 stroke patients aged 15 to 49, 13.6% of the adults had a second stroke (Aarnio et al., 2014). A study on the recurrence rate of stroke in the Chinese population showed that the recurrence rate of stroke was 11.51% in the first year, 16.67% in the second year, and 20.07% in the third year, which is higher than the recurrence rate of the global stroke (Zhang et al., 2019). For adults with a stroke under 55 years old in Chengdu, China, the recurrence rate is 12.05%, accounting for 17.39% of the recurrent stroke population within 3 years (Zhang et al., 2019).

## The impact of ischemic stroke on adults

The increase in stroke at a young age have a detrimental impact on the physical, psychological, social, and economic (Agustiyaningsih et al., 2022).

**Physical**

Studies have shown that most young and middle-aged patients with ischemic stroke are often accompanied by varying degrees of dysfunction, including hemiplegia, which affects patients' self-care ability and reduces their quality of life (Gao & Shang, 2021). Poor functional outcomes and psychosocial problems are common among adults (under 50 years of age) with stroke (Maaijwee et al., 2014). Stroke survivors suffer to different extents from a motor deficiency, sensory disturbances, problems using or understanding language, problems with thinking and memory, and emotional disturbances (Dhamoon et al., 2015). ADL outcome scales, regarded as continuous scaled, where usually higher scores indicate a good outcome (Garcia-Rudolph et al., 2019). higher levels of post-stroke physical activity are related with better physical function as well as better quality of life (Zirnsak et al., 2022). It has been suggested that key scores are BI <40 (representing complete dependence on others), BI >60 (transition from complete dependence to assisted independence) (Quinn et al., 2011). Stroke treatment should not be directed exclusively to acute stroke care or prevention, but also to optimizing post-stroke functioning and Quality of life (Tsalta-Mladenov & Andonova, 2022).

**Psychological**

Most adults with stroke bear important social and family responsibilities, so they are more likely to have psychological burdens and bad emotions after the occurrence of stroke, affecting the physical and mental health of patients (Boot et al.,

2020; Wang et al., 2016). Body image was found to decline following stroke in a mixed gender group under 40 years old (Gracey et al., 2008). Young survivors face the added psychological task of reconciling the perceived incongruity of suffering an older person's disease at an early age and being treated in services in which older people predominate (Morris, 2011). In addition, the survivors' road to recovery is filled with obstacles that may prevent the patients from fully returning to their normal lives. This is particularly relevant among young, working-age stroke survivors, as well as among those with dependents such as children or elderly parents (Yahya et al., 2020).

**Social**

The consequences of stroke in adults are substantial and long-lasting, due to their long survival after stroke. Sequelae of stroke in adults have specific implications in relation to their age, as adults are often at crossroads in their lives with young families, demanding careers, and social interactions that may remain impaired for decades to come (Ekker et al., 2019). Many of the younger stroke survivors also experienced multifold losses after stroke, including loss of pre-stroke vocation, leisure activities, social groups and self-concept (Shipley et al., 2018). Stroke in adults has a considerable socioeconomic impact because of high healthcare costs and loss of labor productivity (Ekker et al., 2018). The disruption of stroke survivors' lifestyles can affect their daily lives, hobbies, roles, and relationships in life (Higgs & Soundy, 2020).

**Economic**

Direct cost is expenditure related with expenditure for treatment and rehabilitation, as well as non-medical cost outside the health system such as patient transportation, the cost of informal care, or other expenses borne by the patient (Rochmah et al., 2021). It incurred by the health system, society, families, and individual patients consisted of health and non-health costs (Rochmah et al., 2021). Compared with older individuals who have a greater overall burden of stroke, young adult stroke survivors may face greater economic impact because of the onset of disability during their most productive years (Mszar et al., 2020). Indirect costs are the loss of household productive labor time for patient and caregivers due to disability and mortality (Rochmah et al., 2021). The socioeconomic cost of loss of employment is

likely to be considerable to young adults themselves and society as they are likely to be in full-time employment, be home owners and have a family to support (Jarvis et al., 2019). Apart from medical expenses, people with cardiovascular disease will cause economic losses for the country's productivity (Rochmah et al., 2021).

## The Individual and Family Self-Management Theory (IFSMT)

The Individual and Family Self-Management Theory (IFSMT) is a mid-range descriptive theory by Ryan and Sawin (2009). Self-management means that individuals and family control and are responsible for the management of chronic conditions or healthy behaviors by purposefully engaging in the performance of learned behaviors, involving knowledge and beliefs, self-regulation skills and abilities, and social facilitation to manage chronic conditions or engaging in healthy behaviors (Ryan & Sawin, 2009). Living with a condition or engaging in healthy behavior is complex and requires integration of self-management behaviors into the lifestyles of individuals and families (Ryan & Sawin, 2009).

The IFSMT proposes that self-management is a complex dynamic phenomenon consisting of 3 dimensions: context, process, and outcomes. Factors in the contextual dimension influence individual and family engagement in the process of self-management as well as directly impact outcomes. Enhancing the individual's and families' self-management processes results in more positive outcomes. The third dimension of the theory relates specifically to outcomes. Outcomes are proximal or distal. While the outcomes of concern are those related to individuals and families, improvement of individual and family outcomes translates to improved outcomes for healthcare practitioners and systems. Researchers can use the IFSMT to more carefully delineate the factors associated with the need for self-management, the role of the individual and family members in self-management, the target of the intervention, and the outcomes to be expected. Individual and family self-management includes the purposeful incorporation of health-related behaviors into an individual or family's daily functioning.

**Context dimension: Risk and protective factors**

Condition-specific factors are those physiological, structural, or functional characteristics of the condition, its treatment, or prevention of the condition that

impact the amount, type, and nature of behaviors needed for SM (Ryan & Sawin, 2009). Self-management occurs in the context of family management in nearly all cases, but the relative importance of each varies across developmental stages (Grey et al., 2015). Further, as people age, families may take on increasing importance in the management of chronic conditions. Environmental factors include physical or social factors, including access to health care, transfer from one health care provider or environment to another, transportation, community, work, schools, culture, or social capital.

**Process dimension**

Ryan and Sawin (2009) elaborated on the processes of self- and family management. Persons will be more likely to engage in the recommended health behaviors if they have information about and embrace health beliefs consistent with behavior if they develop self-regulation abilities to change their health behaviors, and if they experience social facilitation that positively influences and supports them to engage in preventative health behaviors. Knowledge and beliefs impact behavior-specific self-efficacy, outcome expectancy, and goal congruence (Ryan & Sawin, 2009). Self-management processes were identified as focusing on illness needs, activating resources, and living with a chronic illness.

**Outcome dimension**

Outcomes are both proximal and distal. Proximal outcomes are the behaviors, cognitions, symptom management, and changes in biomarkers that result from self- and family management and which ultimately lead to distal outcomes. Health behaviors such as adherence, diet, physical activity, and sleep are often considered outcomes of self- and family management (Grey et al., 2015). Distal outcomes are the achievement of proximal outcomes, falling into 3 primary categories: health status, quality of life or perceived well-being, and cost of health—both direct and indirect.

## Self-management behaviors among adults with stroke

Stroke is considered to be a preventable and controllable disease (National Health Commission of the People's Republic of China, 2021). Self-management interventions benefit the symptom management of stroke patients a lot (Ruksakulpiwat & Zhou, 2021). The goal of stroke treatment is to restore physical function, maintain

good mental and emotional well-being, change health behaviors, and enhance people's ability and skills to actively participate in disease management to prevent and reduce symptoms, improve their health, carry on normal life and work, and prevent recurrence stroke. To optimize survivors' recovery and degree of independence in daily living, it is crucial to strengthen their capabilities in devising pragmatic and lifestyle-integrable strategies to overcome everyday stroke-related challenges (Lo et al., 2022).

In recent years, self-management of stroke patients has developed rapidly in China. However, because stroke patients tend to be elderly, researchers paid less attention to the self-management of adults with stroke.

One study on health behaviors and influencing factors of adults with stroke pointed out that the level of health behaviors was significantly correlated with self-efficacy, daily living ability, and social support (Li et al., 2012). Self-management of adults with a stroke can effectively prevent stroke recurrence. The Stroke Self-Management Behavior Scale for Young Adults (SSMBS-YA) was widely used to measure self-management behavior among adults with stroke, which is designed and modified by Xu et al. (Xu et al., 2016). A study shows that the Orem self-care model improves self-management behavior and confidence levels in adults with stroke (Zhang et al., 2018). Jin's master's thesis described the current situation of self-management level in adults with stroke, analyzed the influencing factors of self-management in adults with stroke, and explored the correlation between self-management and self-efficacy, self-perceived burden, and social support level (Jin, 2019). According to the investigation on the understanding of stroke-related knowledge in first-episode middle-aged and adults with stroke, it was found that the self-management ability was poor, which needs to be improved through health education to improve the cognitive level of relevant knowledge of stroke (Xu et al., 2021). There are few studies on self-management behavior among young and middle-aged people with stroke in China, and more studies are needed.

Recent international clinical guidelines increasingly accentuate the importance of self-management in stroke survivors and recommend the provision of self-management support for all (Foundation, , 2021). It aims to help stroke survivors address any lifestyle interventions necessary to reduce the risk of recurrence of stroke. And it also aims to help stroke survivors adopt strategies to manage changes in physical

and cognitive ability, relationships, and their place of residence, and to better participate in the community (Foundation, , 2021). Self-management behavior plays an important role in preventing stroke patients (Wang, 2017), which is an essential part of self-management.

**4.1 Definition of self-management behaviors**

Self-management refers to a healthy behavior in which patients maintain and improve their health through their behaviors, monitor and manage symptoms and symptoms of their diseases, reduce the impact of diseases on their social functions, emotions, and interpersonal relationships, and consistently treat their diseases (Luo & Xie, 2004). Self-management behavior can change the lifestyle of patients, effectively reduce the disease recurrence rate, improve the quality of life (Shu et al., 2019). For optimal impact on mortality and morbidity rates in stroke secondary prevention, the behavioral/lifestyle change/s required must then not only be adopted by the individual but sustained in the longer term as a lifestyle choice (Lennon et al., 2018).

**4.2 Self-management behaviors among adults with stroke**

In this study, self-management behavior among adults with stroke refers to the behavior of managing their disease, medication, daily life, mood, diet, rehabilitation and exercise, and resource utilization in the long-term process of coping with disease (Xu et al., 2016).

The self-management behavior among young and middle-aged stroke patients is not optimistic. In a study of 125 stroke patients younger than 50 years of age, 35% reported that they were still current smokers, and at least 20% were not taking their prescribed blood pressure or cholesterol-lowering medication (Magwood et al., 2017). Mo used the Health-Promoting Lifestyle Profile II to measure the health behavior among 100 stroke patients aged 18-59 and found that the health behavior among stroke patients was poor (Mo, 2018). Liu's study on the health behavior among 105 stroke patients aged 18-59 showed that the health behavior among stroke patients in the middle level (Liu et al., 2015). Sedentary behavior after stroke is a poor self-management health behavior (Morton et al., 2019). In addition, less than 60% of adults with stroke came to the healthcare system or hospital to get help (Magwood et al., 2017). The coping style of young and middle-aged stroke patients is mainly negative (Fu, 2018). A qualitative study on impediments to health behavior change in adults

with stroke in China indicates that negative psychology will further lead to a decrease in patients' health behavior compliance (Liu et al., 2021). In addition, adults with stroke also face the problem of returning to work, which is a challenge to self-management behavior. So, adults with stroke might be facing more serious health problems than the elderly.

Adults with stroke are at the critical stage of personal growth and career advancement, and poststroke dysfunction has a great negative impact on the work and life of adults with stroke. In China and Wenzhou, stroke rehabilitation and care are inseparable from the family. Family members, as primary caregivers, often have important responsibilities for helping with recovery and self-management. Family members provide psychological support and emotional comfort to the patient, take care of food and daily life, urge the patient to take medication on time, and reinforce healthy behaviors (smoking cessation, alcohol restriction, regular exercise, and healthy eating).

Therefore, this study is based on the theoretical framework of individual and family self-management. To explore the relationship between individual and family factors (family relationship and life stress), knowledge and belief (stroke prevention knowledge), and short-term outcome (personal and family self-management behavior) in adults with stroke.

**4.3 Guidelines for stroke prevention and treatment in China**

Stroke has brought a heavy burden to health care and social economy in China, and national health administration departments and medical staff must pay full attention to it.

Standardized blood pressure monitoring should be carried out in patients with hypertension. Screening for risk factors for stroke; Patients with early and whole hypertension were managed by therapeutic lifestyle; Early initiation of antihypertensive drug antihypertensive therapy for those with the poor effect of lifestyle intervention (Bösel, 2017). Monitor blood glucose and lipid regularly.

The daily diet should be diversified, so that the intake of energy and nutrition tends to be reasonable, can increase the intake of fiber, vitamins, potassium, and other nutrients, reduce blood lipid; Adopt a reasonable diet that is low in saturated fat,

including whole grains, beans, potatoes, fruits, vegetables, and dairy products (English et al., 2021).

Healthy adults should be active for at least 30 minutes each time and 150 minutes per week when the heart rate reaches more than 120 times /min), can choose such as walking, jogging, swimming, and other items. Overweight and obese individuals are advised to reduce their risk of stroke by adopting a healthy lifestyle, a good diet, increased physical activity, and self-monitoring of their weight (CNCCD, 2019).

Medical staff should help smokers understand the dangers of smoking, make them aware of the benefits of quitting smoking, and actively encourage them to quit smoking and improve their willingness to quit. It is recommended that people with hypertension should not drink alcohol. If they drink alcohol, the level of daily alcohol intake should be < 25gm for men and < 15gm for women (CNCCD, 2019).

## The selected factors related to self-management behaviors among adults with stroke

The three variables of stroke prevention knowledge, life stress, and family relationships were selected to determine the correlation between them and self-management behaviors.

### 5.1 Stroke prevention knowledge

Stroke prevention knowledge is knowledge of stroke warning symptoms, stroke risk factors, and health behaviors. An important component of successful stroke prevention is the improvement of public knowledge about stroke (Wan et al., 2014). Knowledge of stroke prevention and treatment can enhance self-management behavior among stroke patients (Wang et al., 2013). Hypertension is one of the most important independent risk factors for the first stroke, and the most fundamental risk factor for stroke in the Chinese population (National Health Commission of the People's Republic of China, 2021). Hypertension control is an important part of stroke patients' self-management (Qu et al., 2019). Self-management education can improve the self-management ability of hypertension patients (Luo et al., 2016).

The stroke knowledge level is an important factor in self-management behavior (Guan et al., 2018). The knowledge level and self-management behavior level of first-stroke patients are at the lower level, which needs to be improved (Li, 2016; Yuan, 2018). When post-stroke patients were asked about risks related to stroke, only 22% were able to name four risk factors, and 8% were unable to name any (Taft et al., 2021). Efforts to increase medication adherence, diet, and stress management should be enhanced to control BP for preventing the recurrence of stroke (Sutini et al., 2018). More importantly, self-management education can effectively prevent secondary stroke in young and middle-aged people (Zhang & Qian, 2020).

**5.2 Life stress**

Stress is defined by Selye as the nonspecific and predictable response by the body to demands placed upon it (Goodnite, 2014). Life stress refers to the psychological confusion or threat caused by adverse factors and stressful events in daily life, thus showing the tension and discomfort of body and mind. Stress is a negative affective state that individuals may attempt to relieve or cope with through unhealthy but often pleasurable behaviors (Krueger & Chang, 2008).

Life stress is involved in the development, maintenance, or exacerbation of several mental and physical health conditions, including stroke (Slavich, 2016). Adults with stroke experience stroke as an acute event and the stroke becomes a chronic difficulty that is considered to be affected by life stress. High levels of perceived stress were associated with smoking initiation, increased smoking levels, lower success rates of smoking cessation attempts, more frequent and heavy drinking of alcohol, increased drinking problems, and reports of positive attitudes toward alcohol consumption. Some people exercise to manage stress, but most people respond to stress by exercising less often and at lower levels because sedentary behavior is more beneficial in the short term (Boutelle et al., 2000; Byrne & Mazanov, 2003; Ng & Jeffery, 2003). This suggests that life stress may be related to self-management behavior among adults with stroke.

**5.3 Family relationship**

Family relationship refers to the family's cohesion, expressiveness, and conflict, which can show family support for adults with stroke. Studies of social relationships and mortality conclude that family relationships are particularly

instrumental in protecting individual health (Umberson, 1987). In China, family members are expected to devote themselves to the family and undertake family obligations. Family is viewed as a source of social, emotional, and physical support when a member has an illness, such as a stroke (Zhang & Lee, 2019).

One study in China indicates that patients with a higher level of social connection, social support, trust, reciprocity, and cohesion had a better quality of life (Ji et al., 2022). Adequate emotional and financial support from family members makes it easier for patients to believe that they are cared for and loved, resulting in a sense of security that improves prognosis and quality of life (Alshahrani, 2020). Recovery from stroke occurs in the everyday home environment, which strongly influences on an individual's behavior and actions. The family created an environment that valued the involvement of the family member in everyday activities and normalization or striving for as normal a lifestyle as possible (Whitehead et al., 2018). Stroke survivors have expressed how self-management is a complex, long-term, and personal learning process in which, in addition to the individual's self-management, relatives play a crucial role (Satink et al., 2018). Family can promote the self-management of stroke patients, so good family relationship plays an important role in self-management (Satink et al., 2018).

## Summary

According to the literature review, knowledge of stroke prevention, perceived stress, and family relationships were associated with self-management behavior in stroke patients. However, these studies focused on older stroke patients and limited the study of younger and middle-aged patients. In addition, there is no specific study on self-management behavior and related factors of adults with stroke in Wenzhou. There is a lack of basic understanding of self-management behavior and its related factors in stroke patients in Wenzhou, China.

Therefore, under the guidance of IFSMT, the researchers conducted this study to explore the current situation of self-management behavior among adults with stroke in Wenzhou, China, and to explore whether stroke prevention knowledge, life stress, and family relationship are related to self-management behavior among adults with stroke.

This study will provide information for healthcare providers in Wenzhou to develop nursing interventions for adults with stroke, support, and guide effective disease management in adults with stroke, improve health outcomes, and improve quality of life. This information will also be useful for nurses and health care providers to guide them to study this population for further research and future intervention studies in this group of patients.

# CHAPTER 3
# RESEARCH METHODOLOGY

This chapter presented the research methodology including research design, population, and sample, setting of the study, instruments, ethical consideration, data collection procedures, and data analysis procedures.

## Research design

A descriptive correlational research design was used for this study to describe the self-management behaviors of adults with stroke, and to determine the relationship between stroke prevention knowledge, life stress, family relationship, and self-management behaviors of adults with stroke.

## Population and sample

### Population

The target population of this study were the persons who were aged between 18-60 years old, diagnosed with ischemic stroke, receiving care and visit for follow-up of their condition at the Neurology outpatient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China.

### Sample

The samples were adults with ischemic stroke between 18-60 years old who came to visit the Neurology outpatient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou China to follow up on their health. Sampling by defining a collecting data period and recruiting samples followed inclusion criteria as follows:

1. Discharged from the hospital between 1-6 months
2. Be conscious with a GCS score of 15
3. The activities of daily living (ADL) scores > 60 by the Barthel Index
4. Living with family
5. Be able to communicate in Chinese

6 No history of mental disorder (from the medical record)

7 No history of other serious diseases or dysfunction of vital organs, such

as malignant tumors, heart, liver, and kidney dysfunction, etc.

**Sample size**

The sample sizes in this study were calculated by using the G*Power 3.0.10 program for descriptive correlational design. The researcher tested the influence between self-management behavior and each independent variable. In this study, the researcher estimated a medium effect size =.30 and achieved a power of .90, and $\alpha = .05$ were used for computing the sample size, which leaded to at least 112 participants being needed.

**Sampling technique**

Sampling by defining a collection data period and recruiting samples following inclusion criteria were used in this study. The researcher cooperated with the registered nurse in the Neurology outpatient department, to select the adults with ischemic stroke who met the inclusion criteria from all appointments. In addition, data collection was only carried out after the persons' consent was signed.

## Study Setting

The Second Affiliated Hospital of Wenzhou Medical University had a total of five districts. This research was conducted in the Longwan district of the Second Affiliated Hospital of Wenzhou Medical University. The Neurology outpatient department with four rooms in this district, which were open five days a week (Monday to Friday) from 08:00 to 12:00 am and from 01:00 to 04:30 pm. The information collected from the Neurology outpatient department showed that approximately 40 to 60 stroke survivors, 5 to 8 belonged to stroke persons aged between 18-60 years old every week. The Neurology outpatient department with four rooms in this district was managed by 8 neurologists and 4 registered nurses without other health care providers.

In the outpatient department, the doctor mainly asked the patient whether there was any discomfort recently, whether the recent treatment was effective, and whether the medication was on schedule. The patient's health was then assessed, and a checklist was issued. The doctor answered questions from patients and their families based on the results of the examination and adjusts the treatment plan. The registered nurses told the patient the details of the exam, such as the location of the exam and

what to do during the exam. The nurses cooperated with the doctor to give the patient a physical examination.

## Research Instruments

The five questionnaires were used for collecting data: the demographic questionnaire, the Stroke Self-management Behavior Scale for Young Adults（SSBS-YA）, the Stroke Prevention Knowledge Questionnaire (SPKQ), the Perceived Stress Scale, and the Brief Family Relationship Scale (BFRS).

**The Demographic Questionnaire**

The demographic questionnaire was developed by the researcher, specifically for this study. It includes 1) General information: gender, age, religion, education level, marital status, occupation (previous and current), family member, main caregiver, family income, living house, and healthcare payment scheme; 2) Health information: weight, height, BMI, ADL (discharged from hospital, current), the day they were diagnosed of ischemic stroke, NIH Stroke Scale score (the level of disability), length of stay in the hospital, family history of stroke, smoking status, alcohol consumption, and source of stroke education. The information from the first part of the demographic questionnaire was obtained from participants' self-report, and the second part was obtained from the medical record.

**The Stroke Self-Management Behavior Scale for Young Adults（SSMBS-YA）**

SSMBS-YA was designed and developed by Xu et al. in 2016 (Xu et al., 2016). The design of this scale was based on the chronic disease self-management program (CDSMP), combined with the guidelines for secondary prevention of stroke and related knowledge of risk factors in adults with stroke.

The scale consisted of 26 items and five dimensions, including symptom management (items 1,2,3,4,5,6,7,8), emotion management (items 9,10,11,12), daily life management (items 13,14,15,16,17,18,19), rehabilitation management (items 20,21,22,23), and resource management (items 24,25,26). Likert 5-level scoring method was adopted to score 5 points for "strongly agree", 4 points for "agree", 3 points for "neutral", 2 points for "disagree" and 1 point for "strongly disagree". The

total score was 130 on this scale. The higher the score was, the better the patient's self-management behavior was. According to previous studies, a score below 78 was considered a low level of self-management behavior, a score between 78 and 104 was a moderate level, and a score greater than 104 was an expression of a high level of self-management behavior (Zhang, 2020). Since the number of items in each dimension of the scale was not equal, for the convenience of comparison, the scores were standardized. The specific calculation method was as follows: Standardized scoring rate = Actual score of each dimension ÷ Maximum score ×100%. A scoring rate below 60% was considered a low level of self-management, a scoring rate between 60% and 80% was medium level, and a score greater than 80% was an expression of a high level of self-management (Jin, 2019; Zhang, 2020).

A content validity index was calculated to be .857 for SSMBS-YA. The Cronbach's α coefficient for the scale is .923 (Xu et al., 2016).

**The Stroke Prevention Knowledge Questionnaire (SPKQ)**

The SPKQ was used to measure the level of stroke knowledge among adults with stroke which was designed and developed by Wan. It was based on a comprehensive review of previous studies on patients' stroke knowledge.

The latest version of this questionnaire was composed of 25 items with a total score of 100, covering 10 main areas, which was revised and developed by Wan and Zhang (Wan et al., 2010; Wan et al., 2014).

These areas of knowledge included physical activity (item 1), nutrition (item 2,3), a low-salt diet (item 4), smoking abstinence (item 7), unhealthy use of alcohol (item 8), medication adherence (items 9,10,11), BP check-ups (items 5,6), stroke warning symptoms (item 22,23,24), stroke risk factors (item 12,13,14,15,16,17,18,19,20,21), and prehospital delay knowledge (item 25). For items 1 to 3 and 7 to 11, one point was for each "correct" answer and zero for each "incorrect" or "unsure" answer. For items 4 to 6, the participants should answer correctly with the right one to get one point, otherwise, the point was zero. For items 12 to 24, one point was for each "yes" answer and zero for each "unsure" or "no" answer. For item 25, the answers to the question "the time to go to the hospital with a stroke warning" were "unsure", "within 12 hours" and "within 3 hours". If the participants selected "within 3 hours", one point was counted, otherwise, it counted as

zero. The final score was converted into a percentage system. In other words, the standard score = the sum of the scores of each area ×4. The higher the final score, the richer the participants' stroke prevention knowledge was. To describe the level of stroke prevention knowledge, participants with a score below 60 were considered to be in the poor knowledge level of stroke. A score of 60-80 was considered a moderate knowledge level of stroke and scores more than 80 were considered to be a good level of stroke knowledge. To get a better comparison of the scores across the areas, the scores were standardized. The specific calculation method was similar as self-management behaviors as follows: Standardized scoring rate = Actual score of each area ÷ Maximum score ×100%. A scoring rate below 60% was considered a low level, while a scoring rate between 60% and 80% was a medium level, and a score greater than 80% was a high level (Yang, 2022).

A content validity index was calculated to be .89 for SPKQ. The Cronbach's α coefficient for the questionnaire is .86.

**The Perceived Stress Scale (PSS)**

The PSS was the most widely used psychological instrument for measuring the perception of stress (Cohen et al., 1994). It was designed and developed by Cohen et al., including 3 versions of PSS-4 items, PSS-10 items, and PSS-14 items. PSS-10 has been proven to have good reliability and validity in different populations, cultures, and institutions. The Chinese version of PSS-10 was translated by Yang (Yang & Huang, 2003). It had been used in stroke patients to study the relationship between perceived stress and depression (Wang et al., 2018).

PSS-10 was composed of 10 items with a total score of 40. The questions in this scale asked participants about their feelings and thoughts during the last month, which were easy to understand for the participants. For six negatively stated items (items 1, 2, 3, 6, 9, 10), zero point was assigned for each "Never", one point for each "Almost Never", two points for each "Sometimes", three points for each "Fairly Often", and four points for "Very Often". For four positively stated items (items 4, 5, 7, 8), the scores are obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1, 4 = 0). The final scores were then summed across all scale items. The higher the score, the more stress the participants perceived.

The reliability and validity of Chinses version of PSS-10 were detected by Zhen et al. (Zhen et al., 2015). The Cronbach's α coefficient for the questionnaire is .91.

**The Brief Family Relationship Scale (BFRS)**

The BFRS was used to measure the participant's perception of the quality of their family relationship functioning, which was designed and developed by Fok et al. (Fok et al., 2014). The Chinese version of this scale was translated by Yu (Huang et al., 2018).

It consisted of cohesion (7 items), expression (3 items), and conflict (6 items) subscales with a total score of 32, measuring support, expression of opinions, and angry conflict within a family. Participants were asked to indicate whether the descriptions of the items are "true" or "false" to them. Zero point was assigned for each "Not at all", one point for each "Somewhat", and two points for each "A lot". They were scoring the items of Cohesion subscales and Expression subscales. The Conflict subscale scores were reverse-keyed, such that a higher conflict score represented the lower conflict in the family or more positive family relationships. For the items in conflict subscales (items 2, 5, 9, 10,12,16), the scores were obtained by reversing responses (e.g., Not at all = 2, Somewhat = 1, A lot= 0). The final scores were then summed across all scale items. The higher the score, the better the family relationship was.

This measurement showed good internal consistency and Cronbach's α coefficient of this scale is .85 in one study, which measures the Chinese population (Huang et al., 2018).

## Psychometric properties of the instruments

The Chinese version of all the instruments were used in this study, and they are tested and validated by the experts in some previous studies, which meant all instruments had good reliability. Cronbach's alpha was found in previous studies to show that the reliability of all instruments applied in this study was ideal. The reliability of instrument was used Cronbach's alpha coefficients to determine the reliability of each questionnaire with 30 adults with ischemic stroke, who had the same characteristics as the sample of the study.

## Protection of human rights

The research proposal was submitted to the Burapha University Ethics Committee on Human Research (BUU EC) and Institution Review Board (IRB) of WMU and the second affiliated hospital of WMU. Only after that, this research was carried out.

Before collecting data, the subjects were introduced to the purpose and process of the research, and the participants were voluntary in this study. During the study, they had the right not to answer questions, and they also had the right to change their minds and refused to participate in the project at any time, and the refusal would not affect the medical services they received. After obtaining informed consent from the participants, the informed consent was issued to the patient and signed. The survey was conducted anonymously and the personal information of the participants were kept confidential.

In the process of data collection and collation, questionnaires were numbered to protect the privacy of research objects. The information collected was stored in a specific and secure location. The data were used only for research purposes and will be destroyed after the study results are available, and patients contacted the researchers if they needed the data.

## Data collection

The data collection procedures in this study were conducted by the researcher as follows:

1. After being approved by the Graduate School of BUU, the researcher submitted recommendations for ethical review to the IRB of BUU and the IRB of the Second Affiliated Hospital of Wenzhou Medical University in China.

2. The researcher asked the Graduate School of BUU and the Second Affiliated Hospital of Wenzhou Medical University in China for permission to collect data on the goals and procedures of the research information.

3. After the researcher obtained the permission of the Second Affiliated Hospital of Wenzhou Medical University, China. The researcher explained the data

collection procedures to the Neurology outpatient department staff and got their cooperation.

4. Considering the situation of the coronavirus in 2022 (COVID-19), the researcher wore masks all the time and reminded patients to wear masks all the time. At the Neurology outpatient department entrance, patients were required to go through a temperature screening and showed a health QR code (an official way to declare residents' health status). Those patients who displayed a green code and a temperature below 37.3 were allowed entry into the outpatient department.

5. The researcher went to the Neurology outpatient department from 8:00 am to 12:00 am and from 1:00 pm to 4:30 pm every weekday (Monday to Friday) for collecting data.

6. The nurse in the outpatient departments searched the registration to find the clients who met the inclusion criteria. The adults with ischemic stroke were asked whether they were interested in participating in the study or not. The outpatient nurse contacted the researcher if the patients were interested to join in this study.

7. The researcher met and informed the participants and their families about the aim of the study, ethical issues, and human protection of the study. Written consents were signed after the participants understood and were willing. Every participant maintained one-meter social distancing from other participants and researchers.

8. These data were collected through a self-reporting questionnaire in a special private room. The room was routinely disinfected daily. The participants started with the demographic questionnaire. The second was the Perceived Stress Scale. The third was the Stroke Self-Management Behavior Scale for Young Adults. The fourth was the Stroke Prevention Knowledge Questionnaire. Finally, participants completed the Brief Family Relationship Scale. It took about 30 minutes for each participant to complete the questionnaires. The researcher ensured that participants could see the doctor in time after the questionnaires were completed.

9. After completing the questionnaires, participants were reminded to take any belongings away. Public goods including pens were disinfected with alcohol cotton after use.

10. The researcher checked if the questionnaires had been filled and completed after the participants submit them.

11. This process was repeated until the required sample size was reached.

12. Terminal criteria: if the person felt unwell and had symptoms of recurrent stroke, the researcher stopped collecting data immediately, sought help from other medical staff, and took good care of the person.

## Data analysis

Data were analyzed by IBM SPSS 26.0 software in this study. The significance level was set at .05, data analysis included:

1. Descriptive statistics were used to describe the demographic characteristics among adults with stroke in this study and the results of each variable. Mean and standard deviation was used to describe the measurement data, and the counting data was described by frequency percentage, etc.

2. Assumption test for using Pearson's product-moment relation examined the positive/negative relationship between stroke prevention knowledge, life stress, family relationship, and self-management behaviors among adults with ischemic stroke.

3. Pearson's product-moment relation was used to examine the relationship between stroke prevention knowledge, family relationship, life stress, and self-management behaviors among adults with stroke.

# CHAPTER 4
# RESULTS

This chapter presents the results of the study about self-management behaviors and factors related to self-management behaviors among adults with ischemic stroke in Wenzhou, China. The results are divided into three parts.

1. The description of demographic characteristics and health information of the participants including gender, age, religion, educational level, marital status, occupation, family member, main caregiver, annual household income, living place, healthcare payment scheme, duration of stroke, source of stroke education, BMI, NIHSS score, ADL score, smoking status, alcohol consumption and comorbidities.

2. The description of the stroke prevention knowledge, life stress, family relationship, and self-management behaviors of adults with ischemic stroke.

3. The relationships between stroke prevention knowledge, life stress, family relationship, and self-management behaviors of adults with ischemic stroke.

## Part 1 The description of demographic characteristics and health information of the participants

### Description of demographic characteristics

The description of the demographic characteristics of the participants was illustrated in Table 1.

Table 1 Frequency, percentage, mean, and standard deviation of demographic characteristics of the adults with ischemic stroke (n = 125)

| Characteristics | Number (n) | Percentage (%) |
|---|---|---|
| Gender | | |
| Male | 88 | 70.4 |
| Female | 37 | 29.6 |
| Age (years) | | |
| 21~30 | 5 | 4.0 |
| 31~40 | 15 | 12.0 |
| 41~50 | 43 | 34.4 |
| 51~60 | 62 | 49.6 |
| (M = 49.40, SD = 8.30, Min = 26, Max = 60) | | |
| Religion | | |
| Buddhism | 27 | 21.6 |
| Christian | 7 | 5.6 |
| Catholicism | 1 | 0.8 |
| No religion | 90 | 72.0 |
| Education level | | |
| Illiteracy | 9 | 7.2 |
| Primary School | 25 | 20.0 |
| Junior to senior high school | 69 | 55.2 |
| Bachelor's Degree | 22 | 17.6 |
| Marital status | | |
| Divorced | 6 | 4.8 |
| Married | 108 | 86.4 |
| Unmarried | 6 | 4.8 |
| Widowed | 5 | 4.0 |
| Occupation | | |
| Before stroke | 125 | 100.0 |
| Civil servants/government staff | 15 | 12.0 |
| Commercial staff | 42 | 33.6 |
| Labor (eg. Builder, factory worker, sanitation worker, driver, farmer) | 68 | 54.4 |
| Post-stroke | | |
| Return to the same work | 84 | 67.2 |
| Civil servants/government staff | 7 | 5.6 |
| Commercial staff | 31 | 24.8 |
| Labor (eg. Builder, factory worker, sanitation worker, driver, farmer) | 46 | 36.8 |
| Suspend work | 30 | 24.0 |
| Change working status | 11 | 8.8 |

Table 1 (Continued)

| Characteristics | Number (n) | Percentage (%) |
|---|---|---|
| Monthly household income (1 CNY = 0.14 USD) | | |
| less than CNY 2000 | 23 | 18.4 |
| 2000 CNY ~ 4000 CNY | 42 | 33.6 |
| 4000 CNY ~ 8000 CNY | 44 | 35.2 |
| more than CNY 8000 | 16 | 12.8 |
| Number of family members | | |
| 1 | 17 | 13.6 |
| 2 | 52 | 41.6 |
| 3 | 52 | 41.6 |
| ≥4 | 4 | 3.2 |
| (M = 2.35, SD =0.80, Min = 1, Max = 5) | | |
| Main caregiver | | |
| Spouse | 89 | 71.2 |
| Child | 17 | 13.6 |
| Parents | 9 | 7.2 |
| Paid caregiver | 8 | 6.4 |
| Relatives | 2 | 1.6 |
| Living place | | |
| Rural | 81 | 64.8 |
| Urban | 44 | 35.2 |
| Healthcare payment scheme | | |
| Urban residents under the medical insurance system (90% paid by the government) | 40 | 32.0 |
| New rural cooperative medical care system (70% paid by the government) | 76 | 60.8 |
| Out-of-pocket medical | 8 | 6.4 |
| Others (eg. Commercial insurance) | 1 | 0.8 |

According to Table 1, 70.4% of the participants were male (n=88), while 29.6% were female (n=37). The age of the participants ranged from 26 to 60 years old with an average age of 49.4 years (SD=8.30). Among all age brackets, the largest number of people were between 51 and 60 years old, accounting for 49.6%, followed by those between 41 and 50 years old (34.4%). In terms of religion, 72.0% of the population had no religious belief, and 21.6% believed in Buddhism. Among these participants, 55.2% had junior to senior high school education, followed by primary school education (20.0%). Only 17.6% of the participants completed a college-level education. Most of the participants were married (86.4%). 67.2% of the participants continued to work after their stroke, while 24% of the previously employed

participants did not. More than half of them were laborers. In terms of monthly family income, 4000 CNY ~ 8000 CNY (1 CNY = 0.14 USD) occupied the largest percentage (35.2%), followed by 2000 CNY ~ 4000 CNY (33.6%). The percentage of participants with two or three family members was both 41.6%. In terms of the main caregiver, the majority of the participants were taken care of by their spouses (71.2%). 64.8% of the participants were living in rural, while 35.2% were living in urban. More than half had a new rural cooperative medical care system to cover their medical expenses (60.8%) and 32.0% used urban residents under the medical insurance system.

**Description of health information**

Table 2 showed the health information of the participants containing BMI, NIHSS score, ADL score on the day of admission, discharge and present, the duration of a stroke, source of stroke education, smoking status, alcohol consumption, and comorbidities.

Table 2 Frequency, percentage, mean, and standard deviation of health information of the adults with ischemic stroke (n = 125)

| Characteristics | Number (n) | Percentage (%) |
|---|---|---|
| BMI (Chinese standards) | | |
| Normal weight (18.5-23.9) | 56 | 44.8 |
| Overweight (24-27.9) | 56 | 44.8 |
| Obese (≥28) | 13 | 10.4 |
| (M = 24.3, SD = 2.8, Min = 18.8, Max =32.1) | | |
| NIHSS score (admission day) | | |
| 0 (Normal) | 25 | 20.0 |
| 1-4 (Mild stroke) | 80 | 64.0 |
| 5-15 (Moderate stroke) | 20 | 16.0 |
| (M = 2.3, SD = 1.9, Min = 0, Max = 8) | | |
| NIHSS score (discharge day) | | |
| 0 (Normal) | 46 | 36.8 |
| 1-4 (Mild stroke) | 74 | 59.2 |
| 5-15 (Moderate stroke) | 5 | 4.0 |
| (M = 1.4, SD = 1.5, Min = 0, Max = 6) | | |
| NIHSS score (The data collected day) | | |
| 0 (Normal) | 47 | 37.6 |
| 1-4 (Mild stroke) | 74 | 59.2 |
| 5-15 (Moderate stroke) | 4 | 3.2 |
| (M = 1.3, SD = 1.4, Min = 0, Max = 6) | | |

Table 2 (Continued)

| Characteristics | Number (n) | Percentage (%) |
|---|---|---|
| ADL score (admission day) | | |
| 0-40 (Severe dependence) | 16 | 12.8 |
| 41-60 (Moderate dependence) | 13 | 10.4 |
| 61-99 (Slight dependence) | 55 | 44.0 |
| 100 (Independence) | 41 | 32.8 |
| (M = 78.8, SD = 23.6, Min = 20, Max = 100) | | |
| ADL score (discharge day) | | |
| 41-60 (Moderate dependence) | 10 | 8.0 |
| 61-99 (Slight dependence) | 67 | 53.6 |
| 100 (Independence) | 48 | 38.4 |
| (M = 87.7, SD = 15.0, Min = 45, Max = 100) | | |
| ADL score (The data collected day) | | |
| 61-99 (Slight dependence) | 65 | 52.0 |
| 100 (Independence) | 60 | 48.0 |
| (M = 91.3, SD = 11.4, Min = 65, Max = 100) | | |
| Duration of post-stroke | | |
| 1~2 month | 62 | 49.6 |
| 2~3 months | 34 | 27.2 |
| 3~6 months | 29 | 23.2 |
| Source of stroke education*（n=158） | | |
| Nurses in hospital (Both inpatient and outpatient) | 125 | 79.1 |
| Social media (eg. Website, Newspaper, TV) | 27 | 17.1 |
| Others (eg. Friends, Community Center) | 6 | 3.8 |
| Smoking status | | |
| Currently smoking | 62 | 49.6 |
| Quite smoking | 2 | 1.6 |
| Never smoked | 61 | 48.8 |
| Alcohol consumption | | |
| No alcohol use | 68 | 54.4 |
| Less than 150ml | 22 | 17.6 |
| 150~300ml | 19 | 15.2 |
| More than 300ml | 10 | 8.0 |
| Quite drinking alcohol | 6 | 4.8 |
| Comorbidities | | |
| Yes | 99 | 79.2 |
| Hypertension | 65 | 52.0 |
| Two or more comorbidities (eg. Hypertension, diabetes, hyperlipidemia, cardiopathy) | 23 | 18.4 |
| Diabetes | 6 | 4.8 |
| Hyperlipidemia | 3 | 2.4 |
| Cardiopathy | 2 | 1.6 |
| None | 26 | 20.8 |

*. Can answer more than one

As shown in Table 2, overweight (BMI 24-27.9) made up 44.8% of the participants, the same proportion as normal weight (BMI 18.5-23.9), and 13% were obese (BMI≥28), with the average BMI of 24.3 (SD=2.8). 64% of the participants had a mild stroke (NIHSS score 1-4) on admission day, while 16% had a moderate stroke (NIHSS score 5-15). On discharge day, the proportion of participants who had moderate stroke dropped to 4% and rose to 36.8% for those with normal stroke. Most of the participants (44%) had ADL scores between 61 to 99 (Slight dependence). 12.8% of the participants had ADL scores of 0-40 (Severe dependence), and 10.4% had ADL scores of 41-60 (Moderate dependence). At the time of discharge, all the participants had ADL scores of more than 40, while more than half (53.6%) of the participants had ADL scores of 61-90, and 38.4% reached ADL scores of 100. It was 49.6% of the patients 1-2 months after stroke. The proportion of participants who were 2-3 months post-stroke (27.2%) was similar to that of participants 3-6 months post-stroke (23.2%). In terms of source of stroke education, more than four out of five participants acquired stroke knowledge from hospital nurses (81.6%). 49.6% of the participants were currently smoking after a stroke, and 48.8% never smoked. More than half of the participants had no alcohol use (54.4%), while 40.8% had a habit of alcohol needs. In terms of comorbidities, hypertension accounted for the largest proportion (52.0%). 18.4% of the participants had two or more comorbidities.

## Part 2 The description of study variables

### Description of self-management behaviors

Self-management behaviors consisted of five dimensions, including symptom management, emotion management, daily life management, rehabilitation management, and resource management. Table 3 illustrated the classification of self-management behaviors. And Table 4 shows the scores of self-management behavior and its five dimensions of the participants.

Table 3 Mean, frequency, percentage, and classification of self-management behaviors among adults with ischemic stroke (n = 125)

| **Self-management behaviors** | **Number (n)** | **Percentage (%)** | **Mean** | **SD** | **Level** |
|---|---|---|---|---|---|
| Self-management behaviors | 125 | - | 88.1 | 16.5 | Moderate |
| > 104 | 17 | 13.6 | 113.2 | 7.3 | High |
| 78-104 | 69 | 55.2 | 92.6 | 8.6 | Moderate |
| ＜78 | 39 | 31.2 | 69.1 | 6.5 | Low |

As Table 3 illustrated, an average of the self-management scores in this study was 88.1±16.5. Overall, the self-management behaviors of the participants were at a moderate level. In this study, 55.2% of the participants got a score of 78-104, which were at the moderate level of self-management behaviors (M=92.6, SD=8.6). 31.2% of the participants got scores less than 78, showing a low level (M=69.1, SD=6.5). Only 13.6% were at the high level (M=113.2, SD=7.3).

Table 4 Range, mean, frequency, percentage, and classification of the five dimensions of self-management behaviors among adults with ischemic stroke (n = 125)

| Self-management behaviors | Range | | Mean | SD | Standardized Scoring Rate (%) | Meaning |
|---|---|---|---|---|---|---|
| | Possible score | Actual score | | | | |
| Symptom management | 8-40 | 14-40 | 27.8 | 6.4 | 69.6 | Moderate |
| Emotion management | 4-20 | 4-20 | 12.1 | 2.9 | 60.8 | Moderate |
| Daily life management | 7-35 | 8-35 | 24.8 | 5.9 | 70.9 | Moderate |
| Rehabilitation management | 4-20 | 4-20 | 14.7 | 4.0 | 73.5 | Moderate |
| Resource management | 3-15 | 3-15 | 8.5 | 3.6 | 56.9 | Low |

As Table 4 showed that the other four dimensions of self-management of the 125 participants were at a moderate level (60%~80%). However, resource management was at low level (56.9%),

**Description of stroke prevention knowledge**

These areas of stroke prevention knowledge include physical activity, nutrition, a low-salt diet, smoking abstinence, unhealthy use of alcohol, medication adherence, BP check-ups, stroke warning symptoms, stroke risk factors, and prehospital delay knowledge. Table 5 illustrated the classification of stroke prevention knowledge. And Table 6 shows the scores of stroke prevention knowledge and its ten areas of the participants.

Table 5 Mean, frequency, percentage, and level of stroke prevention knowledge among adults with ischemic stroke (n = 125)

| Stroke prevention knowledge | Number (n) | Percentage (%) | Mean | SD | Level |
|---|---|---|---|---|---|
| ＜60 | 41 | 32.8 | 38.8 | 14.8 | Low |
| 60-80 | 39 | 31.2 | 71.6 | 7.2 | Moderate |
| > 80 | 45 | 36.0 | 91.9 | 5.0 | High |

According to previous studies, a score below 60 was considered a low level of stroke prevention knowledge, a score between 60 and 80 was medium level, and a score greater than 80 was an expression of a good level of stroke prevention knowledge (Wan et al., 2014; Yang, 2022). In this study, 31.2% of the participants got a score of 60-80, which were at the moderate level of stroke prevention knowledge (M=71.6, SD=7.2). 32.8% got a score less than 60, showing a low level (M=38.8, SD=14.8). 36.0% were at the high level (M=91.9, SD=5.0).

Table 6 Range, mean, frequency, percentage, and ten areas of stroke prevention knowledge among adults with ischemic stroke (n = 125)

| Stroke prevention knowledge | Range | | Mean | SD | Standardized Scoring Rate (%) | Meaning |
|---|---|---|---|---|---|---|
| | Possible score | Actual score | | | | |
| Stroke prevention knowledge | 0-100 | 4-100 | 68.2 | 24.3 | 68.2 | Moderate |
| Physical activity | 0-4 | 0-4 | 3.4 | 1.5 | 84.0 | High |
| Nutrition | 0-8 | 0-8 | 6.3 | 2.9 | 78.4 | Moderate |
| A low-salt diet | 0-4 | 0-4 | 1.7 | 2.0 | 42.4 | Low |
| BP check-ups | 0-8 | 0-8 | 4.0 | 2.9 | 49.6 | Low |
| Smoking abstinence | 0-4 | 0-4 | 3.0 | 1.8 | 74.4 | Moderate |
| Unhealthy use of alcohol | 0-4 | 0-4 | 3.4 | 1.5 | 84.0 | High |
| Medication adherence | 0-12 | 0-12 | 9.4 | 3.8 | 78.7 | High |
| Stroke warning symptoms | 0-40 | 0-40 | 25.4 | 13.2 | 63.4 | Moderate |
| Stroke risk factors | 0-12 | 0-12 | 8.8 | 4.8 | 73.6 | Moderate |
| Prehospital delay knowledge | 0-4 | 0-4 | 2.9 | 1.8 | 72.0 | Moderate |

As Table 6 showed, the scores of stroke prevention knowledge of 125 participants ranged from 4 to 100, with an average of 68.2±24.3. Physical activity and unhealthy use of alcohol had the highest standardized score rates, both scored 84%. The standardized score rate of A low-salt diet was the lowest (42.4%), and BP check-ups were the second lowest (49.6%).

**Description of life stress**

Life stress was measured by PSS-10. Table 7 showed the scores of the perceived stress of the participants.

Table 7 Mean, frequency, and percentage of life stress among adults with ischemic stroke (n = 125)

| Life stress | Number (n) | Percentage (%) | Mean | SD |
|---|---|---|---|---|
| Total | 125 | 100 | 17.0 | 6.1 |

Total mean of life stress was 17.0 and the standard deviation was 6.1.

**Description of family relationship**

Family relationship consists of cohesion, expressiveness, and conflict. Table 8 illustrated the means and standard deviations of family relationships in the 3 dimensions.

Table 8 Range, mean, standardized scoring rate of three dimensions of family relationship among adults with ischemic stroke (n = 125)

| Family relationship | Range | | Mean | SD | Standardized Scoring Rate (%) |
|---|---|---|---|---|---|
| | Possible score | Actual score | | | |
| Family relationship | 0-32 | 6-32 | 22.8 | 5.7 | 71.4 |
| Cohesion | 0-14 | 3-14 | 10.3 | 2.8 | 73.7 |
| Expressiveness | 0-6 | 0-6 | 3.9 | 1.7 | 65.7 |
| Conflict | 0-12 | 1-12 | 8.6 | 2.7 | 71.5 |

The mean score of family relationship was 22.8, with a standard deviation of 5.7. The scoring rate of cohesion (73.7%) and conflict (71.5%) were similar, while expressiveness (65.7%) was the lowest.

## Part 3 The relationship between stroke prevention knowledge, life stress, family relationship, and self-management behaviors among adults with ischemic stroke

The normal distribution of the variables was tested through a PP plot. All variables conform to a normal distribution. Pearson's product-moment correlation was used to examine the relationship between stroke prevention knowledge, life stress, family relationship, and self-management behaviors among adults with ischemic stroke. The results were presented in Table 9.

Table 9 Correlation coefficients between stroke prevention knowledge, life stress, family relationship, and self-management behaviors among adults with ischemic stroke (n = 125)

| | Self-management behavior | *P*-value |
|---|---|---|
| Stroke prevention Knowledge | 0.385 | ＜.001 |
| Life stress | -0.330 | ＜.001 |
| Family relationship | 0.342 | ＜.001 |

Table 9 indicated that stroke prevention knowledge had a positive significant and moderate correlation with self-management behaviors among adults with ischemic stroke (r = .385, $p < .001$). Family relationship also had a positive significant, and moderate relationship with self-management behaviors (r = .342, $p < .001$). Life stress had a negative significant correlation with self-management behaviors (r = -.330, $p < .001$).

# CHAPTER 5
# CONCLUSION AND DISCUSSION

This chapter presents the conclusion and discussion of the study results according to the research objectives and hypotheses. Implications of the study findings, limitations, and recommendations for future research are presented.

## Summary of the study

This study aims to describe the self-management behaviors of adults with ischemic stroke and to determine the relationship between stroke prevention knowledge, life stress, family relationship, and self-management behaviors of adults with stroke. Individual and family self-management theory (IFSMT) was used as a conceptual framework to guide this study. Sampling by defining a collecting data period was applied to recruit 125 participants from the Second Affiliated Hospital of Wenzhou Medical University. Research instruments included the demographic questionnaire, the stroke self-management behaviors scale for young adults (SSMBS-YA), the stroke prevention knowledge questionnaire (SPKQ), the perceived stress scale (PSS), and the brief family relationship scale (BFRS). The reliability of the scales was assessed by Cronbach's alpha in the pilot study. The Cronbach's alpha values of SSMBS-YA, SPKQ, PSS, and BFRS with 30 participants was .87, .94, .88 and .86. Before statistics and analyzing the data, the internal consistency reliability of SSMBS-YA, SPKQ, PSS, and BFRS for the study with 125 participants was .86, .90, .82, and .85, respectively. Data were analyzed by descriptive statistics and Pearson correlation.

According to the study with 125 participants, the age ranged from 26 years old to 60 years old, with an average age of 49.4 years old (SD=8.30). The participants aged 51-60 years accounted for 49.6%, followed by the participants aged 41-50 years, accounting for 34.4%. The majority of the participants were married (86.4%) and 71.2% were taken care of by their spouses. All were employed before their stroke. 67.2% of the participants returned to their original job after the stroke, 24% of the participants stopped working for better rehabilitation, and 8.8% of the participants

changed their working status. Participants with a monthly household income of CNY 4000 to CNY 8000 accounted for 35.2%, followed by those with CNY 2000 to CNY 4000 accounted for 33.6%. The percentage of participants with two family members was the same as that with three family members (41.6%).

In terms of health information, 44.8% of the participants were overweight (24-27.9), and 10.4% were obese (≥28). Comorbidities were present in 79.2% of the participants. 52% of participants had hypertension, and 18.4% had two or more comorbidities.

The mean score of self-management behaviors was 88.1 (SD=16.5). 55.2% of the participants had a medium level of self-management behavior, and 31.2% had a low level. In terms of the standardized scoring rate of five dimensions, rehabilitation management had the highest scoring rate (73.5%), followed by symptom management (69.6%), and resource management had the lowest scoring rate (56.9%).

The factors related to self-management behaviors among adults with ischemic stroke were stroke prevention knowledge ($r = .385$, $p < .001$), family relationship ($r = .342$, $p < .001$), and life stress ($r = -.330$, $p < .001$). The results were consistent with our hypothesis. Stroke prevention knowledge, family relationship, and life stress were related to self-management behaviors. Stroke prevention knowledge and family relationship were positively correlated with self-management behavior, and life stress was negatively correlated.

## Discussion

According to the research objectives and hypothesis, the results of this study were discussed. The first objective was to describe self-management behaviors in adults with ischemic stroke. The second objective was to determine the association of stroke prevention knowledge, life stress, and family relationship with self-management behaviors.

**Self-management behaviors among adults with ischemic stroke**

In this study, the mean score of the self-management behaviors among adults with ischemic stroke, age between 18 years old to 60 years old was 88.1 out of 130 (SD=16.5), which was at a moderate level, higher than Jin's study on self-management behavior of adults with stroke in 2019 and Zhang's study in 2020, both of which

selected the stroke patients aged 18 years old to 45 years old (Jin, 2019; Zhang, 2020). The scores were 67.88 (SD=19.26) from Jin's study and 85.38 (SD=15.77) from Zhang's study. In this study, the mean age of the adults with ischemic stroke was 49.4 years old, which is younger than the participants of Jin's study and Zhang's study. Among the participants, 49.6% were aged from 51 to 60 years old. Self-management across in developmental stage are different (young to older adult) according to IFSMT (Ryan & Sawin, 2009). In a study of self-management in kidney transplant patients, researchers found that self-management increased with age (Xie et al., 2019). In addition, one Study had indicated that self-management of stroke patients tended to improve with age in China (Shuqi et al., 2023). Therefore, compared with the previous studies in China, higher self-management scores in this study might be due to differences the age groups were selected.

Not only age affects self-management, but marriage also affects self-management of stroke patients. 86.4% of the participants were married and 71.2% were taken care of by their spouses as main caregiver in current study. As described by IFSMT, contextual factors are risk or protective factors and include condition-specific factors, physical and social environments, and individual and family characteristics. In one study of effect of self-management of stroke patients on rehabilitation, it was found that the self-management behavior of the married patient was better than unmarried/divorced/widowed patients (Sun et al., 2022). The spouse often plays a role in development of self-management of stroke patients (Satink et al., 2018). Stable partnerships tend to favor good self-management behaviors (Haines et al., 2018). Spouses participated in self-management programs and monitor stroke survivors (their partners) for proper execution of activities for better rehabilitation outcomes (Satink et al., 2018). This could be one reason to explain the higher scores of self-management behaviors in this study. Moreover, 83.2% of the participants had more than two family members. One review found that family members were able to positively support those living with a chronic condition to self-manage their conditions, through flexibility and strategies to sustain adaptation (Whitehead et al., 2018). Otherwise, 92.8% of the participants had healthcare payment scheme to support their rehabilitation after stroke, which greatly reduced the economic burden caused by stroke. Studies in China had shown that the smaller the economic burden, the better self-management

behavior would be (Jin, 2019; Zhang, 2020). All of the above are the reasons for the higher score of self-management behavior in this study, compared with previous studies.

However, when looking at the three levels of the self-management behaviors in this study, it was observed that nearly one third of the adults with ischemic stroke (31.2%) were at the low level (M=69.1, SD=6.5). The findings from this study showed that 82.4% of the participants had a high school education or below, indicating a low level of education. Self-efficacy is a behavior specific concept and refers to the degree of confidence one has in his/her ability to successfully engage in a behavior under normal and stressful situations in IFSMT (Ryan & Sawin, 2009). Lower self-efficacy was reported by patients with low education (Olsson et al., 2019). The education level of adults with first stroke was the main influencing factor of self-management behavior (Fu, 2021). The higher the education level, the higher the self-management level (Jin, 2019). This may be the cause of the low self-management level. In addition, 67.2% of the participants returned to work after stroke as a result in this study. Work is one of the environmental factors affecting self-management according to IFSMT (Ryan & Sawin, 2009). Return to work increased with time, with median frequency increasing from 41% between 0 and 6 months, 53% at 1 year, 56% at 1.5 years to 66% between 2 - 4 years post-stroke (Edwards et al., 2018). Post-work fatigue affected health behaviors such as sedentary and less physical activity in working-age stroke survivors (Roaldsen et al., 2022). It was hard for the young population who considered return to society more after stroke to devote themselves to long-term rehabilitation as peers all working and taking family responsibilities. Otherwise, In the present study, 79.2% of the participants had comorbidities. Among them, the proportion of hypertension was the highest, accounting for 52%. Meanwhile, 18.4% of the participants had two or more comorbidities. The more comorbidities, the worse the self-management behavior of stroke patients (Jin, 2019). It also explained the low level of self-management behaviors in current study.

When observing the subscales of SSMBS-YA, it was found that the standard scoring rate of symptom management, emotion management, daily life management, rehabilitation management, resource management were 69.6, 60.8, 70.9, 73.5 and 56.9 respectively. This study result was higher score than research findings from Jin, which

showed that the standard scoring rate of symptom management was 63.47, emotion management was 49.50, daily life management was 46.14, rehabilitation management was 47.90, and resource management was 45.67 (Jin, 2019).

Among the five dimensions of self-management behavior, symptom management, emotion management, daily life management, and rehabilitation management were at a moderate level, and the rehabilitation management standard scored the highest (73.5%). Rehabilitation management consisted of physical exercise and daily activities. In the current study, on the day of admission, the mean of ADL score was 78.8, which indicated slight dependence in ADL or some assistance required with self-care and mobility. The mean of the ADL score increased by 8.9 points on discharge day (M=87.7, SD=15), indicating that adults with ischemic stroke in this study had better self-care abilities to promote their self-management behaviors of rehabilitation. The mean NIHSS of the participants was 2.3 ± 1.9 on admission day, while the NIHSS of 80 participants (64.0%) was 1–4 points suggesting mild stroke and the NIHSS of 20 participants (16.0%) was 5–15 points suggesting moderate stroke. However, on the discharge day, the proportion of the moderate stroke decreased to 4.0% and 96% of the participants were normal (36.8%) or mild stroke (59.2%). It was explained in IFSMT that physical limitation was one of the obstacles associated with self-management of chronic conditions (Grey et al., 2015; Lindsay, 2008; Ryan & Sawin, 2009). Self-management could promote rehabilitation in stroke patients through the improvement of their physical functions, which could be assessed by ADL and NIHSS (Xing & Wei, 2021). Studies had showed that patients with higher ADL scores had better self-management (Kuo et al., 2021). On the other hand, NIHSS was significantly negatively correlated with the overall self-management and the role of self-management, suggesting that the higher the NIHSS of patients (more severe stroke), the poorer their overall self-management and role of self-management were (Kuo et al., 2021). As a result of good ADL and mild stroke/normal, most of the participants in this study were more likely to promote self-management after discharge and engage in rehabilitation exercises. It could explain the reason of the highest scores in rehabilitation management. This finding suggested that less physical limitation led to better self-management behaviors. Self-management could promote the rehabilitation of adults with stroke, improve their quality of life and reduce the risk of

recurrence stroke (Fryer et al., 2016). Therefore, it was particularly important to improve the self-management ability and self-management behavior of adult with stroke. In this study, the population were adults with ischemic stroke 1-6 months after discharge. 49.6% of the participants had a disease duration within 2 months and 27.2% had a disease duration within 3 months, so compliance with rehabilitation exercise was at a moderate level. Condition-specific factors are those physiological, structural, or functional characteristics of the condition, its treatment, or prevention of the condition that impact the amount, type, and nature of behaviors needed for self-management according to IFSMT (Ryan & Sawin, 2009). One study had shown that the compliance of adults with stroke with rehabilitation exercise decreased with age (Sheng et al., 2016). Compared with the elderly patients, adults with ischemic stroke had stronger compliance with rehabilitation exercise. Meanwhile, another study showed that within 6 weeks after stroke, the compliance with rehabilitation exercise of adults with stroke increased with the increasing duration of disease, which was associated with the positive attitude and strong confidence of rehabilitation exercise (Yao et al., 2017). This was another reason for the high score of rehabilitation management in this study. The study by Herpich and Rincon showed that early exercise rehabilitation was an important component after acute ischemic stroke (Herpich & Rincon, 2020). Meanwhile, studies had demonstrated that interventions could enhance compliance with rehabilitation exercise (Sheng et al., 2016; Yao et al., 2017). It could be concluded that providing continuous rehabilitation exercise guidance for adult patients with ischemic stroke after discharge can effectively improve their exercise compliance and help with subsequent rehabilitation.

When looking at emotion management, it was found that the standard scoring rate for emotion management was only 60.8, which was at moderate level. This suggested that adults with ischemic stroke had not paid enough attention to emotional management. Self-regulation is the process used in IFSMT to change health behavior and includes activities such as management emotional responses associated with health behavior change (Ryan & Sawin, 2009). Emotional problems after stroke were common (Ferro & Santos, 2019). At the chronic phase, difficulties regarding the management of unusual emotional responses were frequently reported by stroke patients (Shiyanbola et al., 2019). Stroke patients often feared recurrence of stroke. A

qualitative study found that psychological and emotional devastation in young stroke patients was largely overlooked (Shipley et al., 2018). Since the participants in this study were in an active period of life with family and social responsibilities, they were more likely to consider returning to work and neglect the emotion management. Not only stroke patients themselves, but also caregivers did not provide corresponding emotional support (Shipley et al., 2020). These reasons explained the poor emotion management of the participants in this study. Further studies should be carried out to understand the problems of emotional management in adults with ischemic stroke, so as to better help them with emotional management.

In post-stroke resource management, the standard score rate was the lowest, only 56.9%. All participants reported that they had received education on stroke knowledge from nurses during hospitalization or at discharge in this study. However, less stroke knowledge was received from other ways, including social media and community centers. The way to acquire stroke prevention knowledge was relatively single, which indicated that maybe most of the participants got once stroke education after stroke. Resource utilization was one of the self-management skills. Individual and family perceptions of resources affect engagement in self-management behaviors in IFSMT (Ryan & Sawin, 2009). Moreover, a lack of social support, resources, and knowledge were identified as the most significant factors associated with stroke recovery by stroke survivors and their caregivers (Magwood et al., 2019). Education level was an important factor of self-management behavior in adult with stroke (Fu, 2022). One explanation for the low level of resource management was that more than 80% of the participants in this study had only a high school education or less, which indicated the weak ability of resource acquisition. Another explanation may be that caregivers had insufficient abilities and skills to activate and utilize resources to provide corresponding support to stroke patients (Lutz et al., 2017). Further studies should be done to determine the impact of resource utilization of caregiver on adults with ischemic stroke at their working age. Enhancing resource utilization was an important component of self-management according to Jonkman's study (Jonkman et al., 2016). A mobile health meta-analysis of self-management of hypertension also illustrated the importance of resource utilization on self-management (Li et al., 2020). Adults with ischemic stroke were the main economic source of the family, often bear

important responsibilities in the family, and were also the main labor force in the society. The application of rehabilitation skills and resources in clinical practice can effectively reduce the occurrence of stroke-related disability in stroke survivors (Platz, 2019). It was necessary to strengthen their awareness of self-management after stroke, improve their ability to use surrounding resources, and promote their adaptability in family, work, and life. For discharged stroke patients, knowledge education during follow-up can be strengthened to promote home rehabilitation of patients. Hospital nurses can go out of the hospital and into the community, make stroke knowledge manuals, hold lectures, and so on to educate stroke patients and healthy people.

**The relationship between stroke prevention knowledge, life stress, family relationship, and self-management behaviors among adults with ischemic stroke**

In this study, stroke prevention knowledge was positively correlated with self-management behaviors among adults with ischemic stroke. Family relationship was also positively correlated with self-management behaviors. Life stress was negatively correlated with self-management behaviors. This was consistent with the hypothesis of this study.

**Stroke prevention knowledge**

The findings of this study showed that stroke prevention knowledge was at moderate level (M=68.2, SD=24.3), which was close to low level. The reason may be that most of the participants in the study could not accept knowledge effectively with low education level. Educational programs should be designed based on the characteristics of participants, including education level. The standardized score rate of A low-salt diet was the lowest (42.4%), and BP check-ups were the second lowest (49.6%). This indicates that adults with ischemic stroke did not pay much attention to salt intake and hypertension monitoring. It was necessary to strengthen the health education of knowledge, so as to guide the daily monitoring of hypertension and salt intake. According to the theory of IFSMT, knowledge was an important factor in the self-management process, which could promote self-management behavior (Ryan & Sawin, 2009). Knowledge plays an important role in self-management (Dineen-Griffin et al., 2019). Consistent with the hypothesis of this study, stroke prevention knowledge was positively associated with self-management behaviors among adults with

ischemic stroke (r = .385, p < .001). It found a positive correlation between stroke prevention knowledge and corresponding health behaviors, indicating that patients with more stroke prevention knowledge are more likely to engage in health behaviors that may prevent stroke (Wan et al., 2014). Knowledge may also positively influence the self-efficacy of stroke patients. The relationship between knowledge and diabetes self-management behaviors was partially mediated by self-efficacy in one study (Jiang et al., 2019). High levels of disease-related knowledge helped patients address their health problems in a positive manner, enhancing their health-promotion behavior (Jang & Shin, 2019). This was consistent with the results of the present study.

**Life stress**

The mean score of life stress of the participants was 17.0 (SD=6.1). The present study revealed that life stress increased during an active life stage of adults with ischemic stroke, regarding stroke as a stressful event. In this study, 67.2% of the participants had returned to work after stroke, and 24.0% planned to return to work after rehabilitation. The results of this study showed that life stress was negatively correlated with self-management behavior in adults with ischemic stroke (r =-.330, *p* < .001). This was consistent with Liu's research on stress and self-management behavior in elderly patients with chronic diseases, both of which are negatively correlated (Liu, 2022). Stress reduction is one of the 12 tasks common to self-management across chronic diseases (Ryan & Sawin, 2009). It was identified there was a strong significant positive relationship between work stress and perceived life stress (Higgins, 2017). In this study, life stress was defined as the perception of adults with stroke about the negative affective state that individuals may attempt to relieve or cope with through unhealthy behaviors after stroke. The population were adults with ischemic stroke who were at a critical stage of life with high work stress and heavy family burden. The INTERSTROKE study, which involved 32 countries, found that psychosocial stress (including a combination of family and work stress, life events, and depression) increased the risk of stroke, with the highest risk in China (Polivka et al., 2019). The report defined stress as a feeling of tension, anxiety, and irritability and had shown that psychosocial stress at work increases the risk of ischemic stroke (Kotlega et al., 2016). A study of working adults suggested that life stress could

contribute to disease through adverse effects on health behaviors (Ng & Jeffery, 2003). It can be inferred that greater stress in adults with ischemic stroke is associated with worse self-management behavior, consistent with the results of this study.

**Family relationship**

The results of the study indicated that family relationship had a positive significant and moderate correlation with self-management behaviors among adults with ischemic stroke ($r = .385$, $p < .001$). Individual and family capabilities and cohesion belong to individual and family factors in IFSMT (Ryan & Sawin, 2009). Supportive family relationships were seen as essential for stroke survivors' survival and recovery (Kitzmuller et al., 2012). Studies have reviewed the evidence for the effect of stroke on family carers and family relationships, and outlined evidence-based interventions to support family carers overcome any difficulties (Gillespie & Campbell, 2011). The length of hospital stay of adults with ischemic stroke was shorter than that of elderly patients, and rehabilitation and self-management behaviors after discharge were particularly important. In the present study, 71.2% of the participants were cared for by their spouse after stroke and 13.6% were cared for by their children. The findings in this study indicated that the major of the participants were taken care of by their families. And the standardized scoring rate of family cohesion was 71.4% in this study. The positive influence of family cohesion and affection on post-stroke marital relationships is documented (Kitzmuller et al., 2012). Meanwhile, family conflict was 71.5%. Previous studies indicated behavior changes of stroke survivors and family conflict surrounding stroke recovery are important considerations for assessment during the poststroke recovery period (Clark et al., 2004). The family has supervisory and assisting help in the self-management behaviors of the participants, directly or indirectly affecting the recovery and health of stroke survivors (Zhang & Lee, 2019). Families were key in constructing an environment that was conducive to family engagement and support (Whitehead et al., 2018). Good family relationship was more conducive to the self-management behavior of adult patients with ischemic stroke after discharge. Therefore, assisting patients and their families to establish a good family relationship can promote the self-management behavior of adults with ischemic stroke.

## Conclusion

In conclusion, the study describes a moderate level of self-management behavior among adults with ischemic stroke in Wenzhou. Stroke prevention knowledge, life stress, and family relationship are related to self-management behavior among adults with ischemic stroke. Stroke prevention knowledge and family relationship are positively correlated with self-management behavior, and life stress is negatively correlated with self-management behavior. These factors can help nursing staff more specifically develop interventions to promote self-management behaviors.

## Implication for nursing practice

The findings of the current study might be useful in the following areas:

**Nursing practice**

The findings of the study provided a reference for nurses to carry out secondary prevention and formulate nursing interventions for the special group of adults with stroke. This information can be useful in developing appropriate nursing interventions to promote self-management behaviors after discharge. Nursing staff can provide necessary self-management support, strengthen stroke prevention knowledge and self-management education for patients according to their conditions, improve the confidence of patients to take the initiative to self-management, guide patients to reduce pressure reasonably, help patients and their families to establish a good family relationship, and learn how to correctly manage the disease.

**Nursing education**

For nursing educators, it is useful to strengthen nursing students' knowledge of the related factors of self-management behaviors among adults with ischemic stroke. In addition, from the hospital to the community, more stroke patients, family caregivers, and community health workers should be educated to provide holistic nursing for patients from knowledge, psychology, family support, and other aspects, improve the self-management ability of patients, so as to achieve the purpose of preventing stroke recurrence.

## Recommendations for future research

This study focused on the self-management status of adults with ischemic stroke, and verified stroke prevention knowledge, life stress, family relationship, and self-management behaviors among adults with ischemic stroke. It provided a reference for further intervention research, changing self-management behaviors, and formulating individualized holistic nursing interventions.

This study only investigated adults with ischemic stroke in one hospital in Wenzhou, which may affect the representativeness of the sample. In future studies, the investigation scope and sample size can be expanded, and samples from different levels of hospitals can be compared when necessary.

This study was a descriptive study, which only investigated and analyzed the self-management status and factors related to self-management behaviors among adults with ischemic stroke without intervention. In the future, intervention measures suitable for young stroke patients will be further explored.

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# APPENDIX

**APPENDIX A**

Questionnaires in English

# QUESTIONNAIRES
# FACTORS RELATED TO SELF-MANAGEMENT BEHAVIORS AMONG ADULTS WITH ISCHEMIC STROKE IN WENZHOU, CHINA

The questionnaires include five parts as follows:

1. The Demographic Questionnaire with 25 items
2. The Stroke Self-Management Behavior Scale for Young Adults with 26 items
3. The Stroke Prevention Knowledge Questionnaire with 25 items
4. The Chinese version of the Perceived Stress Scale with 10 items
5. The Chinese version of the Brief Family Relationship Scale with 16 items

**1. The Demographic Questionnaire**

NO._____ Name:

Direction: Please tell me about your personal information. The questions are below.

| | | | |
|---|---|---|---|
| Gender | ☐ Male ☐ Female | | |
| Age | _____Years old | | |
| Religion | …… | | |
| Education level | …… …… …… …… | | |
| …… | …… | | |
| …… | …… | | |
| …… | | | |
| Main caregiver | | | |
| Annual household income | …… | | |
| Living place | …… | | |
| Healthcare payment scheme | …… | | |
| Weight/Height | ____kg / ____m | BMI | |
| ADL score | | | |
| …… | …… | | |
| …… | …… | | |
| …… | …… | | |
| Smoking status | …… | | |
| Alcohol consumption | …… | | |
| Source of stroke education | …… | | |

**2. The Stroke Self-Management Behavior Scale for Young Adults（SSMBS-YA）**

Direction: The following is a list of statements, which can help understand your ability to cope with and manage stroke in daily life. ……..

| Item No | Item | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| **Symptom management** | | | | | | |
| 1 | I can monitor blood pressure regularly. (Patients without hypertension please choose always) | | | | | |
| 2 | …… | | | | | |
| 3 | …… | | | | | |
| 4 | …… | | | | | |
| 5 | …… | | | | | |
| 6 | …… | | | | | |
| 7 | …… | | | | | |
| 8 | …… | | | | | |
| **Emotion management** | | | | | | |
| 9 | I am irritable sometimes, but I can try to change. | | | | | |
| 10 | …… | | | | | |
| 11 | …… | | | | | |
| 12 | …… | | | | | |
| **Daily life management** | | | | | | |
| 13 | I monitor my weight and try to control it by adjusting my diet or exercise plan. | | | | | |
| 14 | …… | | | | | |
| 15 | …… | | | | | |
| 16 | …… | | | | | |
| 17 | …… | | | | | |
| 18 | | | | | | |
| 19 | | | | | | |
| **Rehabilitation management** | | | | | | |

| Item No | Item | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| 20 | If I can participate in physical activities, I can do aerobic exercise (such as fast walking or jogging, etc.) at least 3 times a week, with an average exercise time of 40min each time. If activity is limited, I can do moderate physical activity. | | | | | |
| 21 | …… | | | | | |
| 22 | …… | | | | | |
| 23 | …… | | | | | |
| **Resource Management** | | | | | | |
| 24 | I can get information about stroke through the Internet, reading books or newspapers. | | | | | |
| 25 | …… | | | | | |
| 26 | …… | | | | | |

### 3. The Stroke Prevention Knowledge Questionnaire (SPKQ)

Direction: The following is about your knowledge of stroke. ……

| Area | Items | Answer | | |
|---|---|---|---|---|
| 1 | 1. Keeping a moderate amount of exercise can help prevent stroke. | Incorrect | Unsure | Correct |
| 2 | 2 . …… | | | |
| | 3.…… | | | |
| 3 | 4.…… | | | |
| 4 | 5.…… | | | |
| | 6.…… | | | |
| 5 | 7.…… | | | |
| 6 | 8 . | | | |
| 7 | 9 . | | | |
| | 10.…… | | | |
| | 11.…… | | | |
| 8 | Which of the following factors can increase the risk of stroke | | | |
| | 12. Family history of stroke | No | Unsure | Yes |
| | 13. Age ⩾55 | No | Unsure | Yes |
| | 14.…… | | | |
| | 15. | | | |
| | 16. | | | |
| | 17.…… | | | |
| | 18. | | | |
| | 19.…… | | | |
| | 20 . | | | |
| | 21. | | | |
| 9 | Which of the following is a warning sign of stroke | | | |
| | 22. Numbness in one face | No | Unsure | Yes |
| | 23. | | | |
| | 24. | | | |
| 10 | 25. | | | |

**4. The Chinese version of the Perceived Stress Scale**

Direction: This scale asks about your personal feelings and thoughts during the last month. For each question, you are asked to indicate how often you feel or think.……

| Items | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| 1. In the last month, how often have you been upset because of something that happened unexpectedly? | Never | Almost Never | Sometimes | Fairly Often | Very Often |
| 2. …… | | | | | |
| 3. …… | | | | | |
| 4. …… | | | | | |
| 5. …… | | | | | |
| 6. …… | | | | | |
| 7. …… | | | | | |
| 8. …… | | | | | |
| 9. …… | | | | | |
| 10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? | Never | Almost Never | Sometimes | Fairly Often | Very Often |

**5. The Chinese version of the Brief Family Relationship Scale**

Direction: The following is a list of statements, which reflects your feelings about family. Please indicate how you feel when answering each question. ……

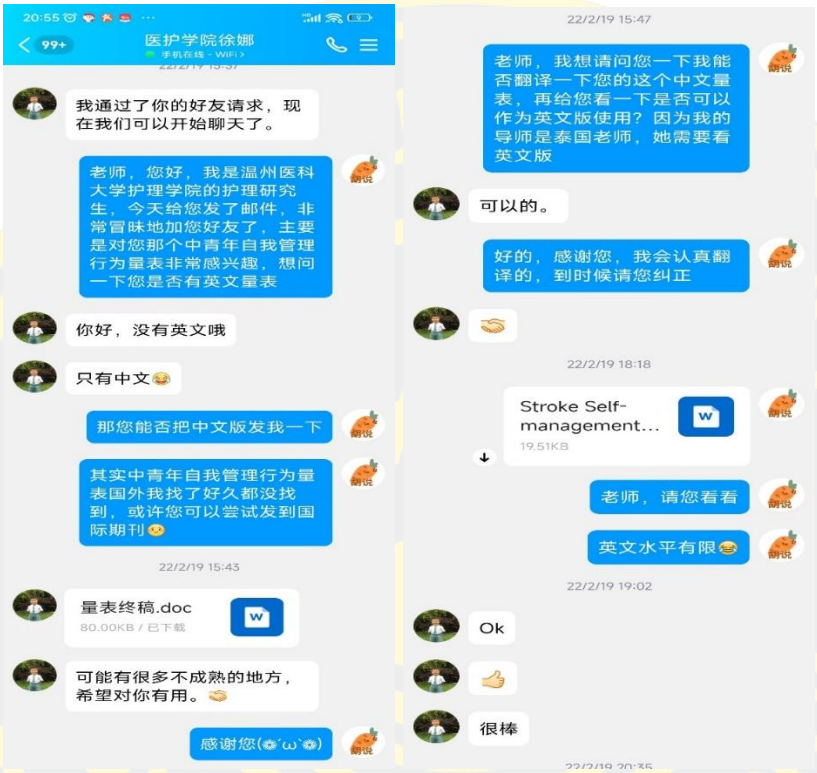
| Items | 0 | 1 | 2 |
|---|---|---|---|
| 1. In our family we really help and support each other. | Not at all | Somewhat | A lot |
| 2. …… | | | |
| 3. …… | | | |
| 4. …… | | | |
| 5. …… | | | |
| 6. …… | | | |
| 7. …… | | | |
| 8. …… | | | |
| 9. …… | | | |
| 10. …… | | | |
| 11. …… | | | |
| 12. …… | | | |
| 13. …… | | | |
| 14. …… | | | |
| 15. …… | | | |
| 16. In our family we raise our voice when we are mad. | Not at all | Somewhat | A lot |

**APPENDIX B**

Permission letters to use instruments

1. **The Stroke Self-Management Behavior Scale for Young Adults（SSMBS-YA）**

**The scale has been authorized for use by developer Xu Na on February 19th, 2022. (Email: 1250213078@qq.com)**




2. **The Stroke Prevention Knowledge Questionnaire (SPKQ)**

**The questionnaire has been authorized for use by developer Lihong Wan on February 25th, 2022. (Email: wanlh@mail.sysu.edu.cn)**

### 3. The Chinese version of the Perceived Stress Scale (PSS-10)

**The scale has been authorized for use by Professor Tingzhong Yang on April 27th, 2022. (Email: tingzhongyang@zju.edu.cn)**

2023/9/6 21:03 QQ邮箱 - 打印邮件

QQ邮箱 mail.qq.com

**回复： 您好，我是来自温州医科大学护理学院的研究生在读生**

发件人：Xiaoxiao Chen (shirley) <363772639@qq.com>
时 间：2022年4月27日(星期三) 晚上8:28
收件人：tingzhongyang<tingzhongyang@zju.edu.cn>

杨教授，十分感谢您!

---------- 原始邮件 ----------
**发件人：** "杨廷忠" <tingzhongyang@zju.edu.cn>;
**发送时间：** 2022年4月26日(星期二) 下午2:47
**收件人：** "Xiaoxiao Chen (shirley) "<363772639@qq.com>;
**主题：** Re: 您好，我是来自温州医科大学护理学院的研究生在读生

晓晓,欢迎使用CPSS,

看附件,

祝好!

Yang,Tingzhong

School of Medicine,Zhejiang University,China

Injury Control Research Center, West Virginia University, USA

-----原始邮件-----
**发件人：**"Xiaoxiao Chen (shirley) " <363772639@qq.com>
**发送时间：**2022-04-26 13:56:54 (星期二)
**收件人：** tingzhongyang <tingzhongyang@zju.edu.cn>
**抄送：**
**主题：** 您好，我是来自温州医科大学护理学院的研究生在读生

杨教授，您好，非要冒昧地给您发这份邮件，我是温州医科大学护理研究生陈晓晓，我的研究生论文是做与温州青年脑卒中患者的健康行为相关的影响因素分析，研究的其中一个变量是生活压力，我看到您对中文PSS-10量表进行了翻译和信效度测试，能否请您授权将该量表的中文版本作为我的研究使用.

https://eprovide.mapi-trust.org/instruments/perceived-stress-scale-10-items#need_this_questionnaire

## CONTACT AND CONDITIONS OF USE

### Authors

Cohen S ; Williamson GM

Sheldon Cohen's publications (PubMed)

### Contact information

MAPI Research Trust
PROVIDE™
27 rue de la Villette
69003 Lyon
France
Phone: +33 (0)4 72 13 66 66

### Conditions of use

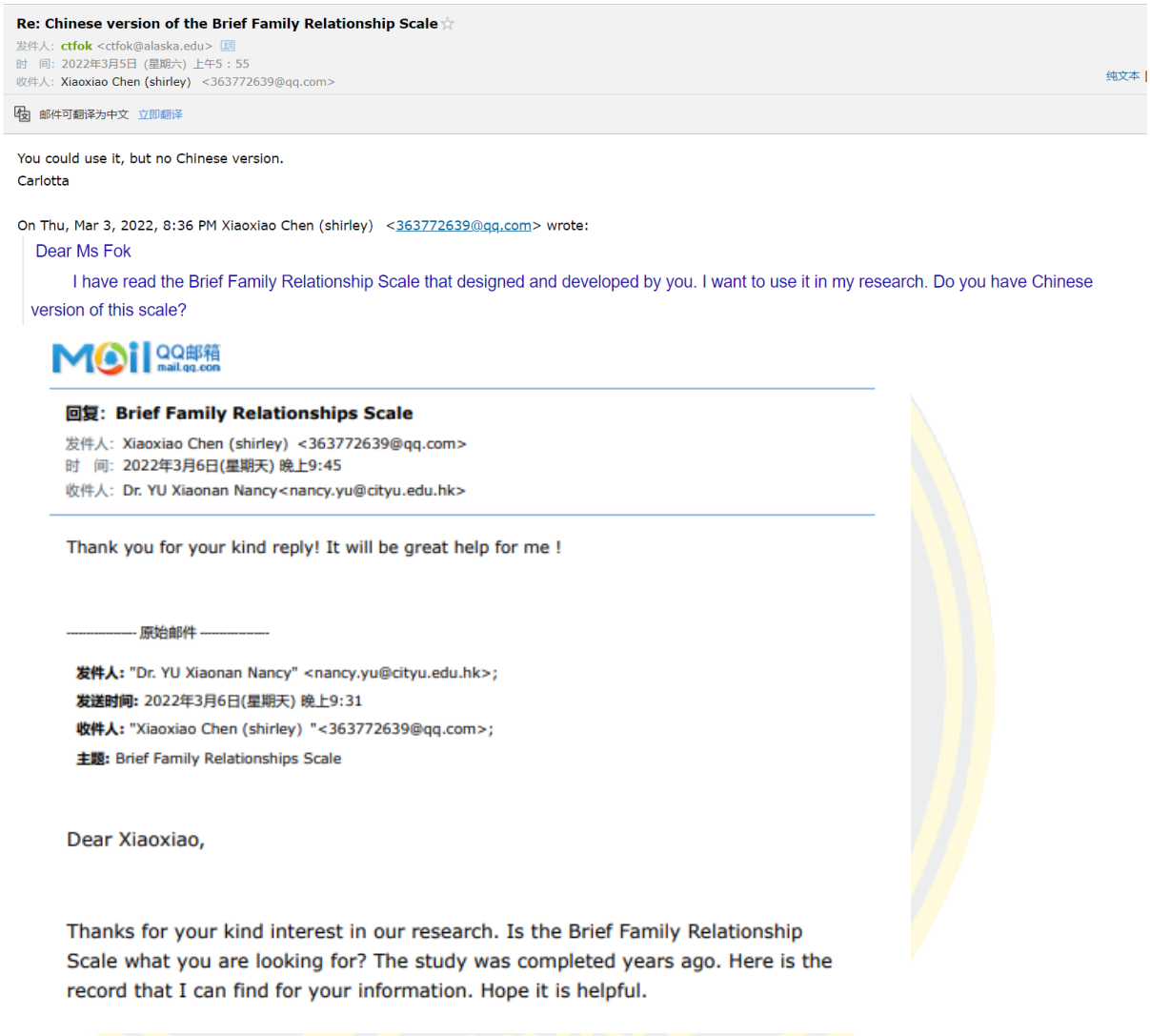
**Students, physicians, clinical practice, not-funded academic users**

You may access the questionnaire and/or its available translations directly (see tutorial). Should you not see the **Download** button, please contact us.

**Funded academic users, healthcare organizations, commercial users & IT companies**

Fees may apply to your project. Submit your request (see tutorial). Our PROVIDE team will get back to you with the needed information and license agreement in a timely manner.

## 4. The Chinese version of the Brief Family Relationship Scale (BFRS)



**Re: Chinese version of the Brief Family Relationship Scale** ☆

发件人: **ctfok** <ctfok@alaska.edu>
时　间: 2022年3月5日（星期六）上午5：55
收件人: Xiaoxiao Chen (shirley) <363772639@qq.com>
纯文本

邮件可翻译为中文 立即翻译

You could use it, but no Chinese version.
Carlotta

On Thu, Mar 3, 2022, 8:36 PM Xiaoxiao Chen (shirley) <363772639@qq.com> wrote:

> Dear Ms Fok
>
> I have read the Brief Family Relationship Scale that designed and developed by you. I want to use it in my research. Do you have Chinese version of this scale?

QQ邮箱 mail.qq.com

**回复: Brief Family Relationships Scale**

发件人: Xiaoxiao Chen (shirley) <363772639@qq.com>
时　间: 2022年3月6日(星期天) 晚上9:45
收件人: Dr. YU Xiaonan Nancy<nancy.yu@cityu.edu.hk>

Thank you for your kind reply! It will be great help for me !

---------- 原始邮件 ----------

**发件人:** "Dr. YU Xiaonan Nancy" <nancy.yu@cityu.edu.hk>;
**发送时间:** 2022年3月6日(星期天) 晚上9:31
**收件人:** "Xiaoxiao Chen (shirley) "<363772639@qq.com>;
**主题:** Brief Family Relationships Scale

Dear Xiaoxiao,

Thanks for your kind interest in our research. Is the Brief Family Relationship Scale what you are looking for? The study was completed years ago. Here is the record that I can find for your information. Hope it is helpful.

**APPENDIX C**

Participant information sheet and consent forms

# เอกสารชี้แจงผู้เข้าร่วมโครงการวิจัย
# (Participant Information Sheet)

รหัสโครงการวิจัย : .....
(สำนักงานคณะกรรมการพิจารณาจริยธรรมในมนุษย์ มหาวิทยาลัยบูรพา เป็นผู้ออกรหัสโครงการวิจัย)
โครงการวิจัยเรื่อง : **Factors related to self-management behaviors among adults with ischemic stroke in Wenzhou, China**
เรียน .....

Dear participants

I am Xiaoxiao Chen, a student in Master of Nursing Science (International Program) Faculty of Nursing, Burapha University Thailand. **My study is** "Factors related to self-management behaviors among adults with ischemic stroke in Wenzhou, China". The objectives are to describe the self-management behaviors among adults with stroke and to determine the relationship between stroke prevention knowledge, life stress, family relationship with self-management behavior among adults with stroke in Wenzhou, China.

This study will be a survey study. Participating in this study is voluntary. If you agree to participate in this study, you will answer the following questionnaires, which will take approximately 30-minutes. During the data collection period, the researcher will clarify any questions posed by the participants for clarity regarding the language or content. You will not get any direct benefits by participating in this study. However, the results of this study will help nurses and other health care providers better understand the self-management behaviors of adults with stroke in Wenzhou, China. The information gained in this study will further determine the relationship between the relevant factors that influence self-management behaviors among stroke patients in young and middle-aged adults. This study can help nurses and other primary care providers to help adults with stroke understand the factors that contribute or hinder their own self-management behaviors. It will help patients' recovery as soon as possible, reduce complications, reduce the recurrence rate, so as to improve the quality of life. It will also provide a reference for nurses to carry out secondary prevention and formulate nursing countermeasures and intervention measures for the special group of adults with

stroke.

During the study, you have the right not to answer questions, and you also have the right to change your minds and refuse to participate in the project at any time, and the refusal would not affect the medical services you received. Any information collected from this study, including your identity, will be kept confidential. A coding number will be assigned to you and your name will not be used. Findings from the study will be presented as a group of participants and no specific information from any individual participant will be disclosed. All data will be accessible only to the researcher which will be destroyed one year after publishing the findings. You will receive a further explanation of the nature of the study upon its completion, if you wish.

**The research will be conducted by** Xiaoxiao Chen **under the supervision of my major-advisor,** Associate Professor Dr. Niphawan Samartkit (Email: nsamartkit@gmail.com)**. If you have any questions, please contact me at mobile number: + 86**15067765320 **or by email** 363772639@qq.com **and/or my advisor's e-mail address** nsamartkit@gmail.com**. Or you may contact Burapha University Institutional Review** Board (BUU-IRB) telephone number +6638 102 620**. Your cooperation is greatly appreciated. You will be given a copy of this consent form to keep.**

Xiaoxiao Chen

**เอกสารแสดงความยินยอม**
**ของผู้เข้าร่วมโครงการวิจัย (Consent Form)**

รหัสโครงการวิจัย : .....
(สำนักงานคณะกรรมการพิจารณาจริยธรรมในมนุษย์ มหาวิทยาลัยบูรพา เป็นผู้ออกรหัสโครงการวิจัย)
โครงการวิจัยเรื่อง .....Factors related to self-management behaviors among adults with ischemic stroke in Wenzhou, China
ให้คำยินยอม วันที่ ..... เดือน ..... พ.ศ. .....

Before giving my signature below, I have been informed by researcher, Ms. Xiaoxiao Chen, about the purposes, method, procedures, benefits and possible risks associated with participation in this study thoroughly, and I understood all of the explanations. I consent voluntarily to participate in this study. I understand that I have the right to leave the study any time I want, without fearing that it might affect the medical services I will receive.

The researcher Ms. Xiaoxiao Chen has explained to me that all data and information of the participants will be kept confidential and only be used for this study. I have read and understood the information related to participation in this study clearly and I am signing this consent form.

Signature

……..……Participant

(…….)

# 同意书

研究项目代码：G-HS035/2565

(泰国东方大学人类伦理评审办公室发布了研究项目代码。)课题研究项目：温州地区成人缺血性脑卒中自我管理行为的相关因素

同意日期：

在我签字之前，我已经被研究员陈晓晓女士详细告知了参与本次研究的目的、方法、程序、益处和可能的风险，并且我理解了所有的解释。本人自愿同意参加本次研究。我明白我有权在任何我想要的时候离开研究，而不用担心这可能会影响我将接受的医疗服务。

研究人员陈晓晓女士已向我解释，所有参与者的数据和信息将被保密，仅用于本次研究。我已经清楚地阅读并理解了参与本次研究的相关信息，并在此签署此同意书。

参与者签字：

**APPENDIX D**

Ethical clearance letter and data collection letters

สำเนา

ที่ IRB3-063/2565

**เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์**

**มหาวิทยาลัยบูรพา**

---

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

**รหัสโครงการวิจัย :** G-HS035/2565

**โครงการวิจัยเรื่อง :** Factors related to self-management behaviors among adults with ischemic stroke in Wenzhou, China

**หัวหน้าโครงการวิจัย :** MISSXIAOXIAO CHEN

**หน่วยงานที่สังกัด :** คณะพยาบาลศาสตร์

BUU Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission Version 2 : 5 July 2022
2. Research Protocol Version 1 : 19 May 2022
3. Participant Information Sheet Version 2 : 5 July 2022
4. Informed Consent Form Version 2 : 5 July 2022
5. Research Instruments Version 1 : 19 May 2022
6. Others (if any) Version - : -

วันที่รับรอง : วันที่ 2 เดือน สิงหาคม พ.ศ. 2565

วันที่หมดอายุ : วันที่ 2 เดือน สิงหาคม พ.ศ. 2566

ลงนาม *Assistant. Professor Ramorn Yampratoom*

*(Assistant. Professor Ramorn Yampratoom)*

Chair of The Burapha University Institutional Review Board

Panel 3 (Clinic / Health Science / Science and Technology)

# 温州医科大学附属第二医院 温州医科大学附属育英儿童医院

## 伦理委员会审查批件

批件号：伦审（2022-K-56-02）

| | | | |
|---|---|---|---|
| 科室：护理部 | 主要研究者：陈晓晓 | | 职称：护师 |
| 项目名称 | 个人与家庭自我管理理论指导下温州市中青年缺血性卒中患者自我管理行为的相关因素分析 | | |
| 项目来源 | 自选课题 | | |
| 审查类别 | 复审 | 审查方式 | 简易审查 |
| 审查日期 | 2022 年 5 月 31 日 | 审查地点 | / |
| 审查委员 | 刘婵娟 | | |
| 审查材料 | 1．临床课题研究复审申请<br>2．试验方案（版本号：V2.0；版本日期：2022.05.17）<br>3．知情同意书（版本号：V2.0 ；版本日期：2022.05.17） | | |
| 审查意见 | 经过我院医学伦理委员会审查，审查结果为：同意 | | |
| 年度/定期跟踪审查 | 审查频率为该研究批准之日起每 12 月一次，首次请于 2023 年 5 月 31 日前 1 个月递交"定期/年度研究进展报告"。<br>本伦理委员会有根据实际进展情况改变跟踪审查频率的权利。 | | |
| 批件有效期 | 2022 年 6 月 1 日——2023 年 5 月 31 日（逾期未实施，自行废止） | | |
| 主任委员签字：<br>日　期：2022 年 6 月 1 日<br>温州医科大学附属第二医院 温州医科大学附属育英儿童医院<br>医学伦理委员会（盖章） | | | |

声明：

本伦理委员会的职责、人员组成和工作程序均遵循 ICH-GCP、NMPA-GCP、中国相关法律和法规。

地址：浙江省温州市龙湾区温州大道东段 1111 号　电话：0577-85676879　邮编：325000

注意事项：

1）修改试验方案、知情同意书、招募广告及其他提供给受试者的相关材料，请及时提交“修正案审查申请”。

2）本中心发生的医疗器械严重不良事件或药物可疑且非预期严重不良反应及研发期间安全性更新报告须按照 NMPA/GCP 最新要求及时递交我院伦理委员会，国内外其他中心发生的严重不良事件或药物可疑且非预期严重不良反应需定期汇总后递交伦理委员会，伦理委员会有权对其评估做出新的决定。

3）研究纳入了不符合纳入标准或符合排除标准的受试者，符合中止试验规定而未让受试者退出研究，给予错误治疗剂量，给予方案禁止的合并用药等没有遵从方案的情况；或可能对受试者的权益\健康以及研究的科学造成不良影响等偏离 GCP 原则的情况，请发现者及时提交“不依从或违背方案报告”。

4）自批件签发之日起，请研究者在规定的跟踪审查截止日期前 1 个月提交“定期/年度研究进展报告”，本伦理委员会有根据实际进展情况改变跟踪审查频率的权利。

5）暂停或提前终止临床研究，请及时提交书面申请。

6）完成试验请及时提交“结题报告”。

7）凡涉及中国人类遗传资源采集标本、收集数据等研究项目，必须获得中国人类遗传资源管理办公室批准后方可在本中心开展研究。

8）凡经我院伦理委员会批准的研究项目在实施前，申请人应按相关规定在国家卫健委、药审中心等的临床试验登记备案信息系统平台登记研究项目相关信息。

地址：浙江省温州市龙湾区温州大道东段 1111 号　　电话：0577-85676879　　邮编：325000

MHESI 8137/1162

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

August 15th, 2022

Dear Director of The Second Affiliated Hospital of Wenzhou Medical University,

Enclosure: 1. Certificate ethics document of Burapha University
2. Research Instruments (Try out)

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Xiaoxiao Chen to collect data for testing reliability of the research instruments.

Ms. Xiaoxiao Chen ID 63910143, a graduate student of the Master of Nursing Science program in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Factors Related to Self-management Behaviors Among Adults with Ischemic Stroke in Wenzhou, China" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 30 participants who are aged between 18-60 years old, diagnosed with ischemic stroke, receiving care and visit for follow-up their condition at the Neurology Outpatient Department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. The participants will be recruited from who discharged from hospital between 1-6 months, be conscious with a GCS score of 15, ADL scores over 60 by Barthel Index, living with family, be able to communicate in Chinese, no history of mental disorder (from medical record), and no history of other serious disease or dysfunction of vital organs such as malignant tumors, heart, liver and kidney dysfunction, etc. The data collection will be carried out from August 1 to September 15, 2022. In this regard, you can contact Ms. Xiaoxiao Chen via mobile phone +86-1506-7765-320 or E-mail: 363772639@qq.com

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

(Assoc. Prof. Dr. Nujjaree Chaimongkol)
Dean of Graduate School, Burapha University

Graduate School Office
Tel: +66 3810 2700 ext. 701, 705, 707
E-mail: grd.buu@go.buu.ac.th
http://grd.buu.ac.th

MHESI 8137/1163

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

August 15th, 2022

Dear Director of The Second Affiliated Hospital of Wenzhou Medical University,

Enclosure: 1. Certificate ethics document of Burapha University
2. Research Instruments

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Xiaoxiao Chen to collect data for conducting research.

Ms. Xiaoxiao Chen ID 63910143, a graduate student of the Master of Nursing Science program in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Factors Related to Self-management Behaviors Among Adults with Ischemic Stroke in Wenzhou, China" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 124 participants who are aged between 18-60 years old, diagnosed with ischemic stroke, receiving care and visit for follow-up their condition at the Neurology Outpatient Department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. The participants will be recruited from who discharged from hospital between 1-6 months, be conscious with a GCS score of 15, ADL scores over 60 by Barthel Index, living with family, be able to communicate in Chinese, no history of mental disorder (from medical record), and no history of other serious disease or dysfunction of vital organs such as malignant tumors, heart, liver and kidney dysfunction, etc. The data collection will be carried out from October 1, 2022 to January 31, 2023. In this regard, you can contact Ms. Xiaoxiao Chen via mobile phone +86-1506-7765-320 or E-mail: 363772639@qq.com

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

(Assoc. Prof. Dr. Nujjaree Chaimongkol)
Dean of Graduate School, Burapha University

Graduate School Office
Tel: +66 3810 2700 ext. 701, 705, 707
E-mail: grd.buu@go.buu.ac.th
http://grd.buu.ac.th

Please type or write with readable hand writing

GRD-109 (Eng)
(Try out)

**Graduate School Burapha University**

**Request form for issuing a requesting letter for data collection (Try out)**

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**To Dean of Graduate School**

I am (Mr./Mrs./Ms.) Xiaoxiao Chen Student ID #.....63910143.....

❑ Doctoral degree ☑ Master degree - plan ☑ A ○ B Study type ☑ Full-time ○ Part-time

Program Master of Nursing Science (International Program) Major/Pathway Adult Nursing

Faculty Nursing Telephone +86-15067765320 E-mail 363772639@qq.com

Doctoral dissertation/ Master thesis/ IS **Title**: Factors related to self-management behaviors among adults with ischemic stroke in Wenzhou, China

Principal advisor' name Associate Professor Dr.Niphawan Samartkit

I would like to request for issuing **a requesting letter for data collection (Main Study)**:

By issuing to (name of the director of Institute/ University/ Organization)

The director of the Second Affiliated Hospital of Wenzhou Medical University

Institute/ University/ Organization/ Department/ Division

Neurology Out-patient Department

To collect data from (details of participants and sample size)

**Target population**: The target population of this study will be the persons who are aged between 18-60 years old, diagnosed with ischemic stroke, receiving care and visit for follow-up their condition at the Neurology out-patient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China.

**Sample size**: 30 participants.

**Sampling method**: The samples of this study will be recruited by defining a collecting data period and recruit samples follow inclusion criteria.

1. The researcher cooperates with the doctors and nurses in Neurology out-patient department to search the registration records to find the clients who meet the inclusion criteria, which are:

1.1. Discharged from hospital between 1-6 months

1.2. Be conscious with a GCS score of 15

1.3. The activities of daily living (ADL) scores > 60 by Barthel Index

1.4. Living with family

1.5. Be able to communicate in Chinese

1.6. No history of mental disorder (from medical record)

1.7. No history of other serious diseases or dysfunction of vital organs, such as malignant tumors, heart, liver and kidney dysfunction, etc.

2. Then the doctors and outpatient nurses will give the information about the objective of this research and ask them to participate if they are interested in this study.

3. If they are interested to join in study, the doctors and nurses in Neurology out-patient department will contact the researcher, and then the researcher will introduce herself to the adults with ischemic stroke, inform them about the study, its purposes, data collection process, and human right protection. If the adults with ischemic stroke voluntarily participate in the study, the researcher will ask them to sign the consent forms for signature verification.

4. The researcher will go to the Neurology out-patient department from 8:00 am to 12:00 am and from 1:00 pm to 4:30 pm every weekday (Monday to Friday) for collecting data. 4-5 samples will be taken every week.

Duration of data collection: from date.....1th...August...2022.....to.....15th...September 2022.....

My contact information: # cellphone and E-mail .....+86-15067765320 and ...363772639@qq.com .....

**With this request, I have enclosed documents.....copies**

1) A copy of proof of ethical approval from Burapha university, and
2) Research instruments

Please be informed accordingly,

Student's name .....Xiaoxiao Chen.....

(Xiaoxiao Chen)

Date...28... Month.....July.....Year.....2022....

| Principal advisor acknowledged | Dean of Faculty/College acknowledged | Dean of Graduate School approved |
|---|---|---|
| (Signed).....<br>Date..... 10 AUG 2022 | (Signed).....<br>Date..... 10 AUG 2022 | (Signed).....<br>(Assoc.Prof.Dr.Nujjaree Chaimongkol)<br>Dean of Graduate School<br>Date..... 15 August 2022 |

Please type or write with readable hand writing

GRD-109 (Eng)
(Main Study)

**Graduate School Burapha University**

**Request form for issuing a requesting letter for data collection (Main Study)**

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**To Dean of Graduate School**

I am (Mr./Mrs./Ms.) **Xiaoxiao Chen** Student ID #.....**63910143**.....

❑ Doctoral degree ☑ Master degree - plan ☑ A ○ B Study type ☑ Full-time ○ Part-time

Program Master of Nursing Science (International Program) Major/Pathway **Adult Nursing**

Faculty **Nursing**..... Telephone **+86-15067765320** E-mail **363772639@qq.com**

Doctoral dissertation/ Master thesis/ IS **Title**: **Factors related to self-management behaviors among adults with ischemic stroke in Wenzhou, China**

Principal advisor' name **Associate Professor Dr. Niphawan Samartkit**

I would like to request for issuing **a requesting letter for data collection (Main Study)**:

By issuing to (name of the director of Institute/ University/ Organization)

**The director of the Second Affiliated Hospital of Wenzhou Medical University**

Institute/ University/ Organization/ Department/ Division

**Neurology Out-patient Department**

To collect data from (details of participants and sample size) :

**Target population**: The target population of this study will be the persons who are aged between 18-60 years old, diagnosed with ischemic stroke, receiving care and visit for follow-up their condition at the Neurology out-patient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China.

**Sample size**: 124 participants.

**Sampling method**: The samples of this study will be recruited by defining a collecting data period and recruit samples follow inclusion criteria.

1. The researcher cooperates with the doctors and nurses in Neurology out-patient department to search the registration records to find the clients who meet the inclusion criteria, which are:

1.1. Discharged from hospital between 1-6 months

1.2. Be conscious with a GCS score of 15

1.3. The activities of daily living (ADL) scores > 60 by Barthel Index

1.4. Living with family

1.5. Be able to communicate in Chinese

1.6. No history of mental disorder (from medical record)

1.7. No history of other serious diseases or dysfunction of vital organs, such as malignant tumors, heart, liver and kidney dysfunction, etc.

2. Then the doctors and outpatient nurses will give the information about the objective of this research and ask them to participate if they are interested in this study.

3. If they are interested to join in study, the doctors and nurses in Neurology out-patient department will contact the researcher, and then the researcher will introduce herself to the adults with ischemic stroke, inform them about the study, its purposes, data collection process, and human right protection. If the adults with ischemic stroke voluntarily participate in the study, the researcher will ask them to sign the consent forms for signature verification.

4. The researcher will go to the Neurology out-patient department from 8:00 am to 12:00 am and from 1:00 pm to 4:30 pm every weekday (Monday to Friday) for collecting data. 4-5 samples will be taken every week.

Duration of data collection: from date……1st…October …2022….to…31st January 2023

My contact information: # cellphone and E-mail ….+86-15067765320 and ….363772639@qq.com

**With this request, I have enclosed documents…...copies**

1) A copy of proof of ethical approval from Burapha university, and
2) Research instruments

Please be informed accordingly,

Student's name ……Xiaoxiao Chen……

(……Xiaoxiao Chen ……)

Date…28… Month…July…Year…2022……

| Principal advisor acknowledged | Dean of Faculty/College acknowledged | Dean of Graduate School approved |
|---|---|---|
| (Signed)…N. Samaitat…<br>Date…10 AUG 2022… | (Signed)…Pomchai…<br>Date…10 AUG 2022… | (Signed)…(Assoc.Prof.Dr.Nujjaree Chaimongkol) Dean of Graduate School…<br>Date…15 August 2022… |

# BIOGRAPHY

| | |
|---|---|
| **NAME** | Xiaoxiao Chen |
| **DATE OF BIRTH** | 13 November 1991 |
| **PLACE OF BIRTH** | Wenzhou, China |
| **PRESENT ADDRESS** | The Second Affiliated Hospital of Wenzhou Medical University |
| **POSITION HELD** | Nurse |
| **EDUCATION** | Bachelor's Degree |