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ORIGINAL RESEARCH

Experiences of Young and Middle-Aged Stroke Patients with Hemiplegia Who Actively Participate in Rehabilitation Exercises and Their Perceptions of Well-Being: A Descriptive Qualitative Study

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Background: Young and middle-aged stroke patients who suffer from neurological deficits brought on by hemiplegia experience significant physical and psychological effects.This study was designed to explore the experience of these patients during active participation in rehabilitation exercises and their perception of well-being. The purpose was to inform the clinical development of individualized rehabilitation programs.

Methods: Purposive sampling was employed to conduct semi-structured, in-depth interviews with 16 young and middle-aged stroke hemiplegic patients (18–59 years old) using a descriptive qualitative research approach. Thematic analysis was used for data analysis.

Results: Five core themes were identified: (1) motivation for the rehabilitation movement, (2) the importance of the rehabilitation environment, (3) challenges for the rehabilitation movement, (4) psychological dynamics and growth in rehabilitation, and (5) rehabilitants' unique perception of well-being. In addition, it is important to note that, the well-being of the majority of the young and middle-aged stroke patients with hemiplegia in this study remained substantially reduced after the disease despite the fact that they were actively engaged in rehabilitation exercises.

Conclusion: Young and middle-aged stroke patients with hemiplegia who actively participate in rehabilitation have a variety of needs and experiences. Their rehabilitation process includes not only the restoration of physical function but also the reconstruction of psychological adaptability and the dynamic transformation of well-being. Nonetheless, the current rehabilitation system has glaring flaws when it comes to considering the combined benefits of psychological and physical therapies. In order to remedy the situation, it is advised that well-being be included in stroke rehabilitation, that commonly used rehabilitation and psychological intervention programs be covered by health insurance, as well as reimbursement rates be raised. In this way, a system of health care coverage and support for patients' complete recovery will eventually be built.

Keywords: stroke, hemiplegia, rehabilitative, well-being, qualitative study

Introduction

Stroke is still the second most common cause of death among non-communicable diseases (NCDs) and the third most common cause of death from disability combined globally, according to the most recent Global Burden of Disease (GBD) Survey 2021.[1] The incidence of stroke is gradually getting younger and younger as risk factors, including hypertension, diabetes mellitus, and obesity, continue to be highly prevalent.[2] According to studies,[3] the overall hospitalization rate for stroke rose from 31.6 to 33.3 per 10,000 hospitalizations, with young and middle-aged adults being the primary demographics responsible for this increase. In contrast, the percentage of older adults has been declining over time. This is an equally concerning scenario in my country. The prevalence of stroke in China has been significantly increasing

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in recent decades, and statistics reveal that over two-thirds of stroke occurrences have occurred in young and middle-aged people.[4] Young and middle-aged stroke patients are a unique demographic; they are the foundation of their families and communities and are going through a crucial time in their lives. Being under more stress than the older generation, they are more likely to experience psychological and social issues. Furthermore, it is important to note that even after receiving successful treatment, over 50% of stroke patients still have hemiplegia. This physical disability not only impairs their quality of life and daily functioning but also slows down the rehabilitation process as a whole.[5]

Studies have demonstrated that patients with hemiplegia who have undergone stroke can enhance their quality of life and physical function through active participation in rehabilitation exercises.[6] Well-being, as a patient's overall assessment of quality of life, has an equally important impact on their rehabilitation process and psychological well-being.[7] Although there is no agreed-upon definition in academia, the Centers for Disease Control (CDC) defines well-being as a comprehensive state that includes experiencing positive emotions, not experiencing persistent negative emotions, achieving a standard level of life satisfaction, feeling fulfilled personally, and maintaining normal social functioning.[8] Due to its highly subjective nature, well-being is less commonly included in clinical evaluations, yet numerous research has demonstrated that it is linked to better psychological moods and higher levels of physical health.[9–11] Currently, scholars typically concentrate on the treatment outcomes of specific symptoms, such as stroke hemiplegia or related disease experiences. However, few studies have examined the internal experiences of young and middle-aged stroke hemiplegic patients, a unique group of individuals who actively participate in rehabilitation exercises, and their perceptions of well-being. The psychological dynamics of these patients' participation in rehabilitation and their distinctive perception of well-being are of particular importance to healthcare professionals. This is because it not only informs the development of individualized rehabilitation programs but also facilitates the transformation of clinical practice from a sole focus on the recovery of limb function to a comprehensive focus on the patient's physical and psychological Rehabilitation.

Methods

Study Design

The study employed semi-structured interviews to explore the well-being perceptions and experiences of young and middle-aged stroke patients with hemiplegia who are actively engaged in rehabilitation exercises. A descriptive qualitative research methodology was employed,[12] which prioritizes the direct description of the phenomenon, enables patients to articulate complex experiences in their own words, and is capable of addressing a multitude of questions regarding the subject matter of the study without the necessity of focusing on a single phenomenon. From March 2024 to September 2024, interviews were conducted at a tertiary hospital in Shenzhen. In accordance with the reporting criteria for qualitative studies, the investigation was reported.[13]

Participants

A purposive sampling method was employed to identify the sample population, which consisted of young and middle-aged stroke patients with hemiplegia. Patient inclusion criteria: limb motor dysfunction, age 18–59 years, clear consciousness, good communication ability, no serious cognitive impairment, and informed consent to participate in the study for stroke patients who meet the diagnostic criteria, as confirmed by cranial CT or MRI. Exclusion criteria include a history of psychosis and the presence of comorbid severe heart, liver, kidney, malignant tumor, and other diseases. The sample size was determined by the saturation of the collection and the absence of any novel themes.[14]

Data Collection

Face-to-face communication with patients and the semi-structured interview method were implemented in this investigation. The research team initially drafted the interview outline after a discussion. Subsequently, they conducted pre-interviews with two young and middle-aged hemiplegic patients who had suffered a stroke. The interview outline was subsequently revised and refined in accordance with the results of the interviews (Table 1). The researcher needs first to build a relationship of trust with the interviewees and agree on the time and location of the interviews in advance before

Table 1 Outline of the Interview

1. Could you provide me with an account of the experience of receiving a stroke diagnosis?
2. What are your thoughts on the impact of a stroke on your life?
3. What emotions did you experience upon discovering your limb movement dysfunction?
4. Have you been provided with any information regarding stroke and physical function rehabilitation? What are the primary sources of information?
5. Do you perceive yourself as being actively engaged in your recovery program? How is your family? Collectively, did they engage?
6. Currently, which extremities are you engaged in? What emotions and experiences do you possess?
7. What advantages or disadvantages do you perceive in the consistent practice of functional limb exercise?
8. What are the factors that you believe motivated you to engage in rehabilitation actively? Were any obstacles encountered?
9. Do you believe that your participation in the recovery movement has had any impact on your perspective?
10. Right now, how do you feel on the inside? Do you continue to experience a sense of well-being in spite of your illness?
11. How would you define "well-being"?
12. Could you kindly provide a specific list of the one or two things that brought you the greatest sense of well-being before and after you fell ill?
13. What is your perspective on the attainment of well-being? What are the primary sources of your sense of well-being?
14. In relation to your present illness, what would you consider to be the ideal state of your well-being?

conducting them. YS, the first author, committed to safeguarding the privacy of the respondents and provided them with a comprehensive explanation of the study's purpose, methodology, and significance. The respondents were instructed to sign the informed consent form after obtaining informed consent. The audio recording was then captured using a recording device, and in-depth interviews with the respondents were started. YS, a postgraduate student, had received practical experience in conducting qualitative interviews and had meticulously taken courses related to qualitative research. The interview location was selected in accordance with the patient's personal preferences to guarantee a secure, silent environment that was not readily disturbed. Furthermore, in order to gain a more profound understanding of the data, YS composed reflective memoranda during the interview process. Each respondent was interviewed once, and the interview typically lasted between 30 and 50 minutes. All respondent data, whether electronic or paper, were password-protected to ensure that only the authorized researcher had access to it in order to safeguard patient privacy. The researcher (JD, MP) conducts routine monitoring and examinations of the research process to identify and rectify any security risks promptly and to prevent the disclosure of respondents' data. In qualitative research, both JD and MP have accumulated substantial experience. In this study, JD gave the remaining researchers who had obtained basic training in qualitative research (YS, XH) and those who were not familiar with qualitative research (SZ, ZO) consistent training in qualitative methods and software.

Data Analysis

NVivo 12.0 software was employed to analyze qualitative data, and all records were imported. Two researchers (YS and XH) independently transcribed the audio recordings verbatim into text and returned to the interviewees in time to ask questions if there was any ambiguity or uncertainty. The Chinese text was translated into English by JD and YS. The translation staff verified the translation's accuracy. The transcribed textual material was read repeatedly by SZ and ZO, who systematically coded areas of greater interest across the textual data set. They then combed through the list of codes to summarize them and analyzed them. The research team then evaluated each theme to confirm that it accurately conveyed the true meaning of the textual material.[15] The interviewee has never been associated with any of the authors.

The data was analyzed in the following stages in accordance with Braun and Clarke's[16] qualitative thematic analysis framework: (1) Acquaint yourself with the data, transcribe the data, read the data iteratively, and designate initial ideas. (2) Identify keywords, phrases, or concepts and designate them to the codes: systematically label meaningful units in the data,

analyze them sentence-by-sentence or paragraph-by-paragraph, and generate initial codes. (3) Locate themes: Organize codes into prospective themes and compile all data associated with each theme. (4) Review themes: verify that all themes correspond to the corresponding codes and data. (5) Define and name themes: provide a detailed description of the themes' content, elucidate their relevance to the research questions, and use names that are both concise and obvious. (6) Compose a report that integrates the results of the analyses, relates them to the research questions and literature, and generates an analysis report. To the research query and literature in order to produce the analysis report.

Ethical Consideration

This study was approved for review by the Medical Ethics Committee of Shenzhen Chinese Medicine Hospital (approval number k2021- 107- 01) and conformed to the ethical standards for medical research involving human subjects, as laid out in the 1964 Declaration of Helsinki and its later amendments. The rights to privacy and information of the young and middle-aged stroke patients with hemiplegia patients were adequately respected before the interview. All data were used solely for this study, and numerical identifiers (eg, N1 and N2) were used instead of the patients' real names. The research methods, contents, and procedures were presented to the study participants in detail, and all the participants signed an informed consent form.

Rigour

The credibility of this qualitative study was enhanced by the implementation of numerous strategies recommended by Birt et al[17] to guarantee its rigor. (1) compilation of numerous data sources: preventing the one-sidedness of a single data source by collecting a variety of data types (eg, interviews, memos) for cross-validation; (2) continuous review of coding and themes: the researchers, SZ and ZO, independently open-coded the same interview text. If any discrepancies were identified, they negotiated the final coding attribution, considering the theoretical framework and the original context. (3) Weekly reflection sessions were conducted to evaluate the impact of the researchers' professional backgrounds and biases on the data collection and analysis. Researcher posture and bias were regularly reviewed. (4) Member checking: YS provides respondents with feedback on the preliminary analysis to guarantee the veracity of the data.

Results

Two of the 18 patients who were invited to participate in this study declined the invitation to participate in an interview. One of the patients was apprehensive about disclosing his privacy for fear of causing undue interference. The other patient believed that the interview would elicit unpleasant recollections and cause emotional distress. The final interview included 16 patients. The characteristics of the participants are shown in Table 2. From the interviews, we identified five themes and seventeen sub-themes, as depicted in Table 3.

Table 2 Participant Characteristics (N=16)

Characteristics		**N(%)**
Age(years)	18–31	2(12.50)
	32–45	5(31.25)
	46–59	9(56.25)
Gender	Male	13(81.25)
	Female	3(18.75)
Marital status	Married	14(87.50)
	Single	2(12.50)
Employment status	Employed full-time or part-time	3(18.75)

(*Continued*)

Table 2 (Continued).

Characteristics		N(%)
	Unemployment	13(81.25)
Hempligic side	Left	5(31.25)
	Right	11(68.75)
Diagnosis	Ischaemic stroke	9(56.25)
	Haemorrhage stroke	7(43.75)
Duration of stroke(months)	<6	7(43.75)
	6–12	1(6.25)
	>12	8(50.00)
Living conditions	Living alone	7(43.75)
	Living with family	9(56.25)

Table 3 Main Themes and Sub-Themes

Main Theme	Sub-theme
1. Motivation for the rehabilitation movement	1.1 Demand for Enhancement of Physical Functions
	1.2 Exercise-induced positive emotional responses
	1.3 A requirement for a "normal" identity
	1.4 Motivated by a sense of familial and social duty
	1.5 Role of success examples in motivating individuals
2. The importance of the rehabilitation environment	2.1 Physical Support Environment
	2.2 Social support environment
3. Challenges for the Rehabilitation Movement	3.1 A lack of knowledge regarding the rehabilitation of hemiplegia
	3.2 A significant financial burden
	3.3 Dissatisfaction with the rehabilitation exercise program
	3.4 Objective restrictions of diseases
4. Psychological Dynamics and Growth in Rehabilitation	4.1 Ambivalence: a mix of hope and pain
	4.2 Self-reflection and adaptive development
	4.3 Luck and Gratitude
5. Rehabilitants' unique perception of well-being	5.1 The multifaceted meaning of "well-being"
	5.2 Fluctuations and Stability of Well-Being
	5.3 Psychological Needs and Sources of Well-Being

Theme 1: Motivation for the Rehabilitation Movement

Demand for Enhancement of Physical Functions

The majority of respondents reported that their limb function improved significantly as a result of their active participation in rehabilitation exercises. They also suggested that adhering to the exercises could expedite their recovery.

> My hands are a lot more flexible now that I've been exercising for a few months. (N1)

> My legs show the most noticeable improvement. I walked in circles and had extremely stiff legs when I initially arrived, but this strange gait has gradually been fixed. (N4)

Some of the participants had previously encountered the adverse repercussions of declining to participate in rehabilitation. Subsequently, they started to contribute to rehabilitation on their initiative.

At first, I didn't want to do rehab, so my hand stayed down and didn't move, which resulted in a lot of pain in the problematic shoulder. Then I had to undergo rehab training, and now my shoulder not only doesn't hurt, but I can use my good hand to support the problematic hand to raise it slowly over my head. (N9)

Exercise-Induced Positive Emotional Responses

A number of respondents indicated that rehabilitation exercises improved their self-efficacy and satisfaction by distracting them and reducing negative emotions.

I feel really free after working out every time.(N7)

Whenever I work out, I focus entirely on my hands and legs; I don't think about anything else but how to control them. (N3)

Every rehabilitation movement is a challenge and a test of my ability, and I think I can succeed. (N10)

A Requirement for a "Normal" Identity

The respondents defined "normal" as a healthy individual who, in their opinion, is more capable of enjoying life, performing their work, and recognizing their self-worth.

Being a regular person was a luxury, and everything I had previously struggled to understand or care about was tossed out the window. (N5)

I don't want to be considered a disabled person because I'm still very young. (N10)

Motivated by a Sense of Familial and Social Duty

Many of the respondents in this study are subject to both social and familial pressures. In order to facilitate their return to work and ensure self-care, they actively engage in rehabilitation exercises and collaborate.

Hey, you have to go to work and return to society. (N6)

From the perspective of myself, my family, and my work.I need to work hard. (N5)

I'm still young and have to take care of my parents, so I have to put a lot of effort into my rehabilitation. If I were her age—an 80-year-old grandmother—I would definitely prefer to "lie down" and do nothing. (N3)

Role of Success Examples in Motivating Individuals

A number of respondents were inspired to increase their efforts in performing rehabilitation exercises after learning about the success tales of hemiplegic rehabilitation from a variety of sources.

Before, I had a sick buddy who was over 20 years older than me and spent over half a month in the intensive care unit. His body was paralyzed, and he was unable to speak, but now he is able to run and return to work. I'm not nearly as serious as he is. (N10)

Theme II: The Importance of the Rehabilitation Environment

Physical Support Environment

Some respondents expressed their preference for rehabilitation exercises conducted in hospitals or professional rehabilitation institutions over at-home rehabilitation. This tendency is primarily due to the fact that these locations are equipped with more sophisticated and professional rehabilitation facilities that can offer more scientific and efficient training support.

I like doing my therapy in hospitals, because they have more specialized equipment, large rehabilitation spaces, and are very safe—there are handrails everywhere, so I don't have to worry about falling. (N1)

Social Support Environment

The care of family members is crucial to the patient's recovery, as they are the nearest and most trusted individuals to the patient.

> I believe I'm the finest, as my son stated. (N8)

The meticulousness and patience of healthcare personnel create a sense of comfort in patients, which, in turn, increases their willingness to participate in rehabilitation.

> I initially felt really sick and frustrated. I felt more confident after hearing the doctor's gentle reassurance that I still had a lot of opportunities to get better. (N4)

Also, the patient's recovery is positively impacted by the support of friends and fellow patients.

> My friend insisted that I comply with the treatment, saying, 'You'll absolutely recover!' Hearing that warmed my heart. (N14)

> My neighbor, the grandmother, usually cheers me on and gives me a lot of encouragement. (N3)

Some respondents claimed that their employers offered them sympathy rather than discriminated against them because they were ill.

> My supervisor advised me to relax and heal at the hospital; there is no need to hurry, and I may return to work whenever I feel good. (N10)

Theme III: Challenges for the Rehabilitation Movement

A Lack of Knowledge Regarding the Rehabilitation of Hemiplegia

Some of the respondents were so unaware of hemiplegic rehabilitation that they continued to engage in high-intensity and high-impact exercises despite the fact that their bodies were emitting danger signals, such as pain and distress, during the rehabilitation process.

> The other day, I exerted too much pressure on my hand, resulting in a slight ache in my wrist. However, I failed to regard the situation as serious and continued to exercise, only to experience an even more severe ache in the evening. (N10)

Additionally, certain respondents tended to disregard the comprehensive nature of rehabilitation exercises, instead concentrating on a single aspect of training.

> My only goal has always been to strengthen my arm muscles. I can now lift five pounds of rice without any issues, but the doctor also mentioned that I need to improve my fine motor skills in addition to my muscle strength because my fingers are not very nimble. (N12)

A Significant Financial Burden

Some of the respondents reported that hemiplegia has significantly impacted their financial situation and that of their families.

> I need to save some money because I can't stay in the hospital for very long. After all, it's very costly. I don't have a job, and I have two children to support. (N2)

Dissatisfaction with the Rehabilitation Exercise Program

Respondents who perceived that they were not offered an individual rehabilitation program experienced internal dissatisfaction.

> I don't believe the doctors have "individualized" my rehabilitation program to suit my needs, and I don't believe that doing the same exercises each time I visit is helping me get better. I believe it ought to be different. (N5)

Objective Restrictions of Diseases

Some respondents stated that the adverse physical symptoms they experienced were a hindrance despite their eagerness to participate in the rehabilitation movement.

> I sometimes feel especially physically exhausted, even when I'm not moving. (N16)

Theme IV: Psychological Dynamics and Growth in Rehabilitation

Ambivalence: A Mix of Hope and Pain

A number of the respondents articulated their feelings of confusion and helplessness in response to the uncertainty surrounding the outcome of their rehabilitation. Despite the fact that a seemingly straightforward task, things like making and releasing a fist and pouring water, required an immense amount of energy and caused them to feel miserable, they still harbored a glimmer of hope.

> If I skip even two days of exercise, my paralyzed side gets worse again. I'm scared to stop… but I don't know how long this has to go on. (N13)

> To be honest, I still haven't let go. There's this tiny part of me that still hopes—maybe, just maybe, all my efforts will somehow make things better. (N5)

Self-Reflection and Adaptive Development

Some of the respondents were periodically engaged in reflection and learning during the rehabilitation period, and they came to the realization that they could not always depend on hospitals or rehabilitation institutions. They also recognized the necessity of incorporating the rehabilitation and maintenance of limbs into their daily lives.

> I really believe reflecting is key. I used to hate working out, but now my brain knows I need to change—and my body is even pushing me to keep going! (N11)

> I eat with my good hand to help my bad hand hold the spoon even though I can hardly move my fingers. I eat slowly and frequently spill, but I know I have to use it. (N10)

> I think getting better isn't just about doing the same exercises over and over. For me, even something like taking a walk is a great way to recover, too. (N6)

Some of the respondents stated that since beginning the rehabilitation movement, they have gradually formed the habit of exercising.

> I work out for at least two hours every day; to me, it's already like eating and sleeping. (N1)

Some respondents realized that bad moods can really slow down their recovery.

> I attempt to change my mood to be cheerful since I find that when I'm feeling down, I lose motivation and don't want to work out. (N7)

Some of the respondents have progressively come to terms with their current living conditions after undergoing the rehabilitation process. With the gradual restoration of their physical functions and self-care capabilities, they are no longer restricted to passive acceptance of care but have instead taken the initiative to assume some of the family's responsibilities.

> I even cooked for myself in an attempt to assist my family. Since using a spatula was first inconvenient, I attempted to turn the pot upside down, which gave me a sense of worth. (N15)

Luck and Gratitude

According to several responders, they felt extremely lucky, which motivated them to take a more active role in their rehabilitation.

> I received my thrombolytic medications on time, and I didn't damage any important brain regions. Since I'm so fortunate, what justification do I have for not continuing with rehabilitation? (N11)

> I realize how fortunate I am after seeing the individuals on the news who are enduring the war. (N2)

Theme V: Rehabilitants' Unique Perception of Well-Being

The Multifaceted Meaning of "Well-Being"

Well-being was perceived by respondents as a positive emotion, including optimism, contentment, and pleasure.

> A sensation of well-being is pleasant and good. (N5)

> Well-being is happiness, and I'm content if I'm content with where I am right now. (N16)

Fluctuations and Stability of Well-Being

Although all of the respondents in this study were actively engaged in the rehabilitation movement, the majority of them exhibited a substantial decline in their well-being index or even nearly lost their sense of well-being in comparison to their pre-illness levels.

> In my heart, I always feel less than others, and I'm not as happy as I used to be. When everyone else was well, how did I get this illness at such an early age? (N5)

> My intentions to get married have all fallen through due to this disease. My well-being doesn't seem to be where it ought to be. (N7)

> I have not been employed since I fell ill; my existence is so monotonous that I am unable to experience any sense of well-being. (N13)

Some respondents reported that their sense of well-being remained the same as or even better than before.

> My sister's constant presence has increased my sense of wellbeing and motivated me to recommit to getting better. (N11)

> My son, relatives, and friends often call or send messages to check on me, and I am gradually getting better each day. I still feel the same sense of well-being as before, and I will work hard on my rehabilitation to recover sooner. (N8)

Psychological Needs and Sources of Well-Being

Some respondents' pursuit of well-being changed before and after they fell ill, and they tended to place a higher priority on more fundamental yet essential elements like getting well and going back to work.

> The greatest source of my well-being is returning home, and I hope never to set foot in a hospital again. (N6)

> I shall experience a sense of well-being when my body is in good health, and there is hope in life. (N13)

> There are so many sources of well-being in life that I don't think they can be compared. Every phase of life has its own moments of well-being—for instance, right now, simply walking or pouring a glass of water brings me profound satisfaction. (N14)

Discussion

Young and middle-aged stroke hemiplegic patients encountered numerous challenges during rehabilitation exercises, which led to a substantial decline in overall well-being, an accumulation of negative emotions, and an increase in

psychological pressure. Nevertheless, it is important to acknowledge that the patients eventually developed sustained rehabilitation participation behaviors by integrating intrinsic rehabilitation beliefs and external support resources, despite encountering numerous unfavorable factors, and gradually completed psychological and behavioral adjustment.

Improving the Motivation of Patients to Engage in Physical Activity During Rehabilitation

The majority of patients in this study reported that their strong motivation for rehabilitation significantly influenced their adherence to rehabilitation exercises. This motivation not only affects the patient's propensity to commence rehabilitation exercise, but it also persists throughout the entire rehabilitation process, influencing the intensity, frequency, and duration of rehabilitation exercise.[18,19] For instance, certain patients are driven by a strong desire to regain the ability to walk independently and manage their daily lives independently. This objective serves as a powerful incentive for them to persevere through the challenges and discomforts of the rehabilitation process. Motivation, as an intrinsic psychological factor, can induce behavioral change. In the context of rehabilitation therapy, motivation is considered a critical determinant of functional recovery outcomes. Studies have demonstrated that the intensity of patients' motivation for rehabilitation is closely correlated with their level of physical activity and their motivation to engage in rehabilitation training.[20] Therefore, it appears that the success of rehabilitation therapy is contingent upon the motivation of patients to recover. Nevertheless, healthcare professionals acknowledge that patients' subjective motivation is essential for rehabilitation outcomes; however, this is more challenging in the stroke setting due to treatment-related debilitation.[21] Healthcare professionals can significantly improve patients' motivation for rehabilitation, motor function, and quality of life by satisfying their three psychological needs of autonomy, competence, and belonging, as prescribed by self-determination theory (SDT).[22] The fun of rehabilitation exercises can be improved by incorporating technological instruments, which can also enhance its appeal. Research has demonstrated[23] that immersive virtual reality (VR) scenarios possess specific characteristics that enhance the motivation of stroke rehabilitation patients to engage in the rehabilitation process and complete tasks.

Development of an Advantageous Rehabilitation Environment and Establishment of a Multifaceted Social Support Network System

Research has verified[24,25] that stroke patients are more likely to engage in rehabilitation exercises when they are in a positive rehabilitation environment. Some of the patients in this study expressed a preference for rehabilitation at hospitals or rehabilitation organizations. The reason for this is that hospitals are well-equipped for rehabilitation and have professional rehabilitators to guide, operate, and supervise them. This enables them to concentrate and conduct a comprehensive and efficient rehabilitation.[26] Chen et al[27] demonstrated that hospital-based rehabilitation resulted in prolonged treatment duration and an improvement in the quality of life of stroke patients when contrasted with home-based rehabilitation. Nevertheless, there are still a few patients who are hesitant to participate in hospital-based rehabilitation. It was determined that economic burden is one of the primary factors contributing to this phenomenon through further investigation. In the context of stroke patients in China who are youthful and middle-aged, the issue of economic burden is particularly significant.[28] In order to resolve the issue of low participation in rehabilitation exercises among patients who are economically pressured, the Chinese government must expand the scope of health insurance coverage, increase the reimbursement rate of health insurance, and implement a differentiated reimbursement policy, particularly for young and middle-aged patients. Furthermore, healthcare professionals can offer patients with financial constraints additional rehabilitation training at a reduced cost, contingent upon the severity of their dysfunction and their financial circumstances. This will guarantee that they have access to the most fundamental rehabilitation services.

In addition to the aforementioned financial burdens, this study discovered that patients. Encountered additional obstacles during the rehabilitation process, including a lack of knowledge regarding hemiplegic rehabilitation, dissatisfaction with the rehabilitation exercise program, and poor disease status. These factors impeded patients' participation in rehabilitation exercise, and our findings are consistent with prior research.[29,30] We, as healthcare professionals, must prioritize the rehabilitation of young and middle-aged stroke patients with hemiplegia, enhance the guidance and

supervision of patients' motor rehabilitation, and implement a variety of health education methods to enhance the level of knowledge, belief, and behavior of hemiplegic patients. Simultaneously, it is imperative to consider the patients' particular circumstances and personalized rehabilitation requirements when developing rehabilitation exercise regimens for them. Shared decision-making (SDM) is a medical decision-making model that emphasizes the joint participation of both doctors and patients in the decision-making process. SDM enables doctors to understand the needs and expectations of patients better and allows patients to maximize their subjective initiative, which is conducive to improving their health outcomes.[31]

The interviews revealed that social support from a variety of sources was advantageous in the development of positive emotions and the motivation of young and middle-aged stroke patients with hemiplegia to engage in rehabilitation exercises with a positive attitude. This is comparable to the findings of the investigation conducted by Gurková et al.[32] Social support is a critical prospective resource for patients in managing their illness, and it provides a beneficial effect on the preservation of their physical and psychological well-being.[33] Often, it is challenging to provide the patient with the comprehensive rehabilitation requirements that a single support can provide, as the rehabilitation of a stroke is a lengthy and intricate process. It is advisable to fortify the integration between the patient and each support system in order to establish a synergistic support network, which will enhance the rehabilitation effect, improve the patient's quality of life, and promote their functional recovery.[34] Consequently, in order to boost the patients' self-assurance in their recovery, it is recommended that family members and friends provide them with encouragement, supervision, and companionship, as well as attend attentively to their emotions and employ praise and affirmation more frequently. Healthcare professionals should enhance their active communication with patients, dynamically evaluate their rehabilitation requirements, and devise professional support and intervention strategies that are both personalized and precise. Furthermore, the patient group's active involvement in rehabilitation plays a substantial role in the promotion of patient recovery. It is achieved through the mechanisms of experience sharing, emotional resonance, and behavioral incentives, which in turn increase the self-efficacy of patients and decrease the level of psychological stress.

Focus on the Negative Emotions of Patients and Enhance Their Well-Being

Studies have demonstrated that patients' motivation for treatment is closely correlated with their emotional state and that positive emotions serve to heighten patients' motivation for rehabilitation exercise.[35] We discovered in this study that certain patients maintained a strong hope for recovery despite the physical and mental pain caused by hemiplegia. This hope served as an incentive for them to maintain a positive attitude during the rehabilitation exercise. This finding is in accordance with the findings of the study conducted by Visvanathan et al,[36] which further confirmed the critical role of hope as a critical psychological resource in the rehabilitation process of patients. It is important to note that interventions that are based on Snyder's theory of hope have been demonstrated to promote adherence to rehabilitation exercises and increase hope levels in young and middle-aged stroke patients.[37] Consequently, healthcare professionals can systematically implement the theoretical framework to offer more precise rehabilitation support to patients by means of psychological interventions that support their sense of optimism. In addition, this study determined that certain patients were capable of recognizing obstacles to recovery and devising coping strategies through self-reflection. These patients also exhibited robust adaptive development capabilities, which significantly facilitated their recovery. White et al[38] also maintain that reflection can assist individuals in extracting lessons from their experiences and in continuing to develop their wisdom and capacity to identify novel solutions. This study discovered that certain patients experienced feelings of gratitude and luck when reflecting on their experiences. This optimistic outlook significantly increased their motivation to engage in rehabilitation exercises, a finding that is similar to the findings of a previous study conducted by Liu et al[39] on elderly chronic patients. Nevertheless, healthcare professionals currently tend to offer patients basic solace and encouragement solely when they are experiencing negative emotions, and they rarely take the initiative to assist patients in cultivating a positive mindset. In order to mitigate this issue, hospitals should implement consistent psychology training. This will enable healthcare professionals to acquire the necessary skills to employ scientific methodologies to assist patients in cultivating a positive outlook.

In this study, we discovered that despite the fact that all of the young and middle-aged stroke hemiplegic patients in our study were actively engaged in rehabilitation exercises, the majority of them exhibited a substantial decline in their

sense of well-being following the disease or even a near complete loss of their sense of well-being. This outcome appears to be somewhat antithetical to the findings of Xing et al,[40] who determined that adherence to rehabilitation exercise is positively correlated with well-being. On the one hand, the quality of life of patients with hemiplegia is significantly impaired, making it difficult for them to return to work and lose their financial resources. This is due to the fact that hemiplegia restricts their ability to perform daily activities, even if some patients have a good prognosis of limb function. On the other hand, it may be caused by the disruption of the rhythm of life for hemiplegic patients, which results in a decrease in their sense of self-worth and a dearth of fun and meaning in their life as they transition from a "healthy person" to a "patient". Consequently, the psychological well-being of stroke patients may be disconnected from their positive behavioral efforts as a result of the intricate factors at play. According to the PERMA model,[7] the impact of rehabilitation exercise on well-being necessitates the concurrent fulfillment of five dimensions: positive emotions (P), engagement (E), relationships (R), meaning (M), and achievement (A). For instance, patients' well-being may nevertheless deteriorate if other dimensions (eg, inadequate social support) are not addressed despite their active engagement (E). In numerous diseases, well-being has been demonstrated to be correlated with favorable clinical outcomes. Individuals who exhibit a high sense of well-being are more likely to be successful, exhibit behaviors that are likely to lead to success and maintain better physical health than those who are less well-being.[41] Nevertheless, numerous studies have demonstrated that stroke patients experience a general lack of well-being, as their psychological requirements are not adequately addressed.[34,42] In order to resolve this issue, clinical healthcare professionals may implement the intervention strategy that was developed using the PERMA model to create a personalized intervention plan for stroke patients. This plan has the potential to improve the patient's well-being significantly. In addition, it is advised that our nation integrate psychological intervention programs into the reimbursement of stroke rehabilitation and integrate well-being into the routine rehabilitation process of stroke to facilitate the comprehensive physical and mental recovery of patients. Future research could also further develop AI-based wearable devices to monitor patients' psychological states in real time and predict changes in their well-being. This would establish an early warning system for psychological risks and provide more timely support and intervention for mental health.

This study is subject to several limitations. Firstly, all participants were recruited from a tertiary care hospital in China, and they were all Chinese. Consequently, the results may differ if volunteers were recruited from various cultural groups or ethnicities; Secondly, the study's findings may be compromised by the fact that a substantially higher proportion of males than females was present despite efforts to ensure sample diversity. Future research will seek to optimize recruitment strategies further to balance the gender ratio. Nevertheless, the recovery process and the well-being of this demographic continue to be of significant research value, given the greater prevalence of stroke among young and middle-aged adults and the more intricate physical and mental adaptations they undergo following the disease. Lastly, the study has not yet explored the requirements of young and middle-aged stroke patients with hemiplegia in terms of their sex life, career planning, and other relevant factors. Future research could address these areas.

Conclusion

Young and middle-aged stroke patients with hemiplegia encounter multidimensional and intricate challenges during rehabilitation exercises. Their rehabilitation process encompasses not only the restoration of motor function but also the reconstruction of psychological adaptability and dynamic changes in well-being. Patients generally demonstrated high levels of engagement; however, the current rehabilitation system continues to exhibit substantial deficiencies in the implementation of systematic interventions for psychological dimensions, which has led to persistently low levels of well-being. These discoveries have significant implications for the healthcare system and policymakers. It is advocated that we integrate psychological intervention programs into the reimbursement of stroke rehabilitation and integrate well-being into the routine stroke rehabilitation process. Furthermore, social forces are encouraged to contribute to the establishment of a supportive social network in order to offer patients more comprehensive support and assistance. This approach enables the greater fulfillment of the multidimensional requirements of patients and the promotion of their overall recovery.

Data Sharing Statement

The datasets utilized and/or examined in this study can be obtained from the corresponding author upon making a reasonable request.

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Disclosure

The authors declare no competing interests in this work.

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