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Life satisfaction and its influencing factors of middle-aged and elderly stroke patients in China: a national cross-sectional survey

Ying Liu [1], Jieyu Liu,[2] Shangcheng Zhou,[1] Xingying Xu,[1] Yu Cheng,[3] Ying Yi,[1] Guanyang Zou [1]

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¹School of Public Health and Management, Guangzhou University of Chinese Medicine, Guangzhou, Guangdong, China
²SOAS China Institute, School of Oriental and African Studies, University of London, London, London, UK
³School of Social Science and Anthropology, Sun Yat-Sen University, Guangzhou, Guangdong, China

Correspondence to
Dr Guanyang Zou;
zgy1021@hotmail.com

ABSTRACT

Objectives This study reports the life satisfaction of middle-aged and elderly patients who had a stroke in China, and explores its association with patients' sociodemographic characteristics, health status, lifestyles and family relationship.

Design Cross-sectional survey.

Setting and participants The samples of this study were selected from the data of China Health and Retirement Longitudinal Study (CHARLS) in 2018, which covered 28 provinces, 150 countries/districts and 450 village/urban communities. 1154 patients who had a stroke aged 45 and over were included in this study as qualified samples.

Outcome measures Descriptive analysis was used to report sociodemographic characteristics, health status, lifestyles, family relationship and life satisfaction of middle-aged and elderly patients who had a stroke. χ^2 analysis and binary logistic regression were used to analyse the factors influencing the life satisfaction of the patients who had a stroke.

Results Overall, 83.1% of patients who had a stroke were satisfied with their lives, although only 8.7% rated their own health as being good. Patients who had a stroke who were male, elderly, married, living with their spouses and having a pension were more likely to report satisfaction with life (p<0.05). Self-rated health, health satisfaction, chronic lung disease, fall, pain, ability to work and family relationships were also significantly associated with life satisfaction (p<0.05). Patients who drank alcohol (86.8% vs 81.7%, p=0.041), had physical activity (84.4% vs 75.6%, p=0.004) and had social activity (85.3% vs 80.8%, p=0.041) were more satisfied with their lives than those who did not. Multivariable analysis confirmed that age, health satisfaction, physical pain, working ability, relationships with spouse and with children had significant effects on life satisfaction of patients who had a stroke (p<0.05).

Conclusions Our study indicates the importance of improving the overall health of patients who had a stroke and mediating factors, such as pain management, and work ability, spouse and children relationship in improving the life satisfaction of patients in the poststroke rehabilitation.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study is based on China Health and Retirement Longitudinal Study in 2018, which aims to establish a high-quality microdatabase representing middle-aged and elderly residents in mainland China.

⇒ This study will enrich the literature on the factors associated with life satisfaction, including sociodemographic characteristics, health status, lifestyles and family relations.

⇒ Use of only a single item to assess life satisfaction may lead to bias in the analysis.

⇒ Around 200 patients (16% of patients who had a stroke) were excluded for analysis due to the lack of life satisfaction data, which may deviate our results to some extent.

INTRODUCTION

Stroke is characterised by high morbidity, high recurrence rate, high disability rate and high mortality rate as the second largest cause of death in the world.[1 2] Although morbidity and mortality rates of patients who had a stroke have been declining in many developed countries over the past two decades, they have continued to rise in low-income and middle-income countries, including China.[3] Compared with developed countries, middle-income and low-income countries tend to have poorer stroke awareness, lower control rate of some stroke risk factors (such as malnutrition, diabetes, hypertension and obesity).[4] In the recent years, due to the development of the national economy, the change of people's lifestyle, the imbalance of nutritional intake and the ageing of the population and other factors, the prevalence of stroke in China has been increasing year by year. It has become one of the major diseases leading to the death of the Chinese population.[5 6]

Stroke is an important cause of long-term disability, which has a rapid onset and serious

consequences,[7] leading to declined physical function and quality of life of patients. Studies have shown that complications, pain and disability are the most common clinical features of patients who had a stroke.[8 9] However, patients who had a stroke are often older,[10 11] complicated with various chronic diseases,[12] and with a lack of physical and social activities.[13] For instance, based on China Health and Retirement Longitudinal Study (CHARLS) (2011–2015), Cai *et al* found that more than half of the patients reported no social participation.[14]

Life satisfaction can be defined as the perception of a person's overall quality of life, reflecting an individual's overall subjective evaluation of life.[15 16] A number of studies have shown that after stroke, patients'life satisfaction will decrease to varying degrees.[17 18] Many studies have explored the influence of social and demographic factors, such as gender, age, education, marital status and occupational status on life satisfaction of patients who had a stroke.[7 19 20] Other studies found that the limitation of physical function after stroke,[21–23] such as the impairment of physical condition, the changes of communication and visual ability,[24] pain and fatigue,[25] psychological factors,[26] depression[18] and patients' perceived knowledge of stroke[27] reduced the life satisfaction of patients who had a stroke.

Life satisfaction may also be associated with the patient's lifestyle, as lifestyle behaviour, including drinking, smoking, coffee intake, dietary habits, physical exercise[28] and social activity,[29] could to some extent lead to changes in quality of life.[30 31] However, the current research regarding the association between the lifestyle behaviour and life satisfaction of patients after stroke is quite limited, although previous studies found that the social activities of patients after a stroke had a significant impact on their life satisfaction.[32 33]

To date, research on life satisfaction of patients who had a stroke and their associated factors are mainly focused on the aspects of social demographic characteristics, disease situation or psychological changes, less on lifestyles and social activity. While previous studies have identified the impact of socioeconomic conditions like gender, age, education and income on the poststroke lifestyle,[34–36] it is important to explore the associations between the lifestyle behaviour and life satisfaction of patients who had a stroke to provide the evidence base of improving life satisfaction through lifestyle interventions. This study will report the life satisfaction of middle-aged patients and elderly patients who had a stroke in China, and explore its association with patients' sociodemographic characteristics, health status, lifestyles and family relationship. The research finding will be informative for the improvement of the poststroke rehabilitation care.

METHODS
Data sources
This study is based on the 2018 survey data of the CHARLS.[37] The CHARLS is a large-scale interdisciplinary and nationally representative survey project, hosted by the National Development Research Institute of Peking University and jointly executed by the Chinese Social Science Research Center of Peking University and the Youth League Committee of Peking University.[38] The survey aims to establish a high-quality microdatabase representing middle-aged and elderly residents in mainland China, which can provide a wide range of information from socioeconomic status to health status, to serve the needs of scientific and policy research on the elderly(online supplemental file 1).[39] The national baseline data of CHARLS was conducted in 2011–2012, covering 28 provinces, 150 countries/districts and 450 village/urban communities, involving 17 708 people in 10 257 households, with wave 2 in 2013, wave 3 in 2015 and wave 4 in 2018.[39] The survey in 2018 mainly covers: (1) cover-screening questions (to screen age-eligible members for a refresher sample and identify whether the main respondent divorces, remarries or dies so as to generate new questionnaire survey); (2) demographics; (3) family interactions; (4) health; (5) health insurance and healthcare utilisation; (6) work, retirement and pension; (7 and 8) income, expenditures and assets; (9) housing characteristics and the community and policy modules.[39] The CHARLS survey is mainly conducted in the form of interview. In case of the respondent's physical or cognitive impairment or inability to complete the investigation for other reasons, a proxy interview will be conducted.[39] Most of the proxies are close family members of the respondents, such as spouses or children. In waves 4, the overall proxy rate was 8.1%.[39]

Study samples
The selection of study samples is based on the questions in the questionnaire: The question 'Have you been diagnosed with stroke by a doctor?', which is mainly aimed at the new respondents, or those who did not have a stroke diagnosed by the doctor in the last wave of interview, and the respondents who answered '1 (yes)' to this question were included in our study. We also included the respondents who had been diagnosed with stroke in the previous waves of survey which were already recorded in the wave 4 database. In total, we include 1372 patients diagnosed with stroke out of 19 816 subjects in the 2018 round of investigation. After excluding the study participants who lacked the key variable of life satisfaction, 1154 valid samples were finally included in this study.

Patient characteristics
According to the research objectives, this paper selects the data from five sections of the questionnaire, including (1) demographics, (2) family interactions, (3)health, (4) health insurance and healthcare utilisation, (5) work, retirement and pension, and in total 26 variables are selected, such as gender, age, self-rated health, hypertension and smoking. These selected variables were further sorted into four aspects: sociodemographic characteristics, health status, lifestyles (including social activity) and

family relationship. In order to facilitate statistical analysis and interpretation, we recode some of the variables in the original questionnaire as necessary (online supplemental file 2).

Life satisfaction

Life satisfaction was assessed by a question from the questionnaire: How satisfied are you with your life-as-a-whole? The answer to this question consists of five options: (1) completely satisfied; (2) very satisfied; (3) somewhat satisfied; (4) not very satisfied and (5) not at all satisfied. Consistent with the previous study,[40] we combined the response categories of 1, 2 and 3 as 'satisfied', while those of 4 and 5 as 'not satisfied'. This classification was consistent with the Chinese semantic as the first three categories represent more positive response of life satisfaction, while the last two represent more negative response. As a one-dimensional assessment of the individual quality of life, life satisfaction is widely used in large-scale national surveys in China.[40 41]

Statistical analysis

We used SPSS V.22.0 (SPSS) for data analysis. Descriptive statistics were conducted to understand the sociodemographic characteristics, health status, lifestyles and social activity, family relationships and the current situation of life satisfaction of patients who had a stroke in China. Then, χ^2 test was used for univariate analysis. In order to further explore the specific factors influencing the life satisfaction of patients who had a stroke, binary logistic regression was used for multivariable analysis. In this case, we did not look at relative contributions of different factors to the life satisfaction but examining a number of exposures individually to describe the potential relationships. The significant variables with p<0.2 resulting from the univariate analysis were included in logistic regression. We made sure to cover important variables such as gender,[7] age,[42] marital status,[20 43] educational level,[7] working ability,[19] pain[21] and social activities[32] in the multivariable analysis. The results of regression analysis showed the adjusted OR values with 95% CI.

Patient and public involvement

We used the data from CHARLS 2018, which is a nationally representative longitudinal survey. Therefore, there was no direct participation of patients or the public in the design, implementation, reporting or dissemination of our research.

RESULTS

Sociodemographic characteristics and life satisfaction of patients who had a stroke

Table 1 shows the descriptive results of sociodemographic characteristics and the univariate analysis results of their relationship with life satisfaction. Of 1154 participants, 959 (83.1%) were satisfied with their lives, while 195

(16.9%) were not satisfied. Most (76.6%) of the participants were aged 60 or above, and 52.8% were males; 76.9% were married and lived with their spouse. They mainly resided in villages, accounting for 69.9% of the selected sample. 64.2% attended primary and secondary school, and 23.3% were illiterate. The vast majority of patients participated in health insurance or pension insurance (98.7%, 89%), and 76.3% had a personal income.

The univariate analysis showed that gender, age, marital status and participation in pension insurance had significant effects on the life satisfaction of patients who had a stroke (table 1). Specifically, male had higher life satisfaction than female (86.9% vs 78.9%, p<0.001), and the elderly were more likely to be satisfied with life (84.5% vs 78.5%, p=0.022). Patients having a stroke who were married and lived with their spouses had higher life satisfaction than those who did not (84.9% vs 77.2%, p=0.003); patients with pension insurance had higher life satisfaction (84% vs 75.6%, p=0.017).

Health status and life satisfaction of patients who had a stroke

The basic information of health status and the univariate analysis results of its relationship with life satisfaction are shown in table 2. In terms of self-rated health, only 8.7% thought they were good, 36.1% thought fair and more than half of patients thought poor. Only half (49.3%) of the patients were satisfied with their health. The majority (78.9%) ofpatients who had a stroke had two or more other chronic diseases. A total of 69.7%, 25.2%, 38.1% and 17.1% of patients had hypertension, diabetes, heart disease and chronic lung disease, respectively. 69.9% of the patients were receiving stroke treatment, 30.7% of the patients had fallen in the past year and 70.6% of the patients had physical pain symptoms. In terms of the ability to work, 36.6% of patients could work properly, while 31.5% of patients could not work for a long time due to physical reasons and 31.9% of patients were unable to work.

The univariate analysis showed that self-rated health, health satisfaction, chronic lung disease, fall, pain and the ability to work were significantly related to life satisfaction of patients who had a stroke (table 2). Patients who rated themselves with good or fair health were more satisfied with life than those who rated themselves as poor (92% vs 91.1% vs 76.5%, p<0.001). Patients who felt satisfied with their health status had higher life satisfaction (96.3% vs 70.3%, p<0.001). The presence of hypertension, heart disease and diabetes had no significant effect on life satisfaction (p>0.05). However, patients who had a stroke with chronic lung disease showed lower life satisfaction than those without chronic lung disease (76.1% vs 84.5%, p=0.004). Falling and physical pain symptoms may reduce patients' life satisfaction (p=0.001; p<0.001). As far as work ability is concerned, the stronger the ability to work, the higher the life satisfaction (89.4% vs 83.5% vs 75.5%, p < 0.001).

Table 1 Sociodemographic characteristics and life satisfaction of patients who had a stroke in China

Variable	Total	Life satisfaction		Univariate analysis	
		Satisfied	Not satisfied	χ^2	P value
Total	1154	959 (83.1%)	195 (16.9%)		
Gender				12.993	< 0.001
Male	609 (52.8%)	529 (86.9%)	80 (13.1%)		
Female	545 (47.2%)	430 (78.9%)	115 (21.1%)		
Age				5.274	0.022
< 60	270 (23.4%)	212 (78.5%)	58 (21.5%)		
≥60	884 (76.6%)	747 (84.5%)	137 (15.5%)		
Address				2.941	0.230
The centre of city/town	248 (21.5%)	215 (86.7%)	33 (13.3%)		
Combination zone between urban and rural areas	99 (8.6%)	80 (82.8%)	17 (17.2%)		
Village	807 (69.9%)	662 (82.0%)	145 (18.0%)		
Marital status				8.754	0.003
Married and live with spouse	887 (76.9%)	753 (84.9%)	134 (15.1%)		
Married but don't living with spouse, divorced, widowed or never married	267 (23.1%)	206 (77.2%)	61 (22.8%)		
Education				3.987	0.136
Illiterate	269 (23.3%)	220 (81.8%)	49 (18.2%)		
Primary and secondary school	741 (64.2%)	611 (82.5%)	130 (17.5%)		
High school and above	144 (12.5%)	128 (88.9%)	16 (11.1%)		
Health insurance				0.448	0.503
Yes	1139 (98.7%)	948 (83.2%)	191 (16.8%)		
No	15 (1.3%)	11 (73.3%)	4 (26.7%)		
Pension				5.734	0.017
Yes	1027 (89.0%)	863 (84.0%)	164 (16.0%)		
No	127 (11.0%)	96 (75.6%)	31 (24.4%)		
Personal income				2.116	0.146
Yes	881 (76.3%)	740 (84.0%)	141 (16.0%)		
No	273 (23.7%)	219 (80.2%v	54 (19.8%)		

Lifestyles and life satisfaction of patients who had a stroke

Table 3 shows the basic information of lifestyles and social activity and the univariate analysis results of its relationship with life satisfaction. A small proportion of patients (23.8%) had the habit of smoking, while the rest did not smoke or had quitted smoking. Those who drank alcohol accounted for 26.9%. Most (85.1%) had the habit of physical activity, while only half (50.8%) had social activities.

The univariate analysis showed that the patients who drank alcohol (86.8% vs 81.7%, p=0.041), had physical activity (84.4% vs 75.6%, p=0.004) and had social activity (85.3% vs 80.8%, p=0.041) might have a higher

life satisfaction than those who did not. Smoking status variables had no significant effect on life satisfaction of patients who had a stroke (p>0.05).

Family relationships and life satisfaction of patients who had a stroke

The descriptive statistical results of family relationships are shown in table 4. In terms of the relationship with their spouse, 74.7% of the patients were satisfied, 10.9% were not satisfied, and 14.4% had no spouse. Most of the patients (65.8%) had three or fewer children, while the

Table 2 Health status and life satisfaction of patients who had a stroke in China

Variable	Total	Life satisfaction		Univariate analysis	
		Satisfied	Not satisfied	χ^2	P value
Total	1154	959 (83.1%)	195 (16.9%)		
Self-rated health				44.823	<0.001*
Good	100 (8.7%)	92 (92.0%)	8 (8.0%)		
Fair	415 (36.1%)	380 (91.1%)	37 (8.9%)		
Poor	637 (55.2%)	487 (76.5%)	150 (23.5%)		
Health satisfaction				139.423	< 0.001
Satisfied	569 (49.3%)	548 (96.3%)	21 (3.7%)		
Not satisfied	585 (50.7%)	411 (70.3%)	174 (29.7%)		
Comorbid conditions				1.885	0.390
0	61 (5.3%)	52 (85.2%)	9 (14.8%)		
1	182 (15.8%)	157 (86.3%)	25 (13.7%)		
≥2	911 (78.9%)	750 (82.3%)	161 (17.7%)		
Hypertension				0.038	0.845
1	804 (69.7%)	667 (83.0%)	137 (17.0%)		
0	350 (30.3%)	292 (83.4%)	58 (16.6%)		
Diabetes				2.005	0.157
1	291 (25.2%)	234 (80.4%)	57 (19.6%)		
0	863 (74.8%)	725 (84.0%)	138 (16.0%)		
Heart attack				0.184	0.668
1	440 (38.1%)	363 (82.5%)	77 (17.5%)		
0	714 (61.9%)	596 (83.5%)	118 (16.5%)		
Chronic lung diseases				8.195	0.004
1	197 (17.1%)	150 (76.1%)	47 (23.9%)		
0	957 (82.9%)	809 (84.5%)	148 (15.5%)		
Stroke treatment				0.055	0.815
Yes	807 (69.9%)	672 (83.3%)	135 (16.7%)		
No	347 (30.1%)	287 (82.7%)	60 (17.3%)		
Fall down				10.677	0.001
Yes	354 (30.7%)	275 (77.7%)	79 (22.3%)		
No	800 (69.3%)	684 (85.5%)	116 (14.5%)		
Pain				27.278	< 0.001
Yes	815 (70.6%)	647 (79.4%%)	168 (20.6%)		
No	339 (29.4%)	312 (92.0%)	27 (8.0%)		
Ability to work				26.811	< 0.001
Unable to work	368 (31.9%)	278 (75.5%)	90 (24.5%)		
Unable to work for a long time	363 (31.5%)	303 (83.5%)	60 (16.5%)		
works properly	423 (36.7%)	378 (89.4%)	45 (10.6%)		

*There is statistical significance between 'fair' and 'poor', p<0.001; there is statistical significance between 'good' and 'poor' , p<0.001.

majority (92.7%) of patients were satisfied with the relationship with their children.

Patients who were satisfied with their relationships with their spouses had the highest life satisfaction, followed by those who had no spouse and patients who were not satisfied with this relationship (89.7% vs 72.3% vs 52.4%, p < 0.001).

Patients who were satisfied with their relationships with children also showed the highest satisfaction with life, followed by those who had no child, and patients who were not satisfied with this relationship (85.9% vs 54.5% vs 46.6%, p < 0.001). No significant correlation was found between the number of children and life satisfaction (p>0.05).

Table 3 Lifestyles and life satisfaction of patients who had a stroke in China

Variable	Total	Life satisfaction		Univariate analysis	
		Satisfied	Not satisfied	χ^2	P value
Total	1154	959 (83.1%)	195 (16.9%)		
Smoke				0.080	0.778
Yes	275 (23.8%)	227 (82.5%)	48 (17.5%)		
No	879 (76.2%)	732 (83.3%)	147 (16.7%)		
Drink				4.183	0.041
Yes	311 (26.9%)	270 (86.8%)	41 (13.2%)		
No	843 (73.1%)	689 (81.7%)	154 (18.3%)		
Physical activity				8.142	0.004
Yes	982 (85.1%)	829 (84.4%)	153 (15.6%)		
No	172 (14.9%)	130 (75.6%)	42 (24.4%)		
Social activity				4.186	0.041
Yes	586 (50.8%)	500 (85.3%)	86 (14.7%)		
No	568 (49.2%)	459 (80.8%)	109 (19.2%)		

Results of multivariable analysis

We included the variables with p<0.2 from the univariate analysis in the logistic regression analysis, which also covered those variables often discussed in the literature (table 5).[7 19–21 32 42 43] The regression analysis suggested that, age, health satisfaction, pain, ability to work, relationships with spouse and relationships with children were independent factors influencing life satisfaction of patients who had a stroke (table 5). Elderly patients who had a stroke (≥60 years old) were more satisfied with life than middle-aged patients (<60 years old), OR=2.098 (95% CI 1.268 to 3.471). Patients who had a stroke who reported being satisfied with their health were 7.986 times more likely to report being satisfied with their lives than those who reported being 'not satisfied' with their health (95% CI 4.569 to 13.959). Patients with pain symptoms were more likely to express dissatisfaction with life than those without pain symptoms (OR=0.427, 95% CI 0.255 to 0.713). Compared with patients with 'unable to work', patients with 'unable to work for a long time' had higher life satisfaction (OR 1.618, 95% CI 1.025 to 2.556). Patients who were satisfied with the relationships with their spouses were 5.120 times more likely to be satisfied with their lives, than those who reported 'not satisfied' with their spouses (95% CI 3.126 to 8.384). Similarly, patients who were 'satisfied' with their children had

Table 4 Family relationship and life satisfaction of patients who had a stroke in China

Variable	Total	Life satisfaction		Univariate analysis	
		Satisfied	Not satisfied	χ^2	P value
Total	1154	959 (83.1%)	195 (16.9%)		
No of children				3.938	0.140
0	10 (0.9%)	6 (60.0%)	4 (40.0%)		
≤3	749 (64.9%)	622 (83.0%)	127 (17.0%)		
>3	395 (34.2%)	331 (83.8%)	64 (16.2%)		
Relationships with spouses				125.028	<0.001
Satisfied	862 (74.7%)	773 (89.7%)	89 (10.3%)		
Not satisfied	126 (10.9%)	66 (52.4%)	60 (47.6%)		
No spouse	166 (14.4%)	120 (72.3%)	46 (27.7%)		
Relationships with children				81.660	<0.001*
Satisfied	1070 (92.7%)	919 (85.9%)	151 (14.1%)		
Not satisfied	73 (6.3%)	34 (46.6%)	39 (53.4%)		
No children	11 (1.0%)	6 (54.5%)	5 (45.5%)		

*There is statistical significance between 'satisfied' and 'not satisfied' , p<0.001; there is statistical significance between 'satisfied' and 'no children' , p<0.05.

Table 5 Multivariable analysis of life satisfaction of patients who had a stroke in China

Variable	B	SE	Wald	P value	OR	95% CI
Sociodemographic characteristics						
Gender	−0.191	0.214	0.795	0.373	0.826	0.543 to 1.257
Age	0.741	0.257	8.314	0.004	2.098	1.268 to 3.471
Marital status	0.032	0.347	0.008	0.928	1.032	0.523 to 2.037
Education*						
Illiterate	0.052	0.386	0.018	0.892	1.054	0.494 to 2.246
Primary and secondary	−0.194	0.330	0.346	0.556	0.824	0.432 to 1.572
Pension	0.393	0.286	1.889	0.169	1.482	0.846 to 2.597
Personal income	−0.190	0.255	0.555	0.456	0.827	0.502 to 1.363
Health status						
Self-rated health†						
Good	−0.603	0.493	1.495	0.221	0.547	0.208 to 1.438
Fair	0.244	0.250	0.953	0.329	1.276	0.782 to 2.081
Health satisfaction	2.078	0.285	53.169	< 0.001	7.986	4.569 to 13.959
Diabetes	−0.150	0.212	0.502	0.479	0.860	0.568 to 1.304
Chronic lung diseases	−0.216	0.227	0.912	0.340	0.805	0.517 to 1.256
Fall down	−0.182	0.199	0.838	0.360	0.834	0.565 to 1.230
Pain	−0.852	0.262	10.581	0.001	0.427	0.255 to 0.713
Ability to work‡						
Unable to work for a long time	0.481	0.233	4.266	0.039	1.618	1.025 to 2.556
Works properly	0.192	0.266	0.521	0.470	1.212	0.719 to 2.044
Lifestyles						
Drink	0.013	0.245	0.003	0.959	1.013	0.627 to 1.636
Physical activity	0.126	0.253	0.246	0.620	1.134	0.690 to 1.863
Social activity	0.264	0.200	1.747	0.186	1.303	0.880 to 1.928
Family relationship						
No of children§						
0	0.683	2.255	0.092	0.762	1.980	0.024 to 164.381
≤3	−0.064	0.217	0.087	0.768	0.938	0.614 to 1.434
Relationships with spouses¶						
Satisfied	1.633	0.252	42.115	< 0.001	5.120	3.126 to 8.384
No spouse	0.654	0.417	2.460	0.117	1.923	0.849 to 4.355
Relationships with children**						
Satisfied	1.361	0.314	18.786	< 0.001	3.900	2.108 to 7.217
No children	−0.029	2.153	0.000	0.989	0.972	0.014 to 66.117

*Comparison with 'high school and above'.
†Comparison with 'poor'.
‡Comparison with 'unable to work'.
§Comparison with ' > 3'.
¶Comparison with 'not satisfied'.
**Comparison with 'not satisfied'.

higher life satisfaction than those who were 'not satisfied' with their children (OR 3. 900, 95% CI 2.108 to 7.217).

DISCUSSION

Overall, 83.1% of patients who had a stroke report satisfaction with their lives, although only 8.7% rated their own health as being good and nearly 80% of patients who had a stroke had two or more other chronic diseases and only half had social activities. Our study shows that the sociodemographic characteristics, health status, lifestyles and social activity and family relationships of patients who had a stroke had significant impacts on their life satisfaction.

Consistent with other studies,[12 44] our study found that the vast majority of the patients who had a stroke had other chronic diseases, among which hypertension and heart disease accounted for a high proportion (69.7%, 38.1%). While pain is one of the most common sequelae of stroke,[22 45] about 71% of the patients in this study had pain symptoms. We also found that patients who had a stroke had poor self-reported health status, low health satisfaction and decreased ability to work, which was consistent with other related studies.[21 23] Our study found that the proportion of patients who had a stroke who smoked and drank were 23.8% and 26.9%, respectively, lower than that of the middle-aged and elderly Chinese population (using 2015 CHARLS samples, 45.7%, 46.2%).[46] This may be because after diagnosis of stroke, patients will follow the doctor's advice or quit smoking and drinking to seek a better health condition. Consistent with other studies,[19 47] we also found limited physical and social activities in middle-aged and older patients who had a stroke, probably due to a series of physical, psychological and cognitive impairments after a stroke. In our study, the majority of patients who had a stroke were satisfied with their relationships with their spouses and children, which may be due to the fact that the patients were well taken care of in the family, thanks to the Confucian and filial piety culture in China.

Our univariate analysis showed that male had higher life satisfaction than female, consistent with other studies in China,[48] but inconsistent with studies from other countries.[7 49] Consistent with other studies,[49 50] our study also found that older adults had significantly higher levels of life satisfaction among patients who had a stroke than middle-aged people. The 'happiness paradox' theory may partly explain, which holds that older people tend to maintain high levels of subjective well-being in the face of different challenges.[51] Consistent with other studies,[7 52] our univariate analysis found that married patients reported higher life satisfaction than unmarried, divorced or widowed patients. Patients with pension insurance had better life satisfaction thanks to a greater sense of security offered by the pension.[53]

Consistent with previous studies,[54 55] our study found that self-reported or self-rated health status and health satisfaction were positively associated with life satisfaction in patients who had a stroke. However, in the multivariable analysis, only health satisfaction showed a significant association. Similarly, chronic lung disease and fall were negatively correlated with patients' life satisfaction in univariate analysis, but this association became insignificant in multivariable analysis. Consistent with previous findings,[21 56] we found that pain has a negative effect on life satisfaction in patients who had a stroke. In our research, work ability is a significant factor influencing the life satisfaction of patients who had a stroke. This result confirmed previous findings that returning to work after stroke is an important factor in achieving high levels of life satisfaction among stroke survivors.[19 57]

Our study may resonate previous studies that moderate drinkers are more likely to have improved mental health and more opportunities to engage in social activities and are more satisfied with their life than abstainers and non-drinkers.[58 59] Consistent with other studies,[55 60] both physical activity and social activity have positive effects on life satisfaction. While many studies suggest that socioeconomic conditions like gender, age, education and income could have an influence on the lifestyle of patients after a stroke,[34–36] it is important to explore how these conditions could affect the life satisfaction through the lifestyle behaviour and other potential variables in the future study. Our study also suggests that improving the lifestyle behaviour and social activities of patients who had a stroke is important to improve their life satisfaction (although their relationships do not appear to be statistically significant in the regression analysis). These may be more proximal factors which can be more easily intervened on, compared with sociodemographic conditions, such as education and income that are more commonly discussed.[7 19 20 32]

Similar to the previous studies,[61] we find satisfaction about family relationship is positively correlated with life satisfaction. Harmonious marital relationships can often promote individual's mental health, bring social and economic benefits and directly affect individual's quality of life.[62] This pattern is similar to that of stroke patients' relationships with children and life satisfaction. This is consistent with previous studies on the relationship between offspring support and life satisfaction,[63] as older parents with a serious chronic illness like stroke will have a greater need for offspring support, to relieve financial and psychological stress. In China, traditional concepts such as 'more children, more blessings' and 'raising children for the aged' are deeply rooted. However, in our study, there was no significant correlation between the number of children and the life satisfaction of patients who had a stroke, which was inconsistent with previous studies.[64] This indicates quality of the support from their children is more important than the quantity itself.

There are some limitations to our study. First, we used only a single item to assess life satisfaction. This may lead to bias in the analysis, while using multiple item measures and covering multiple dimensions[65] to assess life satisfaction may have more accurate predictive power. Second, many variables are set as dichotomous variables, which may cause more detailed results to be ignored. While we classified life satisfaction into 'satisfied' and 'not satisfied', this represents the generally positive and negative dimensions of life satisfaction and similar kind of reclassification is common in the management and research practices in China.[40 41] Finally, around 200 patients (16%

of patients who had a stroke) were excluded from analysis due to the lack of data on life satisfaction, which may cause the deviation of our results. In order to estimate any potential bias arising from this, we conducted a sensitivity analysis. We compared the sociodemographic characteristics between the 218 patients who had a stroke missing from the study (group 1) and 1154 patients who had a stroke included into this study (group 2). Compared with group 2, group 1 accounted for a higher proportion of women (54.6% vs 47.2%), the elderly (88.1% vs 76.6%), those who were married but not living with spouse, divorced, widowed or never married (38.1% vs 23.1%), illiterate (39.4% vs 23.3%) and had higher personal income (85.8% vs 76.3%) (p<0.05) (online supplemental table S1). These differences may lead to the bias of the estimated life satisfaction of patients who had a stroke. Although the effect size of its impact is uncertain, the influence of these factors on life satisfaction has been well documented.[7 20 35 42] In addition, the sex ratio of 1154 patients who had a stroke (52.8% vs 47.2%) were consistent with those of patients who had a stroke in China (55% vs 45%).[66] This may indicate the reduced bias due to exclusion of the patients who had a stroke with missing data, in addition to the relatively larger sample size include into this study. Despite these limitations, our study provides a general picture of the life satisfaction of the patients who had a stroke, and their potential corelationships with sociodemographic characteristics, health status, lifestyles and family relationships.

In conclusion, although we found a generally high satisfaction about life among the middle-aged and elderly patients who had a stroke, this is not consistent with their poorly perceived health status, poor health conditions and lower level of physical and social activities. While our study suggests the increased attention should be paid to improve the overall health of the patients after a stroke, it specially indicates the importance of mediating factors like health satisfaction, pain management, work ability and spouse and children relationship in improving and maintaining the life satisfaction of patients in the post-stroke rehabilitation.

ORCID iDs
Ying Liu http://orcid.org/0000-0003-3301-4129
Guanyang Zou http://orcid.org/0000-0001-6933-2749

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