Multiple mediation effects of health locus of control and hope on the relationship between stroke patients’ social support and self-management

Ting-Ting Lei, Hong-Mei Han, Xiao-Jing Liu

Abstract: Objective: This study aimed to identify the mediation effects of health locus of control (HLC) and hope between stroke patients’ social support and self-management.

Methods: A cross-sectional study was conducted. A total of 300 Chinese stroke patients were recruited by convenient sampling from the acupuncture department of two Chinese Traditional Medical Hospitals in Tianjin Province from June to September 2018. The self-report questionnaires include Social Support Assessment Scale, Herth Hope Index, Mental Health Locus of Control Scale, Stroke Self-management Behavior Scale, and personal information questionnaires. All the survey data were entered in Excel and analyzed using the SPSS 24.0 program. Mediation was tested with Bootstrapping in AMOS 23.0 program.

Results: The result showed that internal health locus of control (IHLC), chance health locus of control (CHLC) and hope were the mediators between social support and self-management. The direct, indirect, and total effects of social support on self-management behavior were 0.306 ($P < 0.01$), 0.109 ($P < 0.01$), and 0.415 ($P < 0.01$), respectively.

Conclusions: Social support can directly influence self-management, and it can also indirectly influence self-management through IHLC, CHLC, and hope.

Keywords: social support • health locus of control • hope • self-management • multiple mediation effects

1. Introduction

Stroke is the second leading cause of death and the third leading cause of disability worldwide.1 A research showed that around 15 million people suffer from stroke each year worldwide, among whom about 5 million people die eventually.2 A report revealed that the number of deaths worldwide was projected to rise to 7–8 million without intervention in 2030.3 Moreover, the global burden of stroke is increasing, especially in low-income and middle-income countries.1 China is the most populated developing country. The World Health Organization (WHO) MONICA Project showed that more than 2 million people suffer from stroke, and 1.65 million people die every year in China.4 The World Bank estimated that stroke and myocardial infarction would account for

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more than 50% of chronic disease burden in China from 2010 to 2030. Therefore, the disease burden of stroke is remarkable regardless of the past, the present, and the future.

Stroke is a common disease of the nervous system with potential long-term impacts on individuals, such as disability, depression and anxiety, social isolation, and so on. However, the current rehabilitation treatments mainly focused on the recovery of the physical function of stroke patients, and the psychosocial aspects of patients were often ignored. What’s more, stroke recovery is a long-term process, and therefore it is unrealistic for stroke patients to merely rely on medicals and rehabilitation institutions. Self-management emphasized the subjective initiative of patients, which belonged to the field of psych behavioral therapy. An earlier study showed that self-management was the ability of individuals to manage the symptoms of diseases, treatment measures, physiological and psychosocial problems, as well as lifestyle changes. A large number of studies suggested that self-management not only enabled the patients to monitor their disease conditions and maintain the satisfaction of the living quality but also to regulate their behaviors and emotions, so that the patients may develop good healthy behaviors and improve the health level. WHO had also proposed that the self-management model of chronic diseases was the most effective measure to improve the health level of chronic patients globally.

Furthermore, given that we intend to strengthen and optimize the self-management intervention programs, it is advisable for us to explore the relationship mechanisms of influence factors. Following the previous studies, the present study aims to identify the mediation effects of health locus of control (HLC) and hope between stroke patients’ social support and self-management.

1.1. Social support and self-management

Social support refers to spiritual and material help from family, relatives, friends, colleagues, party members, other individuals, and organizations, which had a positive impact on emotions and health outcomes. The previous studies found that social support played a significant role in persisting health behavior for individuals and had a direct influence on reducing the negative impacts of various stresses from environment, disease, and society. Mohebi et al. found that social support was one of the most effective impact factors on self-care. Pearson correlation coefficient between self-care and social support was 0.489 (P < 0.001). Furthermore, Karimy et al. also identified that social support was the most important predictor of self-care and that patients with better social support had higher self-care scores.

1.2. Social support, health locus of control, hope, and self-management

Although the earlier studies had clearly identified that the social support was associated with self-management, far less was known about the mediator or process underlying the relationship. A large number of published studies had come up with some variables, but these variables investigated in piecemeal studies only partially explained their relationship with social support or self-management. Therefore, it is necessary for us to integrate the identified factors that may have impacts on social support or self-management in order to give a comprehensive viewpoint to explain how social support possibly influence self-management.

HLC is a likely candidate to mediate the relationship between social support and self-management. HLC, including Internal Health Locus of Control (IHLC), Powerful Health Locus of Control (PHLC), and Chance Health Locus of Control (CHLC), was a measure of an individuals’ beliefs in the context of health behaviors, health outcomes, and health care. Patients with IHLC argued that their behaviors could certainly affect their health condition, and those with PHLC argued that the other people, such as medical staff, friends, and family members, had control over one’s health condition, and those with CHLC argued that individuals’ health condition was a matter of fate, luck, or chance. The theory also referred that individuals’ belief of HLC influences how they responded to events, including adopting healthy behaviors, seeking for healthy ideas, and formulating health beliefs. An earlier empirical research revealed that there was a significant positive relation between self-care and IHLC (P < 0.01). In contrast with CHLC (p < 0.01), PHLC had no significant association with self-care (p > 0.05). In addition, the previous studies had revealed that social support had a positive association with IHLC and a negative association with CHLC. Furthermore, there was a study also showing that IHLC was found to be a significant partial mediator for the effect of social support on health status. Thus, HLC is likely to be a mediator between social support and self-management, which need to be identified.

Likewise, hope might be hypothesized to mediate the relationship between social support and self-management. Hope refers to a kind of belief that made individuals think they could achieve a desired goal in the near future and also referred to a sense of cognition.
that could guide people's behavior. Snyder's theory of hope also showed that hope as a cognition composed of three aspects, including goals thoughts, pathways thoughts, and agency thoughts. Among them, goal was the core concept of hope theory that could promote the generation of behavioral manners. For instance, patients with a higher level of hope were likely to perform better health behaviors. Studies and theories, however, confirmed that social support was related to many psychological factors that could be quantitatively analyzed to predict hope. Hope was usually considered as a positive attitude and was significantly associated with positive emotion. Emotion was central to the quality and range of everyday human experience, which could regulate human behaviors. In addition, numerous empirical studies had shown that hope and social support had a significantly positive relationship, and social support could predict the hope level. Thus, hope is likely to be a mediator between social support and self-management, which need to be identified.

In addition, hope and HLC all were involved in the research field of psychology. The earlier study showed that HLC had an association with hope, and IHLC was significantly positively related to hope level and CHLC was significantly negatively related to hope level. Thus, hope is likely the mediator between social support and HLC, which will need to be verified in the present study. On the basis of the previous studies, we proposed the hypotheses model (Figure 1).

2. Methods

2.1. Procedure and participants

A cross-sectional study was conducted. A total of 300 Chinese stroke patients were recruited by convenient sampling from the acupuncture department of two Chinese Traditional Medical Hospital in Tianjin from June to September 2018. The inclusion criteria included: (1) patients were diagnosed with stroke for at least 1 month before the study by head CT or an MRI examination, (2) had Barthel score > 20 and muscle strength > II level, (3) and were able to speak fluently and had clear consciousness without obvious cognitive and language impairment. The exclusion criteria included: (1) patients had serious complications of heart, liver, or kidney dysfunction, respiratory failure and malignant tumors and (2) had swallowing dysfunction and could not eat through the mouth (food is given by nasogastric tube). All participants provided written informed content before participating in this study, and all questionnaires were filled out by participants themselves.

2.2. Instrument

2.2.1. Demographic questionnaire

Demographic information included gender, age, work status, educational level, residence, medical payment method, stroke subtype, stroke frequency, and Barthel index.

2.2.2. Stroke Self-Management Scale

The Stroke Self-Management Scale (SSMS) developed by Wang and based on the theory of chronic disease self-management, traditional Chinese medicine and stroke evidence-based nursing consists of 51 items and 7 dimensions, including disease, drugs, dietary, daily life, emotion, social interpersonal, and exercise management, which are rated on a five-point Likert-type format. Lower score indicates a poorer self-management. The Cronbach’s α was 0.835 and content validity was 0.950. The Cronbach’s α in the present study was 0.841.

![Figure 1](image_url). The hypothesis model between social support, HLC, hope, and self-management.
2.2.3. Herth Hope Scale

The Herth Hope Scale (HHS), developed by Herth in 1991 and translated into Chinese by Chinese professor Zhao, was used to assess the hope level. The scale has 12 items, and each item is rated on a four-point Likert-type scale ranging from 1 = strongly disagree to 4 = strongly agree. The total score ranges from 12 to 48. Participants with a higher score indicate a greater hope level. The Chinese version of the HHS was tested in the Chinese population with a Cronbach’s α of 0.850. The Cronbach’s α in the present study was 0.824.

2.2.4. Social Support Assessment Scale

The Social Support Assessment Scale (SSAS), developed by Professor Xiao, was used to assess the social support level. The scale consists of 3 dimensions and 10 items, including objective support, subjective support, and availability of support. Participants with a higher score indicate a better social support level. The Cronbach’s α for the three dimensions of the SSAS were 0.825, 0.848, and 0.833. The SSAS has been widely adopted in China. The Cronbach’s α in the present study was 0.818.

2.2.5. Mental Health Locus of Control Scale

The Mental Health Locus of Control (MHLC) Scale, developed by Wallston in 1994, is used to measure participants perceived control over health. The scale consists of 18 items and 3 dimensions, including IHLC, PHL, and CHLC. The scale adopts six-point Likert-type format ranging from 1 (strongly disagree) to 6 (strongly agree). The score on each independent subscale ranges from 6 to 36, and patient with a higher score indicates the importance of the MHLC in the given dimension. The Chinese version validity of MHLC had been verified in the Chinese population with a Cronbach’s α ranging from 0.750 to 0.830 and had been widely used in the medical field. The Cronbach’s α in the present study for IHLC, PHL, and CHLC were 0.827, 0.802, and 0.891, respectively.

2.3. Statistical analysis

Statistical packages (SPSS 24.0 and AMOS 23.0) of the statistical analysis were used for all data. All analytical tests were based on two-sided tests, and statistical significance was considered as \( P < 0.05 \). For all descriptive statistics, continuous variables were presented by mean and standard deviation (SD), and categorical variables were presented by frequency and percentage. The normality of self-management, social support, hope, and HLC were examined by the way of Kolmogorov–Smirnov. Pearson’s correlation coefficients were calculated to identify the correlation relationship of all variables. Mediation of the hypothesized model was tested through Bootstrapping in AMOS 23.0 program. We considered the model fit well if the fitting indices conformed to the following indexes: the Goodness-of-Fit Index (GFI)>0.90, the Adjusted Goodness-of-Fit Index (AGFI)>0.90, Bentler and Bonett’s Normed Fit Index (NFI)>0.90, Bollen’s incremental fit index (IFI)>0.90, Bentler’s Comparative Fit Index (CFI)>0.90, and Root mean squared error of approximation (RMSEA)<0.08.

3. Results

A total of 300 eligible stroke patients were approached, and all of them agreed to participate in the survey, giving a response rate of 100%, and 15 of 300 respondents (5%) had incomplete data.

3.1. Sample characteristic

The mean age of participants was 62.20 ± 10.78 years. Among the 285 participants, 167 (58.6%) were males; 231 (81%) lived in urban; 193 (67.7%) had a junior education level; and 236 (82.8%) reported having health insurance. Ischemic stroke patients were predominated in the present study having 263 (92.3%). Additional information about the demographic or clinical characteristics of the participants is given in Table 1.

The mean and SD of social support, hope, HLC, and self-management are presented in Table 2. Normality of the variables was supported as the absolute values of skewness and kurtosis were not greater than 2 and 7. Therefore, all data of study variables in this study can be considered as having normal distribution.

Pearson’s correlation coefficient was used to define the relationships among research variables, which showed (Table 3) that self-management was significantly associated with all variables \( (r = 0.414, 0.385, 0.302, 0.309, -0.248, \text{and } P < 0.01) \). Likewise, social support had significant relationships with hope, IHLC, CHLC \( (r = 0.224, 0.216, -0.194, P < 0.01) \), and hope had significant relationships with IHLC and CHLC \( (r = 0.313, -0.203, P < 0.01) \). But PHL was not found significant relationships with social support and hope \( (P > 0.05) \).

Bootstrapping with 95% bias corrected confidence interval (CI) based on 1000 bootstrap samples was adopted to examine indirect and direct effects of the social support on self-management. The model consisted of five latent factors (social support, IHLC, CHLC, hope, and self-management). A test revealed a satisfactory fit to the data: \( \text{GFI} = 0.998, \text{AGFI} = 0.967, \text{NFI} = 0.991, \)
The results (Figure 2) showed that social support significantly predicted IHLC ($\beta = 0.154, P < 0.01$), CHLC ($\beta = -0.156, P < 0.01$), hope ($\beta = 0.224, P < 0.01$), and self-management ($\beta = 0.306, P < 0.01$). Hope was also found to have a positive relationship with IHLC ($\beta = 0.278, P < 0.01$), self-management ($\beta = 0.249, P < 0.01$), and a negative relationship with CHLC ($\beta = -0.168, P < 0.05$). Both IHLC and CHLC had a significant impact on self-management ($\beta = 0.141, -0.117, P < 0.01$). Moreover, the total effect of social support on self-management was significant ($\beta = 0.415, P < 0.01$). Additional information about the direct and indirect effects is found in Table 4. According to the results, there were six pathways for social support to impact self-management. Social support could directly impact self-management ($\beta = 0.306, P < 0.01$). While social support exerted its indirect effect through the simple mediation effect of hope, IHLC and CHLC and through the two-factor mediation effect of hope-IHLC and hope-CHLC ($\beta = 0.109, P < 0.001$) to impact self-management. Hope could generate its effects on self-management by the direct pathway ($\beta = 0.249, P < 0.05$) and the indirect pathways ($\beta = 0.059, P < 0.01$) through both IHLC and CHLC.

### 4. Discussion

The present study investigated the relationship among social support, hope, HLC, and self-management in a sample of stroke patients. The results of this study identified the hypothesis that IHLC, CHLC, and hope mediated the relationship between social support and self-management. That is, social support could directly impact on self-management, and patients with higher social support tended to perform greater self-management, which had confirmed previous studies.13,14,17 Family members and friends were the primary source of social support in society, and the past empirical studies had verified the family members and friends provided greater social support for patients, and most of them preferred to better adhere self-management.40,41 On the one hand, a possible reason was that patients with a higher level of social support had relatively better interpersonal relations and family functions. The result supported the notion that good family functions were conducive to the improvement of self-management.42 In the process of self-management, individuals' family members and friends could play roles of supervision and encouragement, which contributed to one's adhering health behavior.43 On the other hand, patients with higher social support could receive more attention and share more resources from others, which was conducive to meet the emotional and material needs to relieve the tension and discomfort of the disease, strengthen the confidence to overcome the disease, and improve the self-management level of patients.43

### Table 1. Participants' characteristics (N = 285).

| Characteristics          | N   | %  |
|--------------------------|-----|----|
| Gender                   |     |    |
| Male                     | 167 | 58.6|
| Female                   | 118 | 41.4|
| Age (years)              |     |    |
| ≤44                      | 15  | 5.3 |
| 45–59                    | 84  | 29.5|
| 60–74                    | 156 | 54.7|
| ≥75                      | 30  | 10.5|
| Educational level        |     |    |
| Primary education (1–6 years) | 41 | 14.4|
| Junior education (7–12 years) | 193| 67.7|
| Senior education (>12 years) | 51 | 17.9|
| Residence                |     |    |
| Urban                    | 231 | 81.0|
| Village                  | 54  | 19.0|
| Work status              |     |    |
| Employed                 | 78  | 27.4|
| Unemployed               | 207 | 72.6|
| Health insurance         | 236 | 82.8|
| Stroke subtype           |     |    |
| Ischemic stroke          | 263 | 92.3|
| Hemorrhagic stroke       | 16  | 5.6 |
| Mixed-stroke             | 6   | 2.1 |
| Stroke frequency         |     |    |
| One time                 | 196 | 68.8|
| More than one time       | 89  | 31.2|
| Barthel index            |     |    |
| Independent              | 129 | 45.3|
| Mild disability          | 97  | 34.0|
| Moderate disability      | 53  | 18.6|
| Severe disability        | 6   | 2.1 |

### Table 2. Descriptive statistics among study variables (N = 285).

| Variables                | Mean | SD  | Skewness | Kurtosis |
|--------------------------|------|-----|----------|----------|
| Social support           | 34.12| 4.42| -0.070   | -0.181   |
| Hope                     | 36.00| 3.79| 0.150    | -0.185   |
| IHLC                     | 25.03| 2.95| -0.133   | -0.172   |
| PHLC                     | 27.05| 2.44| -0.058   | -0.481   |
| CHLC                     | 14.25| 3.77| 0.144    | 0.288    |
| Self-management          | 159.35| 13.40| 0.094    | 0.083    |

IFI = 0.997, CFI = 0.997, RMSEA = 0.044. The results (Figure 2) showed that social support significantly predicted IHLC ($\beta = 0.154, P < 0.01$), CHLC ($\beta = -0.156, P < 0.01$), hope ($\beta = 0.224, P < 0.01$), and self-management ($\beta = 0.306, P < 0.01$). hope was also found to have
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Mediated by CHCL and positively mediated by IHLC and hope. That is, individuals with higher social support possibly more tended to IHLC and less tended to CHLC, as well as had a higher hope level, which leads to performing better self-management. This result was consistent with earlier studies.\textsuperscript{17,20–22} For example, Frey investigated the HLC as a mediator between social support and health status, and results showed that IHLC was also found to be a significant partial mediator for the effect of social support on health outcomes.\textsuperscript{23} An empirical study was conducted on exploring the relationship between social support and HLC, and the research showed that IHLC had a positive association with social support ($r = 0.196$, $P < 0.01$), and CHLC had a negative relationship with social support ($r = -0.191$, $P < 0.01$).\textsuperscript{44} IHLC had a supervisory effect on the practice of self-management, and patients believed that they could change their health status through their efforts.\textsuperscript{19,36} and they were more willing to adopt more resources and help from others to promote better self-management. However, CHLC was

| Outcome                  | Direct effect | Indirect effect | Total effect |
|--------------------------|---------------|----------------|--------------|
| Self-management behavior |               |                |              |
| Social support-Self-management | 0.306\textsuperscript{**} | 0.109\textsuperscript{**} | 0.415\textsuperscript{**} |
| Hope-Self-management     | 0.249\textsuperscript{**} | 0.059\textsuperscript{**} | 0.308\textsuperscript{**} |
| CHLC-self-management     | -0.117\textsuperscript{**} | -0.117\textsuperscript{**} |              |
| IHLC-self-management     | 0.141\textsuperscript{**} | 0.141\textsuperscript{**} |              |
| IHLC                     |               |                |              |
| Social support-IHLC      | 0.154\textsuperscript{**} | 0.062\textsuperscript{**} | 0.216\textsuperscript{**} |
| Hope-IHLC                | 0.278\textsuperscript{**} |                | 0.278\textsuperscript{**} |
| CHLC                     |               |                |              |
| Social support-CHLC      | -0.156\textsuperscript{**} | -0.038\textsuperscript{**} | -0.194\textsuperscript{**} |
| Hope-CHLC                | -0.168\textsuperscript{} | -0.168\textsuperscript{} |              |
| Hope                     |               |                |              |
| Social support-Hope      | 0.224\textsuperscript{**} |                | 0.224\textsuperscript{**} |

Note: *$P<0.05$, **$P<0.01$. 

Table 3. Correlation analysis among study variables ($r$).

Table 4. Direct and indirect effects.
a negative attitude, and these patients argued that there was a relationship between one’s health and opportunity or luck while denying their efforts and others’ views, and were unwilling to obtain help and support from others. Hope as a cognitive process, which determined how we approached events and highlighted confidence and expectations about achieving goals of personal significance, would have a positive impact on the individual’s behavior and attitude. The previous studies and hope theory revealed that the high hope level could make individuals to better use social support, and on the contrary, the sense of self-worth and hope level could be also enhanced by social support, which was conducive to showing stronger willpower and resolution to take relevant measures to persist in self-management.

Our study also showed that hope also mediated the relationship between social support and CHLC or IHLC. Although the previous studies did not find that hope as a mediator among them, published studies had identified that hope could mediate psychological variables. Social support was related to many psychological factors, which could be quantitatively analyzed to predict hope. The beliefs of HLC were not a relatively permanent component in individuals’ psychology filed that could be significantly changed by psychology, society and environment factors. This path indicated that individuals with high social support were apt to engage in high hope level, which might tend to lower CHLC and higher IHLC to adopt better health behavior, which identified the hypothesis in our study. Here, the partial mediation role of hope provided a new insight into the relationship among social support, CHLC, IHLC, and self-management.

We also acknowledge that there were several limitations to the present study that need to be mentioned. First, the participants in the study came from two Chinese Traditional Medical Hospitals of one city. Therefore, the stroke samples in this study could not represent the whole stroke patients. Second, the data collected only through self-report instruments could decrease the internal validity of tools in this study.

Third, the research sample size was smaller than other studies, which might have an impact on the fitting of the model. Future studies with more participants consisted of patients come from various cities and hospitals should be conducted to provide better proof to identify the relationship between social support and self-management behavior.

5. Conclusions

Despite the existence of these limitations in this study, and the present study models potential links between social support and self-management in stroke patients, with mediating roles of IHLC, CHLC, and hope. That is to say, social support can directly influence self-management but also can indirectly influence self-management through IHLC, CHLC, and hope. However, further studies can validate the present study and extend the findings to additional population groups. The findings may provide valuable guidance in making comprehensive intervention measures of self-management for medical works to improve the self-management level of patients. The enhancement of social support may work as an efficient measure to promote individuals to adopt healthy lifestyle. It may also function as a valid method by helping them gain hope level and more tend to IHLC as well as less tend to CHLC. Moreover, although PHLC has no significant relationship with hope and social support, PHLC has a positive connection with self-management which should not be ignored.

Ethical approval

Ethical issues are not involved in this article. Stroke patients who voluntarily participated were informed about the purpose of the study, and this study would not have any negative impact on them.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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