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Original Article

The relationship among hope, symptom distress, social support, coping style and monthly income in maintenance hemodialysis patients: a structural equation model

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Abstract: Purpose: The purpose of this study was to test a model of hope, symptom distress, social support, coping style and monthly income in maintenance hemodialysis patients. Methods: A cross-sectional survey with convenience sampling was used in this study. In 2014, data were collected from 207 maintenance hemodialysis patients in China through questionnaires. Results: Results revealed that the postulated model fits the data from this study well. Monthly income is directly related to active and passive coping style. Active coping style, passive coping style and symptom distress are directly related to hope. Active and passive coping style and monthly income are directly related to social support. Social support is directly related to symptom distress, and the relationship among monthly income, active coping style, passive coping style, social support and hope is mediated by symptom distress. Conclusions: Symptom stress are important in explaining hope in maintenance hemodialysis patients, which is a mediator among factors that affect hope level; and this could serve as a direct factor for hope level. Coping style has both direct and indirect effects on hope level. In addition, monthly income is related to hope level, in which social support appears to play a mediating role. Our findings provide concrete directions for maintenance hemodialysis patients in developing hope intervention programs to increase hope level.

Keywords: Hope, symptom distress, social support, coping style, maintenance hemodialysis, structural equation model

Introduction

The number of patients undergoing hemodialysis continues to extend worldwide. Data from Australia revealed that 16,045 persons suffering from end-stage kidney disease (ESKD) were receiving renal replacement therapy including dialysis [1]. In China, 65,074 end-stage renal disease (ESRD) patients were receiving maintenance hemodialysis (MHD) at the end of 2007, and this number increased to 102,863 patients by the end of 2008 [2]. There are many challenges in this population. It has been reported that patients receiving MHD experience physical and psychosocial problems such as social isolation, depression, anxiety and hopelessness; hence, some patients withdrew from dialysis [3-6]. These findings indicate that besides physical changes, the mental health of patients receiving MHD needs much more attention.

Hope is a determinant of mental health recovery, which is a belief that the present situation can be modified and that better days or moments will come [7]. Evidence has shown that hope can help patients adapt to disease and improve their physical and mental health [8-10]. Although researches on factors that affect hope have revealed that hope is correlated to demographic variables such as income, symptoms, social support and coping style, few studies have explained which factors have a direct and indirect effect on hope [11-

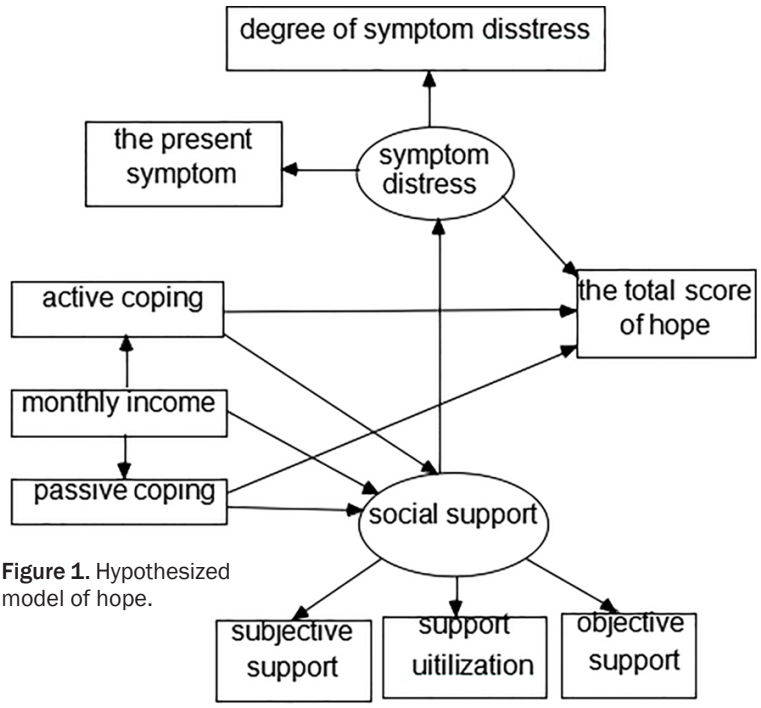

Figure 1. Hypothesized model of hope.

14]. Furthermore, no data have corresponding or established the relationship among hope, symptom distress, social support, coping style and income in Chinese patients receiving MHD.

The purpose of this study was to test a model of factors that affect hope in patients receiving MDH in China. Such model can help to suggest mechanisms, in which one variable may impact another and provide a nuanced understanding of the processes that link hope, social support, coping style and symptom distress and income. The following hypotheses were developed: H1: active and passive coping style and symptom distress are directly related to hope; H2: active and passive coping style and monthly income are directly related to social support; H3: social support is directly related to symptom distress and indirectly related to hope; H4: the relationship among monthly income, active coping style, passive coping style, social support and hope is mediated by symptom distress.

This study hypothesizes that symptom distress has a negative effect on hope, and that social support has a positive effect on hope. Additionally, it is assumed that monthly income has a direct effect on coping style and social support, positive coping style has a positive effect on hope, and negative coping style has a negative effect on hope. This model was tested using structural equation modeling (SEM) to evaluate the fit. Income was an independent manifest variable, and scores of positive and negative coping style were independent manifest variables; while social support and symptom distress were dependent latent variables, and the score of hope was an dependent manifest variable. The hypothesized model of hope is shown in **Figure 1**.

Materials and methods

Design and participants

The study sample was drawn from a survey conducted between July and September 2014 among patients receiving MHD in two outpatient dialysis facilities in hospitals in Guangzhou. Convenience sampling was used. Among the 239 surveys, 207 were valid surveys; and return rate was 86.6%. Participants were informed that their participation was voluntary. The purpose of this study was explained, and confidentiality was assured to uphold the rights pertaining to informed consent and confidentiality. All participants were informed that they had the right to withdraw from the study any time. Inclusion criteria for participation in the study were as follows: (1) diagnosed with ESRD and currently receiving MHD for more than three months; (2) receives MHD for 3-4 hours, three times per week; (3) ≥ 18 years old; (4) able to read and write in Chinese, able to give informed consent, and no spirit or consciousness.

Instrument

Herth hope index (HHI): Hope was measured using the Chinese version of the HHI. The HHI includes 12 items that measure three dimensions of hope, with scores range from 1 (“strongly disagree”) to 4 (“strongly agree”). Total scores in the scale range from 12 to 48 points, in which a higher score indicates higher hope level. Cronbach’s alpha for the Chinese version of the HHI is 0.87 [15].

Table 1. The Univariate analysis of total score of hope in different patients group (n=207)

Variables	n	Scores ($\bar{X}$±S)	*F* values	*P* values
Age (years)			2.338	0.057
20~39	23	33.26±3.32		
40~49	47	34.34±3.57		
50~59	59	32.97±3.97		
60~69	71	32.27±3.43		
Above 70	7	33.29±4.11		
Educational level			1.312	0.272
< Middle school	111	32.72±3.80		
High or secondary school	61	33.33±3.44		
College	20	33.26±3.40		
University	15	34.60±3.91		
Marital			1.872	0.156
Married	176	33.24±3.49		
Unmarried	8	34.50±4.50		
Divorced or widowed	23	31.70±4.57		
Monthly income (RMB)			317.357	0.000
< 1500	34	26.85±1.79		
1500~5000	127	33.25±1.79		
> 5000	46	37.22±1.94		
Time on MHD (months)			2.431	0.066
< 24	49	33.92±4.17		
24~48	94	33.29±3.42		
49~120	37	32.00±3.40		
> 120	27	32.33±3.68		

Note: MHD=maintenance hemodialysis.

Simplified coping style questionnaire (SCSQ): The simplified coping style questionnaire consists of 20 items, arranged with scores from 0 to 3; where 0 is "never do" and 3 is "always do". Factor analysis of the 20 questions of coping style yielded two dimensions, which were defined as: "passive coping" and "active coping". The higher score of each dimension indicates the frequent usage of this coping. This instrument has been used in many Chinese articles, and the Cronbach's alpha of the SCSQ in China is 0.78 [16].

Social support requirement scale (SSRS): This scale contains 10 questions that evaluate subjective support, objective support and support utilization. Each question was scored on a four-point scale from 1 to 4. Higher scores indicate greater social support outside the participant's family. Cronbach's alpha of the SSRS has been found to be 0.90 [17].

Dialysis symptom index (DSI): The English version of the DSI was developed by Steven D in 2004 [18]. We translated the English version of the DSI into Chinese according to World Health Organization recommendations [19]. The Chinese version of the DSI is made up of 30 questions that address a series of physical and emotional symptoms. In order to complete the DSI, patients were asked to report the presence of symptoms over the past seven days and to rate the severity of the symptom on a 5-point Likert scale from a score of 1, which signifies that a symptom is not bothersome, to a score of 5, which signifies that the symptom is very bothersome. An overall symptom burden score ranging from 0 to 30 was generated by summing the number of symptoms reported as being present. In addition, an overall symptom severity score ranging from 30-150 was generated by summing the severity of symptoms. Cronbach's alpha for the Chinese version of the DSI was 0.92. The test-retest reliability of this scale was 0.84, and content validity was 0.94.

General demographic data included gender, age, marital status, educational level and monthly income.

Data analysis

The statistical package for the social sciences (SPSS) software 13.0 and Analysis of Moment Structures (AMOS) Graphics Version 17.0 software were used for all data entered and analyzed, in order to obtain better results for the model fit evaluation. Descriptive and basic statistical analyses of the data were performed using SPSS13.0, while AMOS 17.0 was used to investigate structural equation modeling. The absolute and relative goodness of fit were assessed using the X^2 test, Tucker-Lewis index (TIL) and the comparative fit index (CFI).

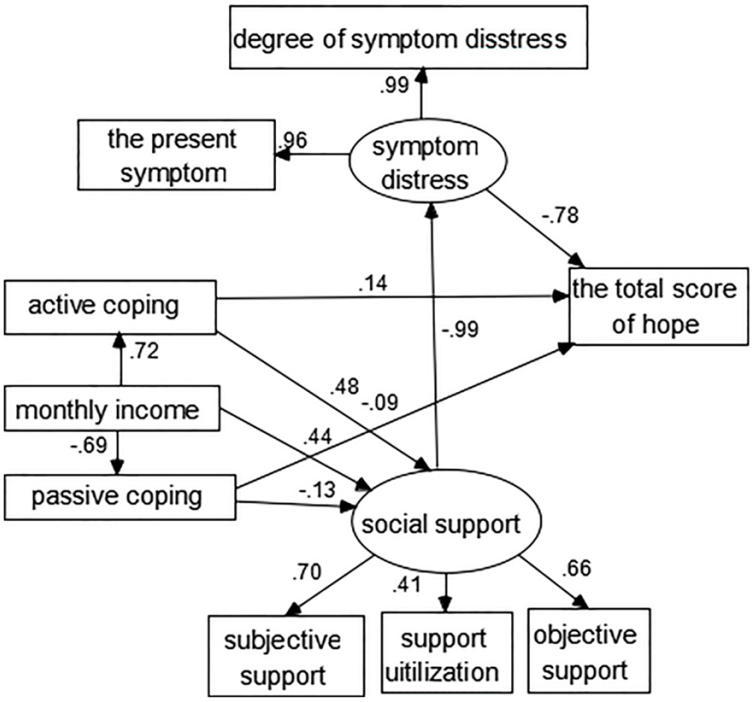

Figure 2. Structural Equation Model for Relationship among hope, symptom distress, social support and coping style in maintenance hemodialysis patients.

Results

Among the total number of patients asked to participate into this study, 207 provided consent and completed the questionnaire. General demographic data are displayed in **Table 1**. All 207 patients obtained moderate hope levels, with a total hope score of 33.08±3.68. Univariate ANOVA of hope score revealed that there were no significant differences in hope scores among patients with different ages, gender, education level, duration of MHD and marital status. However, there were significant differences in hope scores among patients with different monthly income (**Table 1**).

The total social support score for MHD patients was 43.53±4.09, in which objective support was 10.90±2.28 and subjective support was 24.86±2.29. The support utilization was 7.73±1.34. The scores for active coping and passive coping were 2.16±0.27 and 1.55±0.32, respectively.

The symptom distress survey revealed that overall symptom burden score of MHD patients was 13.09±5.62 and overall symptom severity score was 34.08±18.30.

According to the overall model fit results, chi-square of the overall model fit between the theoretical model and data was 24.31 (df=18, n=207, P=0.145); which was not statistically significant. Other indices such as the Goodness-of-Fit Index (GFI), the Adjusted GFI (AGFI), Normal Fit Index (NFI) and Incremental Fit Index (IFI) (Bagozzi & Yi 1988) were also considered. These results revealed that GFI was 0.975, AGFI was 0.936, NFI was 0.990, and IFI was 0.997. These values were all over 0.90, indicating that the fit was acceptable. The overall coefficient of determination for independent and dependent variables reached 0.959, which show that indices representing latent variables of the overall model fit were appropriate. The results of this study indicate that the model fit was generally acceptable. Thus, the cause-and-effect model in this study can explain hope in MHD patients. With regard to residual analysis, the root mean square error of approximation (RMSEA) of this model was 0.041, which met the critical point of 0.05. In general, fit indices demonstrated an ideal external quality.

With regard to the direct effects of independent variables on the theoretical model of hope in MHD patients, according to the data in **Figure 2**, the standardized direct effect of active coping style, passive coping style and symptom distress on hope was 0.51, -0.19, and -0.78, respectively. All of which reached the 0.05 significance level. Thus, hypothesis H1 was supported. Active coping style, passive coping style and monthly income are directly associated with social support (path coefficients are 0.48, -0.13 and 0.88, respectively; and all reached the 0.05 significance level), which in turn is directly associated with symptom distress (path coefficient is -0.99). In other words, MHD patients with good monthly income or active coping style have high social support, while MHD patients with poor monthly income

or passive coping style have low social support. In addition, the poorer the social support MHD patients have, the more severe the symptom distress MHD patients suffer and vice versa. These findings supported H2 and H3.

Additionally, there was a meaningful indirect effect on monthly income, coping style and social support on hope through symptom distress. These findings indicate that MHD patients with good monthly income or active coping style have high social support, and in turn have mild symptom distress and have high hope levels; while MHD patients with poor monthly income or passive coping style have low social support, and in turn have severe symptom distress and have low hope levels. This finding supported hypothesis H4. In addition, the coefficient of determination (R2) of active and passive coping style, social support and symptom distress on hope was 0.96, R2 of active and passive coping style and social support on symptom distress was 0.98, and R2 of active and passive coping style on social support was 0.92; indicating that all R2 were high.

Discussion

Findings of this study provide strong support for the proposed hypotheses that active coping style, passive coping style and symptom distress are directly related to hope, monthly income is directly related to active coping style and passive coping style, active and passive coping style are directly related to social support, and social support is directly related to symptom distress. In addition, the mediating role of symptom distress in the relationship among monthly income, active coping style, passive coping style, social support and hope was examined.

Our finding revealed that social support is indirectly related to hope levels. This finding is not in agreement with the results of Adel Denewer [20], Abend TA [21] and Absetz [22], in which social support had a strong influence on hope among patients with breast cancer. Our finding suggests that symptom distress has a higher proportion in the explanation of hope than in social support. The reason could be that social support was viewed differently across various individuals, and it may be important in improving hope levels for some patients, but may not be as important for others. Even so, social support was indirectly related to hope level through the mediating role of symptom distress. Additionally, in this study, MHD patients who enjoyed high social support had less serious symptom distress and vice versa. This result is the same with the study of Atkins, in which 357 people living with HIV/AIDS that found lower levels of cognitive symptom burden were significantly associated with greater social support [23]. Moreover, according to the study conducted by Corey AL., young adults with cancer perceived higher social support and were also less concerned; thus, they had fewer symptoms such as insomnia [24].

Our findings demonstrate that monthly income has an indirect effect on hope level. This finding is in disagreement with the results of Herth, who noted that income was the best predictors for the level of hope [25]. One possible explanation is that in Herth's study, selected variables only included the demographic data patients, and did not include variables such as coping style. Studies have found that there were relationships among income, coping style and hope. Ouwehand et al. found that people with higher income used more proactive coping strategies in their daily life, while people with lower income undertook less future-oriented activities [26]. Felder [27] and Herth's study [28] revealed that coping style was positively related to hope level. However, these studies were limited to the investigation of the relationship between income and coping strategies, and the association between coping and hope; in which these did not clearly show the path mechanism among those factors. Our finding shows that monthly income has a positive influence on hope level through active and passive coping style. In other words, patients with a high income were more likely to engage in an active coping style, and therefore, had higher hope levels and vice versa. In addition, this study revealed that monthly income can also be indirectly related to hope level through social support and symptom distress. Similarly, patients with higher income have more social support, and patients who enjoy more social support have less serious symptom distress, and therefore have higher hope levels. Indeed, low family monthly income implies heavy family burden. Lindsay RM [29] indicated that in North America, nearly two-thirds of patients receiving MHD reported having heavy family

burden; and more than half of the patients worried that their caregivers were doing too many things, and therefore felt guilty about the demands they made on their caregivers. Family burden may influence coping and social function, and subsequently affect self-reported physical and mental health.

Our findings further indicate that the active coping style has a significant direct positive influence on hope, while passive coping style has a significant direct negative influence on hope. In other words, MHD patients with active coping style have high hope levels, and MHD patients with a passive coping style have low hope levels. This finding is similar with the results of Zhang et al. [14], who noted that there were positive relationships between hope and optimism, hope and self-reliance, and hope and palliative coping style; while there were negative relationships between hope and fatalistic and emotional coping styles in breast cancer patients. Indeed, coping is the cognitive and behavioral effort to manage specific external or internal demands that are appraised as taxing or exceeding the resources of the person [30]. Consequently, people with an active coping style are more likely to perceive cognitive optimism and take positive behavioral efforts to deal with the disease; which is helpful in establishing positive psychological constructs such as hope. On the other hand, these present studies have revealed that in addition to the direct effect on hope, coping style has an indirect influence on hope via social support and symptom distress. This finding suggests that coping style can have an influence on hope though a direct and indirect path, in which the direct path should be given more attention and the indirect path should not be ignored.

More importantly, our findings reveal that symptom distress play a mediate role in the relationships among monthly income, active coping style, passive coping style, social support, and hope. In other words, symptom distress is the strongest that correlated with the total hope score; and it is underpinned by tests of monthly income, active coping style, passive coping style and social support. This finding is supported by a previous study that confirmed hope to be significantly negatively correlated to symptom distress [31]. Moreover, based on literature findings, studies have found that coping style should alter the incidence, severity and/or course of diseases that are immunologically resisted or are associated with aberrant immunological function [32]. According to Corey AL [33], when a patient had higher perceived social support, he or she is also less concerned; and thus, had less symptom distress. In addition, research has shown that patients from families with lower levels of income had a higher frequency of symptoms [34]. Consequently, the important role of symptom distress in mediating the relationship among income, coping style, social support and hope should be given more attention in clinical practice.

Conclusion

Based on the limitation of research resources and financial support, this research study used a convenient sample and only considered MHD patients. Therefore, these results cannot be generalized with other dialysis patients. The study only investigated the relationships among hope, social support, coping style, symptom distress and income. Further studies should relate this to quality of life. This would enable researchers to further deepen our understanding of hope in MHD patients.

The questionnaire used in this study cannot measure the internal perceptions of participants. Therefore, future studies should utilize a mixed quantitative and qualitative approach in order to provide an in-depth understanding of the reality of an individual's view toward the research questions. Finally, this study was based on a cross-sectional design. In order to expand the depth and scope of this research, a longitudinal research study needs to be conducted in the future.

Disclosure of conflict of interest

None.

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