Relationships among Social Support, Coping Style, Perceived Stress, and Psychological Distress in Chinese Lung Cancer Patients

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ABSTRACT

Objective: Social support is associated with improved psychological distress in cancer patients. This study investigates the impact of social support on Chinese lung cancer patients' psychological distress and further clarifies the mediating role of perceived stress and coping style. **Methods:** A cross-sectional survey study examined social support and psychological distress in 441 patients diagnosed with lung cancer from seven hospitals in Chongqing, China, between September 2018 and August 2019. Coping style and perceived stress were considered to be potential mediators of adjustment outcomes. **Results:** We found a detection rate of 17.7% for psychological distress among Chinese lung cancer patients. Social support was in significantly negative association with psychological distress, which was partially mediated by confrontation coping and perceived stress. **Conclusions:** Social support appears to contribute to ameliorate psychological distress by enhancing confrontation coping with cancer and enhancing perceived stress. There is a need for the development and evaluation of psychological intervention program to enhance the buffering effects of social support in lung cancer patients.

Key words: Lung cancer, psychological distress, social support, perceived stress, coping style, structural equation model

Introduction

Lung cancer is one of the most common malignant tumors.[1] It is estimated to have 2,100,000 new cases and 1,800,000 deaths of lung cancer in 2018 worldwide.[2] In China, lung cancer is also the leading cause of cancer-related death.[3] Cancer patients will suffer from several negative outcomes such as adverse symptoms and interruption of treatment, which will then cause psychological distress.[4] It is reported that lung cancer patients experience the highest prevalence of psychological distress[5] due to negative impact from several aspects such as poor 5-year survival rate of <40%.[6] One study reported that more than one-third of lung cancer patients experienced elevated depression before initiation of the treatment.[7] Lynch *et al.* found that 44.12% of 34 lung cancer patients reported psychological distress among.[8] Moreover, Chambers' study suggested that 51.0%

of 151 participants reported elevated distress.[9] In China, the reported incidence of psychological distress among lung cancer patients was varied from 30.00% to 73.00%.[10]

Psychological distress has persistent negative impact on psychological health, compliance with treatment, and quality of life (QoL) among cancer patients,[11] and thus it has been defined as a risk factor of psychosomatic symptoms.[12-14] Social support has a buffering or protective effects on psychosocial adjustment.[15] Several studies have also determined the protective effects of social support on psychological distress.[16-18] Burnette and colleagues found a negative association between social support and psychological distress among 377 cancer caregivers.[16] Min *et al.* also demonstrated that social support was negatively associated with psychological distress.[19]

Coping is an individual's characteristic behavior for responding to stress, which can be categorized into three aspects including confrontation coping, accommodation coping, and avoidance coping.[20] Studies demonstrated that confrontation coping and accommodation coping benefits psychological adjustment as a positive coping style.[20,21] Whereas, patients who tend to adopt avoidance coping will experience more negative outcomes because they will not positively seek additional support sources to deal with difficulties.[21] Evidence suggested that psychological distress is closely associated with psychological adjustment as a strong predictor.[22] Coping style is, therefore, considered to be potentially related to psychological distress, and the association between coping style and psychological distress has been demonstrated.[23,24]

Stress is regarded as a state in which individual's regulatory capacity cannot meet the threshold of processing the environmental demands or mental strain.[25] Individual will conduct a subjective assessment for individual's degree of stress and ability of processing stress when experienced stress,[26] which is defined as perceived stress. Studies have demonstrated that perceived stress will influence individual psychological adjustment.[26,27] Individual will positively conduct psychological adjustment to ameliorate psychological distress when they perceived the threat from the higher stress, which has been demonstrated by published study.[27]

Based on the previous findings, we concluded that social support, coping style, and perceived stress is obviously the three major variables affecting psychological distress. In addition, more importantly, some studies have revealed that social support can directly influence the coping style[20,21,28,29] and perceived stress[30-33] among cancer patients. However, published studies only simply investigated the associative relationship between two variables, and the potential association of these three variables with psychological distress in lung cancer patients is not yet clear, which considerably limits practitioners to develop interventions for targeting social support. Hence, we performed this study to investigate the impact of social support on Chinese lung cancer patients' psychological distress and further clarify the role of perceived stress and coping style as mediators of effects.

Methods

The present study was conducted based on a descriptive and correlational design. The ethics commission of the Chongqing University Cancer Hospital reviewed and approved the study protocol (Approval No. CUCH_P20180225). Investigators informed all candidates the aims and procedures of the study in detail before starting the formal survey. All oral informed consents were obtained from patients before participating in the study. We reported all data in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines for reporting observational studies.[34]
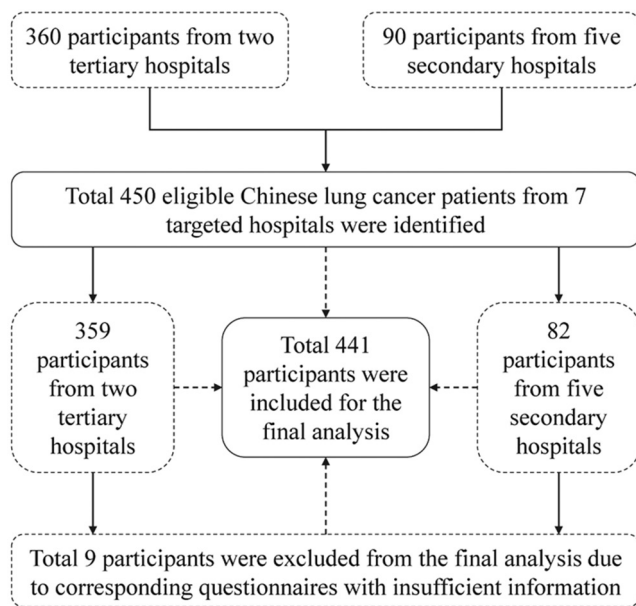
Sample and setting

Eligible lung cancer patients were enrolled from seven hospitals including two tertiary hospitals and five secondary hospitals in Chongqing, China. After a pilot study tested the feasibility of the questionnaire survey, we conducted the formal survey. All questionnaires were independently completed by patients between September 2018 and August 2019. We calculated sample size according to the principle of minimum numbers needed to perform structural equation modeling (SEM).[35] Patients were enrolled if the following inclusion criteria were met: (1) lung cancer was established pathologically; (2) adults patients (18 years or older) who have independent ability of reading, understanding, and writing information; and (3) did not participate in other surveys which has similar study aims. We excluded patients with serious physical diseases, mental disorder, and consciousness disorder from this study. Finally, a total of 450 lung cancer patients were recruited in the investigation and 441 questionnaires were considered to meet the criteria of analysis, with an effective response rate of 98.0%. The process of participants' selection is delineated in Figure 1.

Instruments

Demographic information sheet

The demographic information sheet was developed by the leading investigator (X. T.). Potential demographic variables which may have impact on psychological distress were identified from published literature. We designed 12 demographic variables in this study finally, including age, gender, educational level, work status, marital status, residence, home income, family history (yes or no), smoking history (yes or no), drinking history (yes or no), surgery history (yes or no), pain, and tumor-node-metastasis (TNM) stage.

360 participants from two tertiary hospitals

90 participants from five secondary hospitals

Total 450 eligible Chinese lung cancer patients from 7 targeted hospitals were identified

359 participants from two tertiary hospitals

Total 441 participants were included for the final analysis

82 participants from five secondary hospitals

Total 9 participants were excluded from the final analysis due to corresponding questionnaires with insufficient information

Figure 1: The flow diagram of participants' selection

Psychological distress

In this study, we used a distress thermometer (DT) to measure psychological distress. The DT is a single item with an 11-point scale (0 and 10 represents no distress and extreme distress, respectively) in a thermometer format.[13] Several studies have tested the psychometric properties of DT and confirmed the value of measuring psychological distress.[36-38] According to the criteria, patients will be defined to have clinically significant distress if a score of 4 or above was reported.[39,40] In China, an empirical study demonstrated that the optimal cutoff point of DT was also 4, with an area under the receiver operating characteristic curve of 0.885.[37]

Social support

In the preset study, we used the 12-item Multidimensional Scale of Perceived Social Support (MSPSS) to measure the level of social support from three aspects including family, friends, and significant others.[41] Eligible lung cancer patients were requested to rate each item on a 7-point Likert scale (1 = very strongly disagree to 7 = very strongly agree). The total score of the perceived social support ranges from 12 to 84 points. A previous study has tested the psychological properties of MSPSS and reported that the coefficient alpha values of subscales were ranging from 0.81 to 0.98.[42] The Chinese version of MSPSS has been validated[43] and thus was used to measure the level of perceived social support in our study. Reliability Cronbach's alpha was 0.90 in this study.

Coping style

We used a 20-item Medical Coping Modes Questionnaire (MCMQ), which rated on a 4-point Likert scale from 1 to 3,[44] in this study. The coping style questionnaire was divided into three subscales including confrontation coping (active coping), avoidance coping, and giving up coping (accommodation). Finally, the score of each subscale was calculated, and the higher score indicated that individual is more likely to adopt the corresponding coping style. The MCMQ has been validated in China scenario and then formed Chinese version of MCMQ.[45] Cronbach's alpha for each of the three subscales were higher than 0.65, except for avoidance coping (0.60). In the current study, Cronbach's alpha coefficients were 0.67, 0.68, and 0.74 for confrontation coping, avoidance coping, and giving up coping, respectively.

Perceived stress

In this study, we used the 10-item Perceived Stress Scale (PSS), which was developed by Cohen *et al.*[46,47] to measure stress, which was evaluated on a 5-point Likert scale from 0 to 4. The total possible score was ranging from 0 to 40 points, and a higher score indicated a greater stress level. Cronbach's alpha was 0.84 at the instrument development stage. The Chinese version of PSS has been validated, with a Cronbach's alpha of 0.619.[48] In our study, the Cronbach's alpha was 0.73.

Statistical analysis

All statistical analyses were completed using the Statistical Package for the Social Sciences (Chicago, Illinois, USA) and IBM AMOS 21.0 (Chicago, Illinois, USA). Descriptive statistics were used to summarize patients' characteristics and their average score for psychological distress, social support, coping style, and perceived stress. Kolmogorov–Smirnov test indicated that the scores of psychological distress, social support, coping style, and perceived stress did not follow the normal distribution, so Spearman's rank correlation analyses were calculated to test the relationships among psychological distress, social support, coping style, and perceived stress. Bootstrap test was conducted to test a mediating effect of coping style or perceived stress in the relation of social support and psychological distress. We evaluated the overall model using the criteria of fit index. According to Schreiber,[49] the Chi-square (χ^2) test value should not be statistically significant ($P > 0.05$), 1< χ^2/ degrees of freedom (df) <3, goodness of fit index (GFI) >0.90, adjusted GFI (AGFI) >0.90, comparative fit index (CFI) ≥0.90, incremental fit index (IFI) >0.90, normed fit index (NFI) >0.90, and root-mean-square error of approximation (RMSEA) <0.05 (with 90% confidence interval [CI]). A *P* value of 0.05 was considered to represent statistical significance (two-tailed).

Results

Demographic characteristics and descriptive statistics

Table 1 presents the demographic characteristics of 441 patients. A total of 315 (71.4%) patients were male. The age of majority of patients was more than 50 years (372 patients, 84.4%). A total of 127 (27.2%) patients graduated from primary school, 180 (40.8%) had junior middle school education, 84 (19.1%) had senior high school education, and 57 (12.9%) held a college degree or higher degree. Most patients did not attend work (198 patients, 44.9%) or retired from work (189 patients, 42.9%). 438 patients (99.3%) were married and 3 (0.7%) were divorced or widowed. 306 patients (69.4%) reside in the urban area. For the household income, 39 (8.8%) patients reported under ¥20,000; 123 (27.9%) made between ¥20,000 and ¥50,000; 192 (43.5%) made between ¥50,000 and ¥100,000; and 87 (19.8%) made more than ¥100,000. 54 (12.2%), 282 (63.9%), and 204 patients (46.3%) have family history, smoking history, and drinking history, respectively. 168 (38.1%) patients underwent surgery. Most patients experienced mild-to-severe pain (258 patients, 58.5%), and most patients were diagnosed at advanced stage (378 patients, 85.7%), which were defined as III and IV stage.

Overall, the median score of psychological distress was 2 with an interquartile range of from 2 to 3. The medium score of social support, coping style, and perceived stress was 66 (61–70), 50 (48–52), and 20 (17–22), respectively. Among 441 lung cancer patients, 78 were detected to have a DT score of 4 or above, with a detection rate of 17.7%.

Relationships between psychological distress, social support, coping style, and perceived stress

Table 2 documents the results of correlation analyses of psychological distress, social support, coping style including confrontation coping, avoidance coping and giving up coping, and perceived stress. The results of the Spearman's rank correlation analyses showed that most variables are significantly correlated with one another other than the correlation between coping style and perceived stress. Moreover, avoidance coping and giving up coping were all not significantly correlated with psychological distress.

Table 1: Characteristics of participants (*n*=441)			
Characteristics	Frequency (%)	Z or χ²	P
Gender			
Male	315 (71.4)	−0.479	0.632
Female	126 (28.6)		
Age (year)			
18-39	12 (2.7)	8.005	0.046
40-49	57 (12.9)		
50-59	141 (32.0)		
≥60	231 (52.4)		
Educational level			
Primary	120 (27.2)	8.891	0.031
Junior high	180 (40.8)		
Senior high	84 (19.1)		
University	57 (12.9)		
Work status			
Not working	198 (44.9)	6.560	0.038
Working	54 (12.2)		
Retired	189 (42.9)		
Marital status			
Married	438 (99.3)	3.798	0.051
Divorced/Widowed	3 (0.7)		
Residence			
Urban	306 (69.4)	−1.240	0.214
Rural	135 (30.6)		
Household income (¥)			
<20,000	39 (8.8)	22.224	<0.001
20,000-50,000	123 (27.9)		
50,000-100,000	192 (43.5)		
>100,000	87 (19.8)		
Family history			
No	387 (87.8)	−2.177	0.029
Yes	54 (12.2)		
Smoking history			
No	159 (36.1)	−0.459	0.646
Yes	282 (63.9)		
Drinking history			
No	237 (53.7)	−2.157	0.031
Yes	204 (46.3)		
Surgery			
No	273 (61.9)	−1.102	0.270
Yes	168 (38.1)		
Pain			
No pain	183 (41.5)	7.323	0.062
Mild	174 (39.5)		
Moderate	81 (18.4)		
Severe	3 (0.06)		
TNM stage			
I	42 (9.5)	62.803	<0.001
II	21 (4.8)		
III	48 (10.9)		
IV	330 (74.8)		
TNM: tumor-node-metastasis			

Table 2: Spearman's correlation coefficient of study variables (*n*=441)							
Variables	1	2	3	4	5	6	7
1. Psychological distress	1						
2. Perceived stress	0.131**	1					
3. Social support	−0.444**	0.110*	1				
4. Coping style	0.113*	0.067	0.096*	1			
5. Confrontation coping	0.134**	0.026	0.152**	0.661**	1		
6. Avoidance coping	0.026	−0.012	0.093*	0.624**	0.121*	1	
7. Giving up coping	−0.002	0.082	−0.118*	0.390**	−0.132**	0.104*	1
*P<0.05, **P<0.01							

Table 3: Decomposition of standardized effects from the path model

| Variable of effect	Social support					Perceived		Confrontation coping
	Confrontation coping	Avoidance coping	Giving up coping	Perceived stress	Psychological distress	Giving up coping	Psychological distress	Psychological distress
Total effects	0.155	0.113	−0.164	0.110	−0.524	0.096	0.192	0.191
Direct effects	0.155	0.113	−0.175	0.110	−0.575	0.096	0.192	0.191
Indirect effects	0.000	0.000	0.011	0.000	0.051	0.000	0.000	0.000
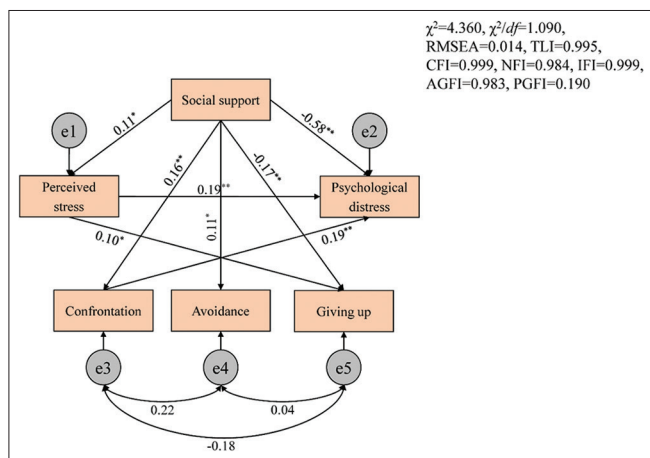
Figure 2: A path diagram of direct and indirect influences of social support, perceived stress and coping style on psychological distress among Chinese lung cancer patients (n = 441). *P < 0.05, **P < 0.01

The mediating effect of coping style and perceived stress on the relationship between social support and psychological distress

SEM with maximum likelihood was used to analyze the path correlations, which are presented in Table 3 and Figure 2. The results showed a better fitness between construct model and the data (χ^2/df = 1.090, GFI = 0.997, AGFI = 0.983, CFI = 0.999, IFI = 0.999, NFI = 0.984, RMSEA = 0.014 [90% CI, 0.000–0.075]).

As illustrated, social support had significant direct effects on psychological distress (β = −0.58, P < 0.001), confrontation coping (β = 0.16, P < 0.001), avoidance coping (β = 0.11, P = 0.02), giving up coping (β = −0.17, P < 0.001), and perceived stress (β = 0.11, P = 0.02) among lung cancer patients. The direct pathways from perceived stress to giving up coping (β = 0.10, P = 0.04) and psychological distress (β = 0.19, P < 0.001) were all statistically significant. Meanwhile, the direct pathway from confrontation coping to psychological distress (β = 0.19, P < 0.001) was also statistically significant. The results of bias-corrected bootstrap method indicated that the indirect pathways between social support and psychological distress through confrontation coping or perceived stress were significant, respectively. The results from bootstrap test for significance of indirect pathways are summarized in Table 4. The results suggested that perceived stress or confrontation coping plays a mediating role in the relationship between social support and psychological distress.

Discussion

Main findings

The aim of the present study is to examine the impact of social support on psychological distress among Chinese lung cancer patients and determine whether coping style and perceived stress mediating the association between social support and psychological distress. The current study stemmed from a fact that the mechanism by which social support influences psychosocial distress among lung cancer patients remains unclear. In our study, only 17.7% of the analyzed patients reported clinically significant psychological distress, which was greatly lower than some previous findings.[10,37] However, there also are some studies found a relatively lower detection rate of psychological distress in Chinese lung cancer patients,[50,51] which were all consistent with our result. After checking the demographic information of all analyzed patients, we found that the vast majority of patients were at advanced stage and thus have greatly low expectation for treatment effectiveness and prognosis, which may be the major reason of causing relatively low detection rate of psychological distress.[37] Certainly, usage of DT for the measurement of psychological distress may be also a potentially important reason because this instrument is not just for cancer patients as a nonspecific type of tool.[37] More important is that most of the enrolled participants received psychological interventions when they were initially hospitalized to ward.[52] Moreover, patients will experience serious stigma when who were diagnosed with advanced lung cancer,[53] and therefore, patients tend to deliberately conceal their psychological distress.[50]

Social support has been identified as a buffering or protective source on distress and psychosocial adjustment.[15] A great deal of studies has established the importance of involving social support sources such as caregivers, spouses, or partners in educational and psychosocial intervention regimes.[54] In the current study, we found a directly negative correlation between social support and psychological distress among Chinese lung cancer patients, which was

Table 4: Bias-corrected bootstrap test for all indirect pathways			
Pathway	Estimate	Bootstrap confidence	*P*
Psychological distress ← social support	−0.575	−0.629-−0.523	0.001
Confrontation copings ← social support	0.155	0.071-0.240	0.005
Perceived stress ← social support	0.046	0.014-0.080	0.021
Psychological distress ← confrontation coping	0.191	0.123-0.262	0.001
Psychological distress ← perceived stress	0.192	0.134-0.258	0.001

consistent with findings from previous studies.[16,55] Studies which were performed to investigate the influencing factors on psychological distress also consistently indicated that social support is one of the most important factors of reducing the severity of psychological distress.[56,57] One study focusing on breast cancer patients also suggested that higher level of social support was in association with higher benefit when a critical threshold of social support was reached.[58] Therefore, professional and nonprofessional social supports should be provided for lung cancer patients for the purpose of buffering the adverse consequences resulted from psychological distress and then improve the QoL.

The coping style is an important person's characteristic strategies to maintain or achieve healthy psychological status through improving environmental adaptability when patients experienced difficulties.[59] Different coping styles including confrontation coping, accommodation coping, and avoidance coping have impact on individual's emotional and mental health status.[23] Evidence indicated that patients with high level of positive attitude may have more expectation and confidence in addressing adverse challenge and vice versa.[60] In the present study, confrontation coping was defined to cope with the stressor positively.[29] We found confrontation coping mediating the relationship between social support and psychological distress, and confrontation coping was also in positive association with psychological distress. Evidence suggested that patients characterized by confrontation coping style were most likely to communicate with their physician for seeking disease- and treatment-related information[20] and then reduce the level of psychological distress. However, a previous systematic review concluded no significant association between engagement coping strategies and psychological distress.[24] These inconsistent results may be resulted from the different structure of psychological distress and coping style measurements, heterogeneity of the sample, or variation in statistical methods. Moreover, the association between negative coping style including avoidance coping and giving up coping (accommodation coping) and psychological distress was not statistically significant, which was also inconsistent with previous findings.[23,24] Thus, further investigation on the relationship between coping style and psychological distress in lung cancer patients should be conducted.

In addition, in this study, we also found that perceived stress partially mediated the relationship between social support and psychological distress, with a positive correlation between perceived stress and psychological distress, which was consistent with previous results.[27,61] Perceived stress will influence the person's psychological adjustment as a positive source of coping diseases, and we therefore assumed that perceived stress will influence psychological distress because psychological distress is a strong predictor of psychological adjustment.[22] Interestingly, a study investigating the relationship among perceived stress, coping style, and psychological distress in Chinese physicians demonstrated our hypothesis.[62] Moreover, Segrin *et al*. also found that stress can predict psychological distress in breast cancer survivors and their family caregivers.[63] Hence, it is critical to emphasize the role of enhancing the level of perceived stress when interpreting the buffering effects of social support on psychological distress. Moreover, psychological intervention programs for involving elements of buffering perceived stress should be developed to enhance the protective effects of social support on psychological distress.

Limitations

Although several valuable findings were identified in the present study, we must acknowledge some limitations which may have adverse impact on the conclusions. First and foremost is that the nature of cross-sectional survey design limits the ability of establishing causality between the proposed variables. And thus, further study with longitudinal design will be necessary to prospectively clear the mechanism of social support in buffering the adverse results from psychological distress. Second, we used convenience sampling method to enroll potentially eligible patients, and thus the sample is not representative. Further investigation with random sampling method should be designed. Third, we assessed psychological distress, social support, coping style, and perceived stress using self-reported questionnaires in the present study. Hence, the results may be inflated due to subjective bias from participants and investigators. Additional studies considering physiological assessment and ecological momentary assessment should be performed.

Conclusions

The minority of Chinese lung cancer patients experienced psychological distress at a clinically significant level. Perceived stress and confrontation coping mediated the protective effects of social support on psychological distress.

Implications for practice

This study enhanced our understanding on the association among social support, coping style, perceived stress, and psychological distress in lung cancer patients. From our current findings, practitioners can enhance the benefits of social support programs through strengthening confrontation coping and perceived stress and then reduce the adverse consequences resulted from psychological distress.

Conflicts of interest

There are no conflicts of interest.

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