



The construction of the structural equation model of burden, benefit finding, and anxiety-depression of esophageal cancer caregivers based on Lazarus stress and coping theory

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Background: A large number of studies have shown that the assignment of long-term care duties brings great pressure and negative emotions to caregivers of cancer patients, and also affects the quality of care. Lazarus and Folkman's stress and coping theory holds that the process of cognition and evaluation of stress is key to the stress response when a stressor acts on individuals. This study is to explore the mediating effect of benefit finding between caregiver burden and anxiety-depression of esophageal cancer caregivers, according to a model hypothesis constructed based on stress and coping theory. The design of this study involved correlation and theoretical testing using a structural equation model.

Methods: A total of 228 pairs of esophageal cancer patients from 2 tertiary hospitals and their family caregivers were recruited in this study from May 2020 to January 2021. A questionnaire survey was conducted using the general information questionnaire, the caregiver burden inventory (CBI), the benefit finding scale (BFS), and the hospital anxiety and depression scale (HADS).

Results: A good fitting model [χ^2 /degrees of freedom (df) = 2.212, root mean square error of approximation (RMSEA) = 0.07, comparative fit index (CFI) = 0.976, Tucker-Lewis index (TLI) = 0.964, goodness of fit (GFI) = 0.954, normed fit index (NFI) = 0.957] indicated the mediating effect of benefit finding between caregiver burden and anxiety-depression of esophageal cancer caregivers. A higher level of benefit finding had a negative effect on caregiver burden and anxiety-depression, which reduced the burden and psychological distress of caregivers. The theoretical hypothesis was validated.

Conclusions: Clinical nurses should pay attention to the benefit finding level of caregivers. For caregivers with low-level of benefit finding, intervention measures should be taken to improve the psychological cognitive level of caregivers, which can ultimately improve the quality of life of patients.

Keywords: Esophageal cancer caregivers; benefit finding; caregiver burden; anxiety-depression; mediating effects

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Introduction

The incidence and mortality of esophageal cancer rank the sixth and fourth highest among malignant cancers, respectively (1). The incidence and mortality of esophageal cancer in China account for more than half of those globally (2). Family caregivers take on the main tasks of caring for cancer patients. A large number of studies have shown that the assignment of long-term care duties brings great pressure and negative emotions to caregivers of cancer patients (3,4), and also affects the quality of care (5,6). Lazarus and Folkman's stress and coping theory (7) holds that the process of cognition and evaluation of stress is key to the stress response when a stressor acts on individuals. A successful response produces positive results, otherwise negative results will be produced. Benefit finding (8) is a cognitive behavior evaluation process in which individuals perceive individual, psychological, social, and spiritual benefits after negative events or trauma. The individuals' positive response, reevaluation, optimistic attitude, social support (9-12), intrusive thinking (12), and social constraints have shown a significant correlation with the positive changes of such individuals. Many studies have found (13-15) that benefit finding was the main influencing factor associated with the burden and anxiety-depression of caregivers. Effective improvement of benefit finding can help caregivers adapt to their role of care, increase their positive mood, and their ability to perform as caregivers. At present, there is no study on the mechanism among the 3 factors in China and internationally. Therefore, this study aimed to: (I) construct a structural equation model of benefit finding, caregiver burden, and anxiety-depression based on stress and coping theory, (II) explore the relationship among the benefit finding, caregiver burden, and the anxiety-depression of caregivers.

We present the following article in accordance with the SURGE reporting checklist (available at <https://dx.doi.org/10.21037/apm-21-1466>).

Methods

Study design

This study was designed as a cross-sectional study. Esophageal cancer patients from 2 tertiary first-class hospitals in the Jiangsu Province and their main caregivers in their families were selected as participants from May 2020 to January 2021. The inclusion criteria were as follows: (I) patients with pathologically confirmed primary

esophageal cancer; (II) the main family caregivers of patients; (III) caregivers with no history of mental disorder and can communicate normally; (IV) caregiving duration ≥ 4 weeks; (V) patients and their caregivers aged 18 years old or older, and willing to voluntarily participate in the study. The exclusion criteria were as follows: (I) caregivers with an employment relationship to the patient; (II) those who had previously participated in another clinical trial. The sample size was calculated through GPower version 3.1.9 as follows: validity of sample size was 95.1%, effect size was 0.3, and significance level was 5% (bilateral) in 134 respondents. In order to ensure the statistical stability of the structural equation model, the sample size was expanded to >200 cases (16). This study adhered to the Helsinki declaration (as revised in 2013), principles of informed consent, security protection, privacy and confidentiality, and fairness and transparency. The study was approved by ethics committees of the 2 hospitals, respectively. The selection and screening process of cases is shown in *Figure 1*.

All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by institutional ethics committee of the Third Affiliated Hospital of Soochow University (2020-CL003-01), Affiliated Hospital of Jiangnan University (LS2020010), and informed consent was taken from all the participants.

Research tools

A general data questionnaire designed by researchers was used to collect patient information (gender, age, disease stages, and payment methods) and that of their caregivers (gender, age, level of education). The modified Chinese version of the benefit finding scale (BFS) (17) was used to measure the level of benefit finding of caregivers. The scale contained 22 items and 5 dimensions: acceptance, family relationship, personal growth, social relations, and health behavior. A 5-point Likert scale method was used [1 point (none) to 5 points (very many)], and the total score range was 22 to 110 points. The higher the score was, the higher the benefit finding level was, and the Cronbach's α coefficient of the scale was 0.93. The Zarit burden interview (ZBI) (18) was conducted, containing 22 items and 2 dimensions: personal burden and responsibility burden, which used a 4-point Likert scale method [0 points (never) to 4 points (always)], A score of more than 21 points was considered no burden or light burden; 21–39 points: medium burden; and 40 points: severe burden. The

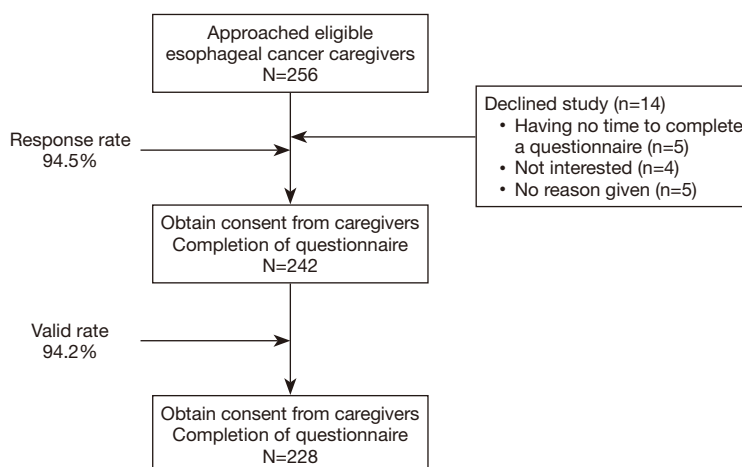


Figure 1 The study flowchart.

Cronbach's α coefficient of ZBI in the Chinese version was 0.86 (19). The hospital anxiety and depression scale (HADS) was used as a reliable tool for screening emotional disorders (20); it included an anxiety and depression subscale, which incorporated 14 items. Each item adopted a 4-point Likert scale (0–3 points), whereby a higher score indicated more serious emotions of anxiety and depression, and the study used 9-point as the cut-off value (21) to judge the anxiety and depression of caregivers.

Reliability and effectiveness

A preliminary study involving 20 respondents was conducted to evaluate reliability and management issues. The results showed that the Cronbach's α coefficient of the questionnaire was acceptable. The Cronbach's α coefficient of BFS in previous studies was 0.93 (17), that of caregiver burden inventory (CBI) was 0.86 (19), and those of anxiety and depression subscale were 0.68–0.93 (average 0.83) and 0.67–0.90 (average 0.82), respectively (22,23). The results of these previous studies confirmed the effectiveness and reliability of the research tools designated to this study.

Data collection

The questionnaire survey method was adopted for data collection. Before the interview, informed consent was provided by all participants, entailing the study purpose, the voluntary nature of participation in the study, and the confidentiality of privacy and anonymous processing of information. All participants completed the questionnaire

within 20 min. The researchers checked the completed questionnaire to evaluate validity of the responses to the questionnaire and eliminate any questionnaires with invalid answers.

Statistical analysis

The software SPSS25.0 (IBM Corp., Armonk, NY, USA) and AMOS 25.0 (IBM Corp.) were used for statistical analysis. For descriptive data, average, standard deviation (SD), frequency, and percentage were used to describe and summarize the demographic characteristics of the study, and the Kolmogorov-Smirnov test was used to test the normal distribution of data. If data (including BFS, CBI, and HADS) did not conform to normal distribution, the median and quartile spacing were used. Spearman's correlation was used to describe the correlation between BFS, CBI, and HADS. The correlation coefficients (r) <0.25, 0.25–0.50, 0.50–0.75, and >0.75 indicated general, medium, good, and excellent, respectively (24).

In order to explore the effect of benefit finding on caregiver burden and anxiety-depression of caregivers, we constructed a structural equation model based on stress and coping theory. Benefit finding was used as the intermediary variable of caregiver burden and anxiety-depression of caregivers. The relationship between the study variables was determined by using maximum likelihood estimation and path analysis. The bootstrap deviation correction method was used to test the 95% confidence interval (CI) for the nonstandard coefficient in order to evaluate the significance of the total effect and the total relationship.

Results

General information of patients with esophageal cancer and their caregivers

There were 228 pairs of patients and their main caregivers in this study. The caregivers were 20–85 years old, with an average age of (60.86±7.44) years; 43 males (18.9%) and 185 females (81.1%); the care time was 1–234 months. The patients were 42–87 years old, with an average age of (67.20±7.44) years old, 198 males (86.8%) and 30 females (13.2%). There were 7 patients in tumor, node, metastasis (TNM) stage I (3.1%), 74 in TNM stage II (32.5%), 85 in stage III (37.3%), and 62 in stage IV (27.2%). Other general information of patients and caregivers is shown in *Table 1*.

The scores of BFS, CBI, and HADS

The total score of BFS was 80 [51–90], and the 5 dimensions were: acceptance, 11 [7–13]; family relationship, 21 [14–24]; personal growth, 27 [19–31]; social relationship, 10 [7–12]; and health behavior, 9 [7–12], respectively. The total score of CBI was 34 [23–41], and the 2 dimensions were: personal burden, 18 [14–24]; and responsibility burden, 8 [5–11]. There were 26 (11.4%) patients with no or light burden, 128 (56.1%) with medium burden, and 74 (32.5%) with heavy burden. The total score of HADS was 18 [10–26], among which anxiety was 9 [5–12], and depression was 8 [5–13]. There were 116 (50.9%) patients with anxiety, 106 (46.5%) with depression, and 107 (46.9%) with both anxiety and depression.

Correlation analysis of benefit finding, caregiver burden, and anxiety-depression of caregivers

As shown in *Table 2*, caregiver burden was negatively correlated with benefit finding. The score of each dimension was positively correlated with anxiety-depression, and negatively correlated with benefit finding.

Mediating effect analysis

Correlation analysis showed that there was a significant correlation among benefit finding, caregiver burden, and anxiety-depression of caregivers. The structural equation model was constructed according to the stress and coping theory, and caregiver burden was taken as the stress source of caregivers. The outcome variable was anxiety-depression, and the mediating variable was benefit finding. As shown

in *Figure 2*. The fitting results of the model: $\chi^2=53.09$, degrees of freedom (df) =24, $P=0.001$, $\chi^2/df=2.212$, root mean square error of approximation (RMSEA) =0.073, comparative fit index (CFI) =0.976, Tucker-Lewis index (TLI) =0.964, goodness of fit (GFI) =0.954, normed fit index (NFI), which indicated that the fitting degree of the model was good. The path from caregiver burden to anxiety-depression ($\gamma=0.42$, SE =0.124, $P<0.001$), the path from caregiver burden to benefit finding ($\gamma=-0.53$, SE =0.098, $P<0.001$), and the path from benefit finding to anxiety-depression ($\gamma=-0.63$, SE =0.126, $P<0.001$). Bootstrap bias correction method was used to test the mediating effect of the model. The results showed that the path coefficient of caregiver burden *vs.* anxiety-depression was 0.40 (95% CI: 0.174 to 0.721), and the path coefficient of benefit finding between caregiver burden and anxiety-depression was 0.32 (95% CI: 0.179 to 0.582). The CI did not include 0. The mediating effect and hypothesis were validated.

Discussion

The effect of caregiver burden on anxiety-depression in esophageal cancer caregivers

In this study, there were 202 (88.6%) esophageal cancer caregivers with medium to severe burden, which was slightly higher than the report of Hu *et al.* (25) on the caregivers of lung cancer patients. This may have been due to the fact that the majority of patients with esophageal cancer were elderly patients, most of them were in the middle and late stage due to their disease characteristics (26). In this study, the caregivers were older, with 63.2% ($n=144$) over 60 years old. In the process of care, the caregivers were prone to lack of strength and fatigue, which led to them experiencing an increased burden. In the process of caring for patients with malignant tumors, the main caregivers of the family usually took on heavy care tasks (27). The long-term care, economic burden caused by repeated treatment, caregiver worry about the disease and prognosis (28), and weakening of social relations led to anxiety-depression. However, the study also found that caregivers who bore the same burden of care did not necessarily experience the same level of anxiety and depression, which indicated that the caregiver burden was restricted by other factors. The results of analysis showed that benefit finding was negatively correlated with the burden and anxiety-depression of caregivers, indicating that the benefit finding of caregivers had an impact on their burden and anxiety-depression.

Table 1 General information of 228 patients with esophageal cancer and their caregivers

Item	n (%)
Caregivers	
Gender	
Male	43 (18.9)
Female	185 (81.1)
Age (year)	
<45	19 (8.3)
45–59	65 (28.5)
≥60	144 (63.2)
Current occupational status	
Yes	64 (28.1)
No	111 (48.7)
Retired	53 (23.2)
Residential area	
Urban	78 (34.2)
Town	150 (65.8)
Relationship between caregivers and patients	
Spouse	183 (80.3)
Children	40 (17.5)
Parent	1 (0.4)
Other	4 (1.8)
Daily care time (hours)	
<6	25 (11.0)
6–12	106 (46.5)
>12	97 (42.5)
Per capita monthly income of family (yuan)	
1,000–3,000	123 (53.9)
3,001–5,000	46 (20.2)
5,001–8,000	40 (17.5)
8,001–10,000	13 (5.7)
>10,000	6 (2.6)
Education	
Primary and junior high schools	174 (76.3)
High school/technical secondary school	23 (10.1)
Junior college or above	31 (13.6)

Table 1 (continued)**Table 1** (continued)

Item	n (%)
Duration of caregiving role (month)	
<6	114 (50)
6–11	35 (15.4)
≥12	79 (34.6)
Chronic disease	
No	118 (51.8)
1	80 (35.1)
2 or more	30 (13.2)
Other	
Caregivers number	
No	136 (59.6)
1	72 (31.6)
2 or more	20 (8.8)
Patients	
Gender	
Male	198 (86.8)
Female	30 (13.2)
Age (year)	
<45	1 (0.4)
45–59	36 (15.8)
≥60	191 (83.8)
Payment method	
Employee medical insurance	77 (33.8)
Resident medical insurance	41 (18.0)
Commercial insurance	6 (2.6)
New rural cooperative medical insurance	103 (45.2)
Own expense	1 (0.4)
Disease staging	
I	7 (3.1)
II	74 (32.5)
III	85 (37.3)
IV	62 (27.2)
Treatment	
Chemotherapy	163 (71.5)
Radiotherapy	23 (10.1)
Chemotherapy + radiotherapy	26 (11.4)
Other	16 (7.0)

Table 2 Correlation analysis of burden, benefit finding, and anxiety-depression of caregivers of patients with esophageal cancer (t, n=228)

	1	2	3	4	5	6	7	8	9	10	11	12
1 Total score of disease benefit	1.000											
2 Acceptance	0.813**	1.000										
3 Family relationship	0.881**	0.719**	1									
4 Personal growth	0.909**	0.674**	0.784**	1								
5 Social relations	0.819**	0.651**	0.680**	0.720**	1							
6 Health behaviors	0.769**	0.625**	0.588**	0.616**	0.671**	1						
7 Total score of caregiver's burden	0.512**	-0.431**	-0.436**	-0.473**	-0.439**	-0.346**	1					
8 Individual burden	-0.324**	-0.240**	-0.267**	-0.303**	-0.316**	-0.197**	0.883**	1				
9 Responsibility burden	-0.455**	-0.399**	-0.388**	-0.433**	-0.316**	-0.352**	0.733**	0.453**	1			
10 Total score of HADS	-0.619**	-0.614**	-0.550**	-0.576**	-0.498**	-0.428**	0.538**	0.384**	0.445**	1		
11 Anxiety	-0.582**	-0.582**	-0.498**	-0.537**	-0.494**	-0.407**	0.442**	0.292**	0.358**	0.876**	1	
12 Depression	-0.560**	-0.525**	-0.506**	-0.523**	-0.410**	-0.378**	0.496**	0.370**	0.447**	0.865**	0.627**	1

**, P<0.01. HADS, hospital anxiety and depression scale.

The effect of caregiver burden on anxiety-depression in caregivers of esophageal cancer patients

Fletcher *et al.*'s experience model of cancer family care (29) showed that the diagnosis and treatment of cancer can initiate the stress response of patients and their families. When stress acted on individuals, the individual response measures and cognitive evaluation behaviors engendered psychological and physical health results, and this cognitive evaluation behavior can be used in the whole treatment. Previous studies (30,31) have shown that the caregivers of cancer patients who had a higher level of benefit finding, had a lower level of anxiety-depression. Through positive cognitive evaluation behavior, the benefits and growth of caregivers were important factors in their response to stressors. In this survey, the majority of caregivers of esophageal cancer patients were spouses of the patient (183/80.3%), and as the continual close companion of the patients, they played an important role in patient recovery (32). When the patients and their spouses were a team coping with stress events, stress perception was mutually influenced (33). A positive response of both spouses helped reduce the load of stress and negative events on individuals. However, caregivers often neglected their own health status because of heavy care tasks; in particular, spouses of elderly patients, who were aged similarly to the patients and had their own chronic diseases, were more likely to experience anxiety and depression (34). Medical staff should approach patients and their spouses as a unified dyad (35), as doing so can help them effectively identify adverse stress reactions, improve their methods of stress cognition, and enhance the caregiver's ability to implement caregiver adaptation and active response.

The mediating effect of benefit finding on caregiver burden and anxiety-depression of caregivers

The results of path analysis of the structural equation model showed that the caregiver's benefit finding contributed a mediating role in the caregiver burden and anxiety-depression of caregivers. This results supported Lazarus' stress and coping theory (7). The theory holds that individuals can initiate self-reliance when responding to stress. Both internal and external response resources should be drawn on to maintain the balance of the internal and external environments, including cognitive evaluation of stress, so as to alleviate and adjust their stress response, produce positive response measures, and maintain the individual's mental and physical health. Previous studies

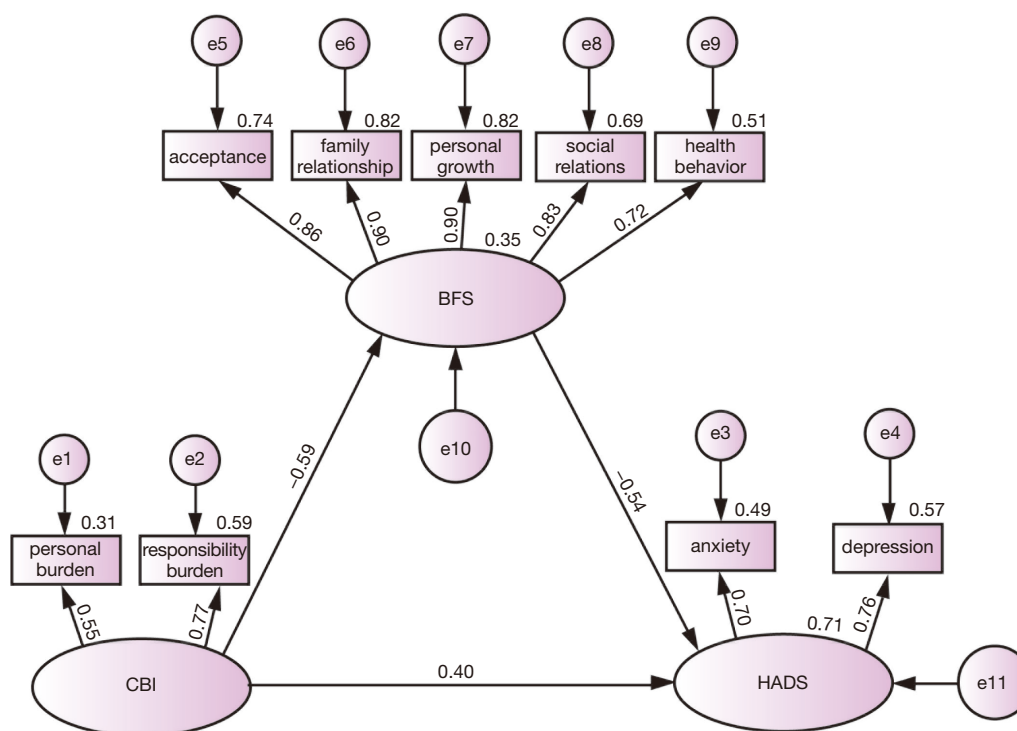


Figure 2 Structural equation model of caregivers' benefit finding. BFS, benefit finding scale; CBI, caregiver burden inventory; HADS, hospital anxiety and depression scale.

(30,36) have shown that, as an individual cognitive evaluation strategy, benefit finding played an active role in the process of response to diseases among family caregivers of cancer patients, such as orderly arrangement of family life, positive self-discovery, and enhancement of family relations (37). Positive cognitive state can affect the individual's mental state and behavior, help them face difficulties calmly, reduce their bad psychological state, improve the caregiver's adaptation to the role of care (38), and thus improve the patient's disease treatment and rehabilitation. Therefore, the results of this study suggested that caregivers should be targeted to improve their psychological cognitive level and positive response strategies. At present, international interventions on benefit finding mainly involved cognitive behavioral therapy (39), brief writing intervention (40), and web-based meaning-centered psychotherapy (41). At present, the benefit finding intervention of Chinese control patients is still in the initial stage. In the future research, we should pay attention to the intervention of benefit finding, so as to reduce the caregiver's anxiety-depression, improve the quality of care for patients.

The limitations of this study

There were some limitations to this study. Firstly, the study implemented a cross-sectional design, only the independent time point data were collected, and the data of caregivers in different treatment and care stages could not be evaluated. In the later stage, a longitudinal research design could be introduced to show the trend of caregiver benefit finding with the course of time. Secondly, the factors associated with psychological problems of caregivers included in this study were limited; later research was conducted, and it was suggested that the relevant factors of anxiety-depression should be discussed comprehensively based on the theoretical framework, which can provide the basis for effective intervention measures.

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Footnote

Reporting Checklist: The authors have completed the SURGE reporting checklist. Available at <https://dx.doi.org/10.21037/apm-21-1466>

Data Sharing Statement: Available at <https://dx.doi.org/10.21037/apm-21-1466>

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://dx.doi.org/10.21037/apm-21-1466>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by institutional ethics committee of the Third Affiliated Hospital of Soochow University (2020-CL003-01), Affiliated Hospital of Jiangnan University (LS2020010), and informed consent was taken from all the participants.

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