

Original Article

Benefit-finding profiles and comparison of caregiving ability among informal caregivers of patients with lung cancer: A latent profile analysis

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ABSTRACT

Objective: This study aimed to explore the benefit finding (BF) profiles among informal caregivers of patients with lung cancer, identify demographic and disease characteristics, and analyze differences in caregiving ability between profiles.

Methods: This cross-sectional study utilized convenience sampling to select 272 informal caregivers of patients with lung cancer from a tertiary care hospital in Guangzhou, China. The research instruments used included the Demographic and Disease Characteristics Questionnaire, the revised version of the BF Scale, and the Chinese version of the Family Caregiver Task Inventory. Data analysis was performed using latent profile analysis, chi-square test, Fisher's exact probability test, Kruskal–Wallis test, and multivariate logistic regression.

Results: (1) BF can be divided into three profiles: “high benefit—family and personal growth” (Profile 1, 7.7%), “moderate benefit—unclear perception” (Profile 2, 44.9%), and “low benefit—coping ability deficient” (Profile 3, 47.4%). (2) Having a cocaregiver and a disease duration of 6–12 months were more likely to belong to Profile 1; caregivers of patients aged 40–60 years tended to belong to Profile 2; caregivers of older patients with disease duration > 12 months and clinical stage II or III were more likely to belong to Profile 3. (3) There were significant differences in the total score of caregiving ability and the scores of each dimension among the different BF profiles ($P < 0.001$), and the caregiving abilities of Profile 1 and Profile 2 were higher than those of Profile 3.

Conclusions: There was heterogeneity in BF among informal caregivers of patients with lung cancer. Healthcare professionals can identify the key profiles of lung-cancer caregivers based on characteristics such as age, clinical stage, disease duration, and cocaregiver status and enhance their caregiving ability through targeted nursing guidance.

Introduction

According to the 2020 Global Cancer Report,¹ the number of new cases and loss of life from lung cancer in China reached 816,000 and 715,000, respectively, with the incidence and mortality rates ranking first in the world.² Lung cancer's early symptoms are difficult to detect and develop rapidly. As the disease progresses, a patient's health condition gradually deteriorates,³ and the accompanying clinical symptoms significantly affect their daily activities.⁴ In severe cases, the patients cannot take care of themselves and require assistance from caregivers. The emergence of new treatment methods has extended the survival period of lung cancer patients,² and the resulting care needs have gradually increased.⁵ However, currently, the caregiving abilities of caregivers are not optimistic. They lack insight into the patient's condition and cannot meet the disease needs during the caregiving process.⁶

Additionally, their coping strategies and abilities are deficient.⁷ Therefore, addressing the imperative need to enhance the quality of care provided by informal caregivers has become a critical concern.

Informal caregivers are individuals or family members, such as patients' relatives or close friends, who have not received professional training and are usually unpaid.⁸ As an important supportive force in lung cancer care, caregivers go through the entire process of patient diagnosis, obtaining treatment information,⁹ integrating treatment resources, and undertaking tasks, such as daily care and participation in disease decision-making.¹⁰ Previous studies have found that informal caregivers face a heavy caregiving burden,⁶ which not only affects their physical health¹¹ but can also generate a range of negative emotions as caregiving stress accumulates, leading to a decline in well-being.¹² Recently, researchers tended to focus on negative emotions such as anxiety, depression,¹³ and post-traumatic stress symptoms.¹⁴ Excessive

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attention from researchers on negative emotions and repeated activation of negative emotional recall in caregivers may worsen their negative cognition and emotions, potentially deepening their distress.

As an important component of positive psychology, “benefit finding” (BF) refers to the internal support and external strength that caregivers experience during the caregiving process, which leads to a sense of achievement and positive meaning.¹⁵ Some studies have noted that caregivers with high levels of BF experience fewer negative emotional experiences and that a positive psychological state can enhance their caregiving ability.¹⁶ According to the research findings,^{17,18} caregivers with proficient caregiving abilities play a crucial role in enhancing patients' overall wellbeing. These caregivers actively engage in assisting patients with daily activities, implementing dietary management, and effectively managing symptoms, all of which contribute to improving patients' quality of life. Furthermore, they provide essential emotional support, alleviating the pain and fear associated with the illness, while also bolstering patients' adherence to treatment plans and facilitating a more favorable disease progression trajectory. However, there is limited research on the relationship between BF and caregiving ability among informal caregivers of patients with lung cancer.

Currently, most existing studies^{19,20} assess the level of BF using a total score on a BF scale. However, in real-world settings, there may be instances where individuals with different life experiences and characteristics score lower on several dimensions, while still obtaining a higher total score on the BF scale. This phenomenon can potentially mask the specificity of different research participants across various dimensions and items. Latent profile analysis can effectively divide a large heterogeneous population into clusters with similar characteristics,²¹ centered on individual informal caregivers of patients with lung cancer, and sufficiently explore the characteristics of these clusters and their differences in caregiving ability.

Therefore, this study aimed to (1) explore the BF profiles among informal caregivers of patients with lung cancer from an individual-centered perspective, (2) identify the demographic and disease characteristics of different BF profiles, and (3) investigate the differences in caregiving ability among BF profiles.

Methods

Study design and participants

This cross-sectional study used convenience sampling to select informal caregivers of patients with lung cancer who visited the oncology and thoracic surgery departments of a tertiary hospital in Guangzhou, Guangdong Province, China, from January 2023 to September 2023.

Inclusion criterion for patients were as follows: a diagnosis of lung cancer by pathological or cytological examination. Inclusion criteria for informal caregivers were as follows: patients' family members (spouses, parents, children, etc.); aged ≥ 18 years, conscious, and have the ability to read and comprehend questionnaire items in Chinese.

Exclusion criteria for patients were as follows: History of mental illness or hearing disorders. Exclusion criteria for informal caregivers were as follows: a history of mental illness or hearing disorders; experienced major stressful events (divorce, bereavement, etc.) over the past three months; and received caregiving remuneration.

Sample size estimation^{22,23} was performed using G*power software with the following parameters: effect size = 0.3, significance level $\alpha = 0.05$, Power = 95%, and degree of freedom = 5. The sample size was calculated as 220. Considering a 20% loss to follow-up and invalid response rate, 264 cases were required. In total, 272 participants were included in this study.

Research instruments

Demographic and disease characterization questionnaire

The demographic questionnaire included patient and caregiver information such as age, gender, literacy level, and cumulative caregiving

hours (months). The patient disease questionnaire included the time of diagnosis (months) and clinical stage.

Revised version of BF scale

Bian²⁴ revised the Chinese version of the BF scale, which contains 22 items in five dimensions: acceptance (items 1–3), family relationships (items 4–9), personal growth (items 10–16), social relationships (items 17–19), and health behaviors (items 20–22). The scale was categorized into five levels, ranging from “not at all” to “very much,” depending on the perceived benefit level. The scale demonstrated good reliability and validity, with a Cronbach's α coefficient of 0.933. In this study, the Cronbach's α coefficient was 0.938.

Family Caregiver Task Inventory

The Family Caregiver Task Inventory (FCTI) was developed by Clark²⁵ in 1983 and was translated into Chinese by Lee.²⁶ This scale assesses the family caregivers' perceptions of the degree of difficulty in performing caregiving tasks. It consists of 25 items, with a total score ranging from 0 to 50. A value of 0 to 2 is assigned according to the degree of difficulty from “not difficult” to “extremely difficult.” Higher scores indicate that the caregiver's task is more difficult and that the caregiver's ability to provide care is lower. The scale exhibited good reliability and validity, with a Cronbach's α coefficient of 0.933. In this study, the Cronbach's α coefficient was 0.868.

Data analysis

SPSS 26.0 and Mplus 7.0 software were used for data analysis. Metric data were expressed as mean \pm standard deviation or median (quartile), and count data were expressed as frequency/percentage.

Mplus 7.0 software was used to explore the latent BF profiles among the informal caregivers of patients with lung cancer. Starting from the initial model (assuming one latent profile), the number of profiles was sequentially increased and the fitting evaluation indicators included the following: (1) log-likelihood ratio, Akaike information criterion (AIC), Bayesian information criterion,²⁷ and sample-corrected Bayesian information criterion—the smaller the three indicators, the better the model fit; (2) information entropy, with a value between 0 and 1—a value closer to 1 indicated a more accurate classification; and (3) Lo–Mendell–Rubin likelihood ratio test (LMRT) and bootstrap likelihood ratio test, with $P < 0.05$, indicating that the k model was better than the k-1 model. Based on these indicators, the best model was identified by comparing the models with each other.²⁸

To explore the BF profile characteristics among informal caregivers, demographic and disease characteristics were used as independent variables, and BF profiles were used as dependent variables for statistical analysis. Regarding the unordered categorical data, the chi-square test or Fisher's exact probability method was used. Regarding the ordered categorical data, the Kruskal–Wallis test was used. Significant variables were included in the multiple logistic regression analysis.

To explore the relationship between BF profiles and caregiving ability, each profile was used as an independent variable, and the total score and scores for each dimension of caregiving ability were used as dependent variables for the single-factor analysis. A P value of < 0.05 was considered statistically significant.

Results

We distributed 296 questionnaires, excluding 24 invalid questionnaires owing to missing entries, and obtained 272 valid questionnaires, with a questionnaire validity rate of 91.9%.

Characterization

Regarding patient and disease characteristics, 186 (68.4%) patients were male, and 86 (31.6%) were female, with an average age of

(59.29 ± 11.14) years. Among these, 67 (24.6%) were newly diagnosed with lung cancer, and 210 (77.2%) had already developed lung cancer metastasis. Most patients had a disease duration of less than three months ($n = 108, 39.7\%$) or more than one year ($n = 99, 36.4\%$). The shortest disease duration was one week, and the longest disease duration exceeded seven years. Most patients were in clinical stage III ($n = 72, 26.5\%$) or IV ($n = 108, 39.7\%$).

Regarding caregiver characteristics, most caregivers were the spouses ($n = 122, 44.9\%$) or children ($n = 112, 41.2\%$) of the patients. Of the caregivers, 122 (44.9%) had a caregiving role for less than three months and 92 (33.8%) for one year or longer.

BF and caregiving ability scores

The caregiver's BF score for lung cancer patients was 73.10 ± 19.30 . Among the five dimensions, the personal growth dimension had the highest score (23.96 ± 6.86), and the acceptance dimension had the lowest score (8.94 ± 3.00). Family caregivers' caregiving competence had a mean score of 10 (interquartile range: 11.5).

Latent profile analysis results

Establishment of the latent profiles model

We fit one to five latent profile models (Table 1). The results showed that the Akaike information criterion, Bayesian information criterion, and sample-corrected Bayesian information criterion reached their minimum values in the five profiles. However, the *P*-values for LMRT were not significant when four and five profiles were retained. When comparing three profiles to two profiles, the LMRT and bootstrap likelihood ratio test tests indicated significant differences ($P < 0.05$). In addition, when the three profiles were retained, the entropy value was maximized at 0.98, indicating a high level of model fit. Based on the model-fit results and clinical interpretability, we selected the model with

Table 1
Fit indices of latent profile models.

Model	AIC	BIC	aBIC	Entropy	LMRT	BLRT	Latent profile probability
1	6813.77	6893.10	6823.35	–	–	–	1
2	5352.03	5514.29	5371.61	0.97	< 0.001	< 0.001	0.489/0.511
3	5032.20	5277.39	5061.78	0.98	0.028	< 0.001	0.077/0.449/0.474
4	4900.07	5228.20	4939.67	0.94	0.043	< 0.001	0.070/0.147/0.346/0.437
5	4825.42	5236.48	4875.01	0.94	0.232	< 0.001	0.202/0.132/0.070/0.151/0.445

AIC, Akaike information criterion; aBIC, adjusted Bayesian information criterion; BIC, Bayesian information criterion; BLRT, bootstrap likelihood ratio test; LMRT, Lo–Mendell–Rubin likelihood ratio test.

three profiles as the best-fitting model. The probability of correct profiles of lung cancer caregivers into their respective profiles ranged from 97.4% to 99%, further validating the reliability of the 3-profile model.

Naming of each latent profile

Based on the potential profiles, the response probabilities of the three profiles for the 22 items were obtained (Fig. 1). According to the characteristics of the response probability of each profile, C1–C3 were named separately. The proportion of the C3 profile was 47.4%, particularly for items six “I know that everyone has a goal in life,” 16 “Helps me organize my time better,” 17 “Gets more friends during caregiving,” 20 “Made me eat healthier,” and 22 “Made me have a healthier lifestyle” were the lowest, this indicated that this profile had difficulty adjusting their emotions and promoting behavioral changes when facing and dealing with the caregiving process’ challenges. Therefore, it was named the “low benefit—coping-ability-deficient” profile.

The response probability of the C2 profile for each item was between those of C1 and C3. However, this profile had a fluctuating period for all dimensions except the acceptance dimension, indicating that this profile was still in the process of adjusting to and recovering from their family member's illness and was therefore named “moderate benefit—perception unclear.”

C1 had a higher probability of responding to all items, particularly to items 7, 11, 12, 20, and 22, which indicated that this profile was confident and resilient, had strong willpower to overcome adversity, and could persevere in the face of difficulties and challenges and benefit from them; consequently, this profile was named “high benefit—family personal growth.”

Demographic and disease characteristics of profiles

We conducted a single-factor analysis using chi-square tests, Fisher's exact probability test, and Kruskal–Wallis tests to examine the

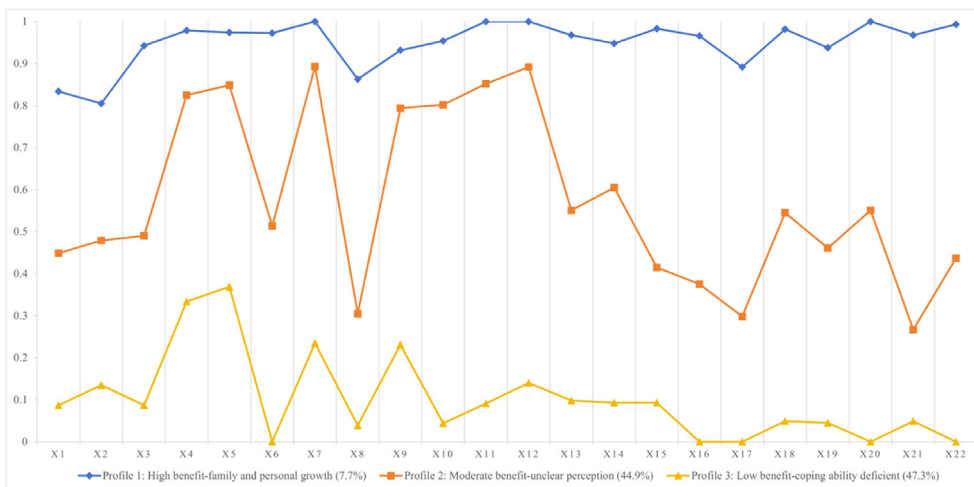


Fig. 1. Response rate of the three profiles across the 22 items.

differences among the different profiles of informal caregivers of lung cancer patients. The results revealed significant variations in patient age, patient marital status, healthcare cost payment method, duration of disease diagnosis (months), clinical stage, relationship with the patient, duration of caregiving (months), and presence of cocaregivers ($P < 0.05$, Tables 2 and 3).

To further investigate these differences, we performed a multivariate logistic regression analysis (Fig. 2). Having a cocaregiver and a disease duration of 6–12 months (odds ratio [OR] = 3.62, $P = 0.009$ and OR = 2.60, $P = 0.043$, respectively) were more likely to belong to profile 1; caregivers of patients aged 40–60 years (OR = 2.33, $P = 0.011$) tended to belong to profile 2; caregivers of older patients with a disease duration of > 12 months and clinical stage II (OR = 0.4, $P = 0.033$) or III (OR = 0.14, $P = 0.028$) were more likely to belong to profile 3.

Differences in caregiving ability among profiles

As caregiving ability was skewed, the Kruskal–Wallis test was used. The results indicated that the three BF profiles among informal caregivers had significant differences regarding the total score and scores for each dimension of caregiving ability ($P < 0.001$). Fig. 3 presents the score distributions.

Multiple comparisons revealed (see Fig. 4) that there was no significant difference between “high benefit—family and personal growth” and “moderate benefit—unclear perception.” However, there were significant differences between “high benefit—family and personal growth” and “low benefit—coping ability deficient,” as well as between “moderate benefit—unclear perception” and “low benefit—coping ability deficient” ($P < 0.001$). Moreover, except for dimension two, the caregiving ability scores of the “low benefit—coping ability deficient” were higher than those of the “high benefit—family and personal growth” and

Table 2
Demographic characteristics and differences between BF profiles.

Variables	BF profiles n (%)			Value	P-value
	1 (n = 21)	2 (n = 122)	3 (n = 129)		
Patient					
Gender				1.92 ^c	0.383
Male	17 (81.0)	84 (68.9)	85 (65.9)		
Female	4 (19.0)	38 (31.1)	44 (34.1)		
Age, years				10.05 ^b	0.040
< 40	1 (4.8)	6 (4.9)	9 (7.0)		
40–59	8 (38.1)	68 (55.7)	47 (36.4)		
≥ 60	12 (57.1)	48 (39.3)	73 (56.6)		
Educational level				0.60 ^b	0.742
Under elementary school	6 (28.6)	40 (32.8)	44 (34.1)		
Junior high school	8 (38.1)	53 (43.4)	53 (41.1)		
High school or vocational school	3 (14.3)	10 (8.2)	14 (10.9)		
College or above	4 (19.0)	19 (15.6)	18 (14.0)		
Caregiver					
Gender				4.05 ^c	0.132
Male	7 (33.3)	51 (41.8)	67 (51.9)		
Female	14 (66.7)	71 (58.2)	62 (48.1)		
Age, years				3.12 ^b	0.540
< 40	9 (42.9)	43 (35.2)	52 (40.3)		
40–59	8 (38.1)	58 (47.5)	63 (48.8)		
≥ 60	4 (19.0)	21 (17.3)	14 (10.9)		
Employment status				1.67 ^a	0.797
Employed	11 (52.4)	64 (52.5)	72 (55.8)		
Retired	4 (19.0)	31 (25.4)	25 (19.4)		
Unemployed	6 (28.6)	27 (22.1)	32 (24.8)		
Education level				0.16 ^b	0.922
Under elementary school	4 (19.0)	16 (13.1)	13 (10.1)		
Junior high school	5 (23.8)	43 (35.2)	42 (32.6)		
High school or vocational school	4 (19.0)	24 (19.7)	38 (29.5)		
College or above	8 (38.1)	39 (32.0)	36 (27.9)		
Monthly household income, RMB				0.50 ^b	0.777
< 2000	3 (14.3)	20 (16.4)	21 (16.3)		
2000–3999	4 (19.0)	27 (22.1)	27 (20.9)		
4000–5999	10 (47.6)	39 (32.0)	36 (27.9)		
≥ 6000	4 (19.0)	36 (29.5)	45 (34.9)		
Relationship with patient				17.41 ^a	0.008
Spouse	8 (38.1)	68 (55.7)	46 (35.7)		
Children	9 (42.9)	38 (31.1)	65 (50.4)		
Parents	0	9 (7.4)	9 (7.0)		
Others	4 (19.0)	7 (5.7)	9 (7.0)		
Duration of care (in months)				15.46 ^b	0.017
< 3	6 (28.6)	48 (39.3)	68 (52.7)		
3–5.9	4 (19.0)	5 (4.1)	9 (7.0)		
6–11.9	4 (19.0)	24 (19.7)	12 (9.3)		
≥ 12	7 (33.3)	45 (36.9)	40 (31.0)		
Cocaregiver				7.12 ^c	0.028
None	2 (9.5)	43 (35.2)	51 (39.5)		
Present	19 (90.5)	79 (64.8)	78 (60.5)		

BF, benefit finding.

^a Chi-square value.

^b H-value.

^c Fisher's exact probability test.

Table 3
Disease characteristics of patients and differences in each profile.

Variables	BF profiles n (%)			Value	P-Value
	1 (n = 21)	2 (n = 122)	3 (n = 129)		
Medical Expense payment method				14.88 ^a	0.013
Public expense	6 (28.6)	11 (9.0)	4 (3.1)		
Medical insurance	10 (47.6)	74 (60.7)	82 (63.6)		
New rural cooperative medical scheme	4 (19.0)	33 (27.0)	40 (31.0)		
Self-pay	1 (4.8)	4 (3.3)	3 (2.3)		
First-time treatment				0.40 ^c	0.846
Yes	4 (19.0)	31 (25.4)	32 (24.8)		
No	17 (81.0)	91 (74.6)	97 (75.2)		
Metastasis				4.69 ^a	0.096
Yes	19 (90.5)	98 (80.3)	93 (72.1)		
No	2 (9.5)	24 (19.7)	36 (27.9)		
Duration since diagnosis (in months)				12.98 ^b	0.034
< 3	5 (23.8)	44 (36.1)	59 (45.7)		
3–5.99	3 (14.3)	8 (6.6)	14 (10.9)		
6–11.99	6 (28.6)	23 (18.9)	11 (8.5)		
≥ 12	7 (33.3)	47 (38.5)	45 (34.9)		
Clinical stage				8.55 ^b	0.014
I	3 (14.3)	23 (18.9)	20 (15.5)		
II	0	13 (10.7)	33 (25.6)		
III	3 (14.3)	36 (29.5)	33 (25.6)		
IV	15 (71.4)	50 (41.0)	43 (33.3)		
Treatment method				0.03 ^b	0.983
One	9 (42.9)	47 (38.5)	44 (34.1)		
Two	6 (28.6)	42 (34.4)	58 (45.0)		
More than two	6 (28.6)	33 (27.0)	27 (20.9)		

BF, benefit finding.

^a Chi-square value.

^b H-value.

^c Fisher's exact probability test.

the “moderate benefit—unclear perception,” indicating that informal caregivers with low BF experienced more caregiving difficulties and had lower caregiving ability (Fig. 3).

Discussion

Identification of three BF profiles

BF accompanies every stage of the disease process, and even relatives who experience high levels of pain may experience positive experiences.²⁹ However, there are differences in the dimensions or specific content of individual perceptions of disease benefits. This study focused on informal caregivers of patients with lung cancer and categorized BF into three profiles.

The “high benefit—family and personal growth” (22 participants, 7.7%) was the least represented among the three subtypes. A previous study on 229 caregivers of children with imperforate anus showed that only 4.8% belonged to the high-benefit group.³⁰ However, a study on informal caregivers of older adults in America indicated that the high-benefit group was larger, accounting for more than 30% of the participants.³¹ The difference in the number of individuals attributed to the high-benefit group was large among different studies and accounted for only 7.7% in this study. The reason for this may be related to the differences in economic development and social welfare between China and Western countries as well as the psychological impact of different disease profiles on caregivers. Lung cancer is insidious in onset and is often discovered in the middle and late stages of the disease,³ making it difficult for caregivers to accept the reality. This indirectly indicates that lung cancer causes significant trauma to caregivers and families; therefore, fewer individuals belong to this profile. However, the overall BF level in this profile was relatively high, particularly regarding the family relationships and personal growth dimensions, indicating that after a family member falls ill, caregivers pay more attention to maintaining emotional connections with the patient and other relatives and maintaining family cohesion. Simultaneously, by inwardly reflecting on and

cultivating their care, patience, and sense of responsibility, they provide patients with higher-quality care services.

It is noteworthy that the “moderate benefit—unclear perception” profile had stable responses in the acceptance dimension, whereas the other four dimensions were in a fluctuating period, indicating that there were significant differences in individual characteristics and interest among this profile. The family relationship and personal growth dimensions were in a period of great fluctuation, which may have been related to the changes in family structure and personal-role conflicts found by Kokorelias.³² This study found that most patients with lung cancer were male and were usually the mainstay of their families. The disease caused a reduction in family income and a restructuring of the family structure. Most informal caregivers were female, and they may be responsible for household chores and taking care of the family's needs. Household chores and the need to readjust to their roles as caregivers posed challenges to their personal growth. Studies have shown that the caregiving process significantly reduces the entertainment time of informal caregivers, resulting in social restrictions, excessive caregiving pressure, an increase in negative emotions, and a decrease in the frequency of healthy behaviors.³³ These factors lead to large fluctuations in the social relationships and health behavior dimensions. Medical staff should guide patients with lung cancer and caregivers to actively participate in patient communication groups and increase their access to social resources. Simultaneously, encouraging a family-centered binary coping style, paying attention to physical exercise, dietary guidance, and so on, allows caregivers to adapt to the caregiver role, strengthens the power of the care experience, enhances the level of benefit for this population, and develops high-level benefits.

The “low benefit—coping ability deficient” category generally scored low on all dimensions, indicating that they had difficulty in dealing with difficulties and obstacles in the caregiving process. The reason for this may be that approximately 40% of the patients in this study were diagnosed with lung cancer less than three months prior, which was the beginning of a traumatic event. Caregivers still avoided reality, and the diagnosis of cancer disrupted the family and caregiver's lives. Caregivers'

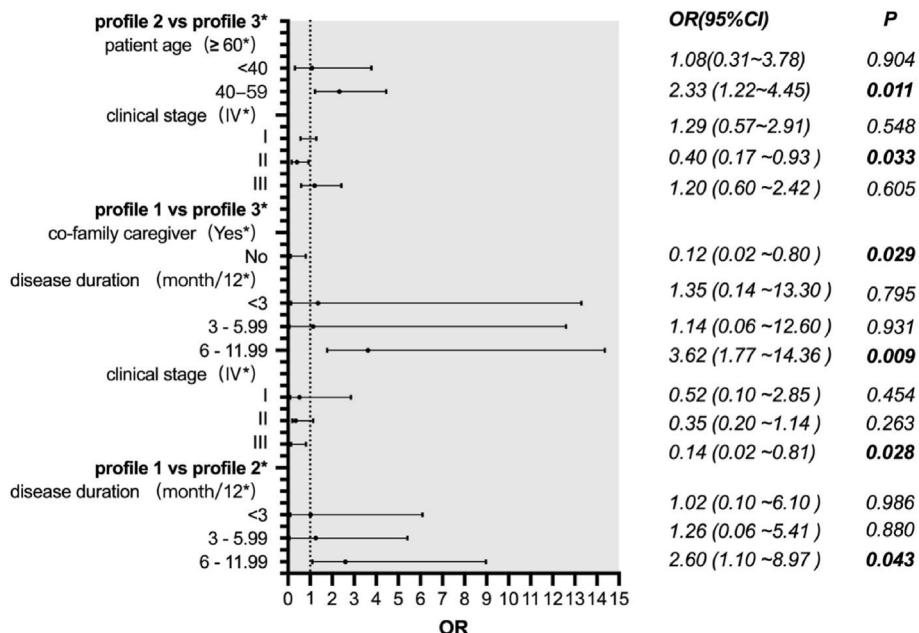


Fig. 2. Profiles' predictive factors. Note: * Denotes the reference category; profile 1 (high benefit–family and personal growth), profile 2 (moderate benefit–unclear perception), profile 3 (low benefit–coping ability deficient), OR (Odds Ratio), 95% CI (Confidence Interval).

level of preparedness for care is generally low,³³ and they may face emotional distress and psychological burdens such as worsening patient conditions and poor treatment effects, which may hinder the generation of positive emotions.³⁴ A scoping review³⁵ revealed that unmet information needs regarding the disease can lead to caregiver distress, anxiety, and depression, highlighting the importance for healthcare providers to offer information support to caregivers. This support should include providing information on the possibility of lung cancer recurrence, interpretation of blood-test results, treatment side-effects, and dietary nutrition to meet their information needs.³⁶ This helps caregivers understand the natural progression of the disease, reduce fear and uncertainty about disease recurrence, alleviate concerns about treatment outcomes, and mitigate anxiety and stress resulting from excessive worry about the disease's progression, thus reducing emotional burden in caregiving.³⁷ Furthermore, research³⁸ indicates that caregivers' adoption of appropriate coping strategies enhances their caregiving abilities. Healthcare professionals can provide guidance on problem-focused coping strategies tailored to caregivers, teaching them skills to identify and manage complications.³⁸ This not only improves their caregiving abilities but also enhances their self-efficacy in the caregiving process, leading to increased BF.³⁹ Additionally, personalized guidance based on caregivers' individual strengths can help them adapt to suitable

caregiving roles. For example, caregivers with higher education levels can be involved in treatment decisions, whereas unemployed spouses can provide daily life care, alleviating the burden of multiple caregiving tasks and effectively addressing challenges in the caregiving process.⁴⁰

Demographic and disease characteristics of BF profiles

The older the patient, the more likely the caregiver is to be categorized as “low benefit–coping ability deficient”

Lechner⁴¹ found that the older the patient, the lower the level of perceived benefit, Chinese scholars found that the patients of colorectal cancer aged 50 and above have lower levels of perceived benefits.⁴² Our study further revealed that the patient's age was closely related to the caregiver's BF level. Patients aged 40–60 were more likely to have caregivers who belong to the “moderate benefit–unclear perception” category. This may be because individuals aged 40–60 are still at the peak of their family and career lives, and their caregivers have higher psychological resilience and emotional regulation abilities. Conversely, older patients may have a shorter survival time and more uncertainty regarding whether they will receive optimal treatment in the future. Most informal caregivers are patients' spouses who also face declining physical function, are unable to accurately identify and observe changes in

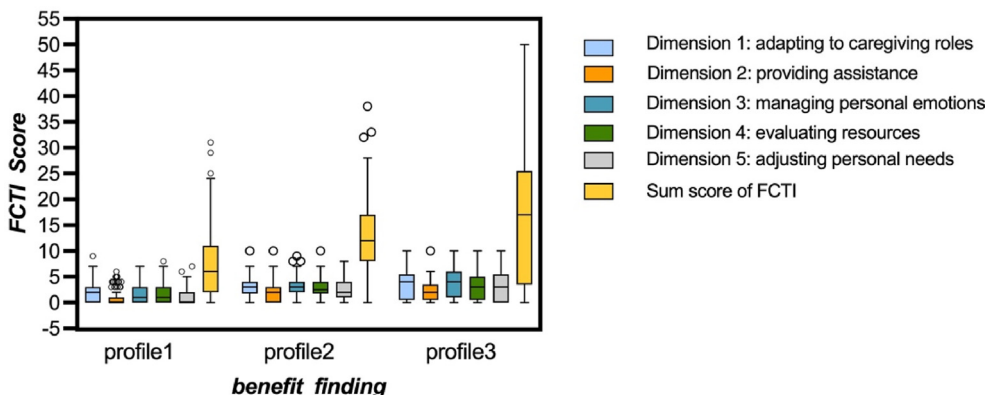


Fig. 3. Comparison of caregiving ability scores and each dimension. FCTI, Family Caregiver Task Inventory.

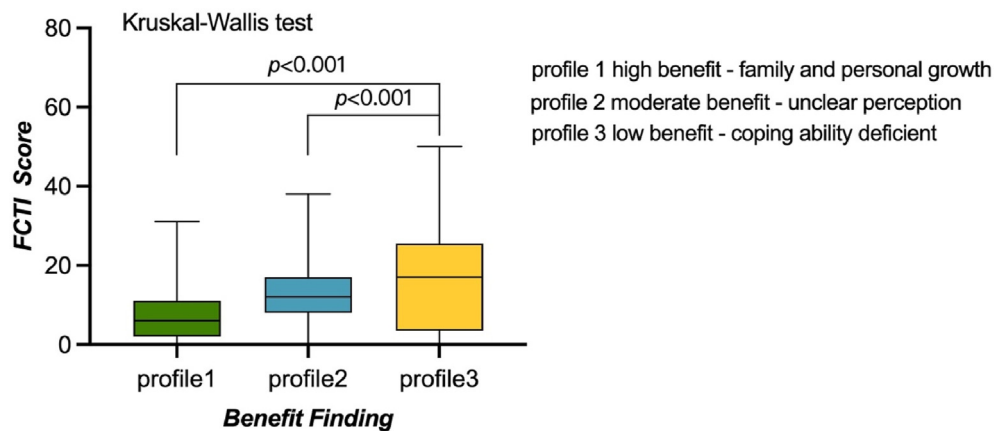


Fig. 4. Multiple comparisons of BF profiles on total caregiving ability score. BF, benefit finding; FCTI, Family Caregiver Task Inventory.

patients' conditions, lack coping skills, and, consequently, perceive fewer benefits.³⁴ Therefore, healthcare professionals should pay more attention to the coping abilities of caregivers of older adults. They can demonstrate the correct care techniques and operating procedures by recording operation videos, situational simulations, and demonstrations to enable caregivers to intuitively understand how to provide care, master better care skills, and enhance care confidence.⁴³

Clinical stages II and III are more likely to be categorized as "low benefit—coping ability deficient"

Previous studies suggested that the perceived benefit level is related to disease progression and increases along a curve. The level of perceived benefit for diseases in stage II was higher than that in stages I and IV.⁴¹ A psychological status evaluation of 254 breast cancer survivors found that the higher the clinical stage, the less perceived benefit female patients had.¹¹ A systematic review noted that the relationship between the clinical stage and BF requires further discussion due to different cultural backgrounds.⁴⁴ The reason for this result in our study may be that patients in stages II and III of the disease experienced more invasive and comprehensive treatments, as well as various complications. This requires caregivers to identify various care scenarios and provide meticulous care. It also places higher demands on the caregivers' care abilities. Healthcare professionals can strengthen caregivers' caregiving roles through training and learning to enhance their care skills, increase their professional knowledge regarding the disease, and make them perceive their value.

Patients diagnosed more than 12 months prior were more likely to be categorized as "moderate benefit—unclear perception" and "low benefit—coping ability deficient"

Patients diagnosed between 6 and 12 months were more likely to have caregivers who belonged to the "high benefit—family personal growth." There is no consensus among scholars regarding the relationship between the time of diagnosis and BF. As caregiving time increased, long-term caregivers felt more burdened by caregiving than by the benefit from it.³⁰ A longitudinal study of patients with multiple sclerosis found that the level of BF was positively correlated with diagnosis time⁴⁵; that is, the longer the diagnosis time, the higher the BF level. Cassidy found that caregiver benefit perception has two peaks: one at 7–12 months and the other at 13–24 months.⁴⁶ This coincides with this study, which indicated that caregiver benefit perception was a dynamic-process variable that exhibits wave-like developmental characteristics; another study also reached the same conclusion.⁴⁷ In the early stages of lung cancer diagnosis, caregivers experience pressure due to poor adaptation to their caregiving role, resulting in low perceived benefits. After a buffering period, new treatments, such as immunotherapy and targeted therapy, are combined to control patients' symptoms, and caregivers

experience a perceived benefit peak. As the disease progresses, patients experience more complex nursing needs. The longer the care time, the more difficult it was for caregivers to cope with their care needs, which resulted in more negative evaluations.

Cocaregivers are more likely to fall into the "high benefit—family personal growth" category

Having multiple caregivers implies that multiple individuals are involved in the care of patients with lung cancer. A survey of parents of children with acute lymphoblastic leukemia showed that caregivers benefited from sharing the burden of care since it reduces the burden and pressure on individual caregivers.⁴⁸ Additionally, caregivers can cooperate and coordinate with each other, share information and knowledge, provide opportunities for emotional release and support, and jointly deal with obstacles and difficulties during the care process. This cooperation and support can strengthen family function, increase intimacy, and increase caregivers' sense of benefit.¹⁴

Differences in caregiving ability existed across the BF profiles, with the low-benefit profile having the lowest caregiving ability

Caregiving ability is an important indicator of whether caregivers can provide timely knowledge, skills, and emotional support based on patient needs. Currently, few binary correlation mechanisms exist between BF and caregiving abilities. Based on this, our study explored the relationship between detailed BF profiles and caregiving ability and proposed possible new ways to improve caregiving ability. A qualitative study showed that caregivers with high BF have sufficient caregiving skills and knowledge to cope with the current situation of their family member's illness and can perceive more family growth and positive personal experiences during the caregiving experience.⁴⁹ Unexpectedly, in our study, the difference in caregiver competence between the moderate- and high-benefit profiles was not significant. This may be because caregiving ability was self-reported by caregivers, and the evaluation process depended on individual subjective feelings. In addition, the response rate of the "moderate benefit—unclear perception" category fluctuated significantly when the benefits profiles were divided.

Compared to the moderate- and high-benefit profiles, caregivers in the low-benefit profile had lower caregiving abilities. The reasons for this may include the following: first, caregivers with a low sense of benefit may bear a greater psychological burden and negative mood. High-intensity care activities may cause caregivers to feel helpless and confused, which may affect their attention and behavioral responses.⁵⁰ Second, caregivers with low BF may face severe physical and mental health problems.⁵¹ They may experience negative changes such as sleep deprivation, fatigue, anxiety, and depression. These health problems may affect caregivers' physical and mental states and, consequently, affect

their caregiving ability. Third, caregivers with low BF may lack social support to effectively obtain sufficient disease information and care skills, thereby limiting the improvement of their caregiving ability.⁵² Therefore, medical staff should encourage caregivers to learn effective stress-coping and emotion management skills, pay attention to their physical and mental health conditions, and undergo regular physical examinations.⁵³ Simultaneously, they are advised to participate in support groups and skills training courses to enhance their caregiving abilities.⁵⁴

Clinical implementation

BF among informal caregivers of lung cancer patients exhibit three profiles, indicating that different profile of caregivers may have varying emotional experiences and needs when facing caregiving tasks and disease management. Healthcare professionals can identify informal caregivers of patients with lung cancer who require special attention by considering characteristics such as patient age, clinical stage, duration of disease diagnosis, and cocaregivers. By recognizing these profiles, personalized nursing guidance and support can be provided to meet the unique caregiving needs of different caregiver profiles. This research has found significant differences in caregiving abilities among different BF profiles, particularly with the lowest caregiving abilities observed in the “low benefit—coping ability deficient” profile. Therefore, for these informal caregivers, healthcare professionals can maximize the caregiving effectiveness and BF of informal caregivers by offering disease information support, problem-focused coping strategies, and caregiver skill guidance. These interventions aim to benefit both patients and promote their recovery.

Limitations

First, this study was a cross-sectional study, which only captured the current level of caregiver BF at the time of the survey and lacked dynamic observational information. Longitudinal studies should be conducted in the future. Second, this study only explored the differences between BF profiles and caregiving ability. Future research could further investigate the specific manifestations of differences between BF subgroups and caregiving abilities, as well as explore the mediating pathways among variables.

Conclusions

The BF and caregiving competencies of informal caregivers of patients with lung cancer need to be improved as there are clear profiles characteristics of perceived benefit. Medical staff can identify low- and moderate-benefit profiles as early as possible through patient age, clinical stage, disease diagnosis time, and whether there are multiple caregivers and provide targeted nursing guidance to improve caregivers' caregiving ability.

Ethics statement

According to the Declaration of Helsinki, this study was approved by the Ethics Committee of the First Affiliated Hospital of Guangdong Pharmaceutical University, China (IRB No. 2023013). The informed consent was designed to ensure that the participants fully understood the study purpose, procedures, risks, benefits, and its implications. The participants willingly signed the consent form voluntarily, and they also retained the right to decline participation in the survey.

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CRedit authorship contribution statement

Xiaoyuan Lin: Conceptualization, Formal analysis, Investigation, Writing – original draft; Haidan Xie: Data curation, Software, Validation, Writing – review & editing; Ziqing Chen: Formal analysis, Investigation; Qi Zhao: Visualization; Xiaozhou Zhou: Methodology, Project administration, Supervision. All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability statement

The datasets analyzed in this study could be obtained from the first author if the request is reasonable.

Declaration of Generative AI and AI-assisted technologies in the writing process

No AI tools/services were used during the preparation of this work.

References

- Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 Countries. *CA Cancer J Clin.* 2021;71(3):209–249. <https://doi.org/10.3322/caac.21660>.
- He S, Xia C, Li H, et al. Cancer profiles in China and comparisons with the USA: a comprehensive analysis in the incidence, mortality, survival, staging, and attribution to risk factors. *Sci China Life Sci.* 2023. <https://doi.org/10.1007/s11427-023-2423-1>.
- Basumallik N, Agarwal M. *Small Cell Lung Cancer. StatPearls. StatPearls Publishing Copyright © 2023. StatPearls Publishing LLC.; 2023.*
- Wong ML, Shi Y, Smith AK, et al. Changes in older adults' life space during lung cancer treatment: a mixed methods cohort study. *J Am Geriatr Soc.* 2022;70(1):136–149. <https://doi.org/10.1111/jgs.17474>.
- Ploukou S, Papageorgiou DI, Panagopoulou E, Benos A, Smyrnakis E. Informal caregivers' experiences of supporting patients with pancreatic cancer: a qualitative study in Greece. *Eur J Oncol Nurs.* 2023;67:102419. <https://doi.org/10.1016/j.ejon.2023.102419>.
- Rassouli M, Beiranvand S, Karami M, Dorcheh AE, Ashrafzadeh H. Caring ability and its related factors in the family caregivers of patients with cancer. *Int J Palliat Nurs.* 2023;29(9):422–432. <https://doi.org/10.12968/ijpn.2023.29.9.422>.
- Murphy C, De Laine C, Macaulay M, Hislop Lennie K, Fader M. Problems faced by people living at home with dementia and incontinence: causes, consequences and potential solutions. *Age Ageing.* 2021;50(3):944–954. <https://doi.org/10.1093/ageing/afaa262>.
- Courtin E, Jemai N, Mossialos E. Mapping support policies for informal carers across the European Union. *Health Pol.* 2014;118(1):84–94. <https://doi.org/10.1016/j.healthpol.2014.07.013>.
- Isenberg SR, Aslakson RA, Dionne-Odom JN, et al. Family companions' involvement during pre-surgical consent visits for major cancer surgery and its relationship to visit communication and satisfaction. *Patient Educ Couns.* 2018;101(6):1066–1074. <https://doi.org/10.1016/j.pec.2018.01.011>.
- Shin DW, Cho J, Roter DL, et al. Preferences for and experiences of family involvement in cancer treatment decision-making: patient-caregiver dyads study. *Psycho Oncol.* 2013;22(11):2624–2631. <https://doi.org/10.1002/pon.3339>.
- Luo D, Gu W, Bao Y, et al. Resilience outstrips the negative effect of caregiver burden on quality of life among parents of children with type 1 diabetes: an application of Johnson-Neyman analysis. *J Clin Nurs.* 2021;30(13-14):1884–1892. <https://doi.org/10.1111/jocn.15739>.
- Mols F, Vingerhoets AJ, Coebergh JW, van de Poll-Franse LV. Well-being, posttraumatic growth and benefit finding in long-term breast cancer survivors.

- Psychol Health*. 2009;24(5):583–595. <https://doi.org/10.1080/08870440701671362>.
13. Lin Y, Luo X, Li J, Xu Y, Li Q. The dyadic relationship of benefit finding and its impact on quality of life in colorectal cancer survivor and spousal caregiver couples. *Support Care Cancer*. 2021;29(3):1477–1486. <https://doi.org/10.1007/s00520-020-05602-x>.
 14. Braun M, Mikulincer M, Rydall A, Walsh A, Rodin G. Hidden morbidity in cancer: spouse caregivers. *J Clin Oncol*. 2007;25(30):4829–4834. <https://doi.org/10.1200/jco.2006.10.0909>.
 15. Mei YX, Xiang DD, Zhang ZX, Twumwaah Budu J, Lin BL, Chen SY. Family function, self-efficacy, care hours per day, closeness and benefit finding among stroke caregivers in China: a moderated mediation model. *J Clin Nurs*. 2023;32(3-4): 506–516. <https://doi.org/10.1111/jocn.16290>.
 16. Fitriyasari R, Nursalam N, Yusuf A, Hargono R, Lin EC, Tristiana RD. Development of a family resiliency model to care of patients with schizophrenia. *Scand J Caring Sci*. 2021;35(2):642–649. <https://doi.org/10.1111/scs.12886>.
 17. Adejoh SO, Boele F, Akeju D, et al. The role, impact, and support of informal caregivers in the delivery of palliative care for patients with advanced cancer: a multi-country qualitative study. *Palliat Med*. 2021;35(3):552–562. <https://doi.org/10.1177/0269216320974925>.
 18. Bourdeanu L, Camnistraci P. Challenges and role changes in caring for adult children with cancer. *J Adv Pract Oncol*. 2018;9(6):634–638.
 19. Ma L, Zhu K, Shi C, et al. Association between the patients' symptom burden and their family caregivers' benefit finding in non-small cell lung cancer receiving combined chemotherapy. *Support Care Cancer*. 2023;31(2):148. <https://doi.org/10.1007/s00520-023-07590-0>.
 20. Zhang Y, Tang R, Bi L, et al. Effects of family-centered positive psychological intervention on psychological health and quality of life in patients with breast cancer and their caregivers. *Support Care Cancer*. 2023;31(10):592. <https://doi.org/10.1007/s00520-023-08053-2>.
 21. Bauer J. A primer to latent profile and latent class analysis. In: Goller M, Kyndt E, Paloniemi S, Damsa C, eds. *Methods for Researching Professional Learning and Development: Challenges, Applications and Empirical Illustrations*. Springer International Publishing; 2022:243–268.
 22. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav Res Meth*. 2009;41(4): 1149–1160. <https://doi.org/10.3758/brm.41.4.1149>.
 23. Kang H, Yeon K, Han ST. [A review on the use of effect size in nursing research]. *J Korean Acad Nurs*. 2015;45(5):641–649. <https://doi.org/10.4040/jkan.2015.45.5.641>.
 24. Bian J, Zhang LF, Liu ZZ, Ni TW, Yy L. Reliability and validity of revised version of Benefit Finding Scale in cancer family caregivers [in Chinese]. *Chin Gen Pract*. 2018; 21(17):2091–2096.
 25. Clark NM, Rakowski W. Family caregivers of older adults: improving helping skills. *Gerontol*. 1983;23(6):637–642. <https://doi.org/10.1093/geront/23.6.637>.
 26. Lee RL, Mok ES. Evaluation of the psychometric properties of a modified Chinese version of the Caregiver Task Inventory—refinement and psychometric testing of the Chinese Caregiver Task Inventory: a confirmatory factor analysis. *J Clin Nurs*. 2011; 20(23-24):3452–3462. <https://doi.org/10.1111/j.1365-2702.2011.03729.x>.
 27. Becker M, Vignoles VL, Owe E, et al. Culture and the distinctiveness motive: constructing identity in individualistic and collectivistic contexts. *J Pers Soc Psychol*. 2012;102(4):833–855. <https://doi.org/10.1037/a0026853>.
 28. Byrne BM. *Structural Equation Modeling with Mplus: Basic Concepts, Applications, and Programming*. Taylor & Francis; 2013.
 29. Howard Sharp KM, Tillery Webster R, Cook J, Okado Y, Long A, Phipps S. Profiles of resilience, distress, and posttraumatic growth in parents of children with cancer and the relation to subsequent parenting and family functioning. *J Pediatr Psychol*. 2023; 48(4):375–385. <https://doi.org/10.1093/jpepsy/jsac097>.
 30. Wang D, Xu H, Liu K, et al. Different reaction patterns of caregivers of children with imperforate Anus: a latent profile analysis. *Front Pediatr*. 2021;9:796725. <https://doi.org/10.3389/fped.2021.796725>.
 31. Pristavec T. The burden and benefits of caregiving: a latent class analysis. *Gerontol*. 2019;59(6):1078–1091. <https://doi.org/10.1093/geront/gny022>.
 32. Kokorelias KM, Naglie G, Gignac MA, Rittenberg N, Cameron JL. A qualitative exploration of how gender and relationship shape family caregivers' experiences across the Alzheimer's disease trajectory. *Dementia (London)*. 2021;20(8):2851–2866. <https://doi.org/10.1177/14713012211019502>.
 33. Batura N, Roy R, Aziz S, et al. Maternal time investment in caregiving activities to promote early childhood development: evidence from rural India. *Front Pediatr*. 2023;11:1120253. <https://doi.org/10.3389/fped.2023.1120253>.
 34. Alam S, Hannon B, Zimmermann C. Palliative care for family caregivers. *J Clin Oncol*. 2020;38(9):926–936. <https://doi.org/10.1200/jco.19.00018>.
 35. Hart NH, Crawford-Williams F, Crichton M, et al. Unmet supportive care needs of people with advanced cancer and their caregivers: a systematic scoping review. *Crit Rev Oncol Hematol*. 2022;176:103728. <https://doi.org/10.1016/j.critrevonc.2022.103728>.
 36. Son NT, Hsu HT, Huong PTT, Trung TQ. Information needs of patients with breast cancer undergoing treatment in Vietnam and related determinants. *J Nurs Res*. 2023; 31(2):e265. <https://doi.org/10.1097/jnr.0000000000000546>.
 37. Molassiotis A, Wang M. Understanding and supporting informal cancer caregivers. *Curr Treat Options Oncol*. 2022;23(4):494–513. <https://doi.org/10.1007/s11864-022-00955-3>.
 38. Coppetti LC, Girardon-Perlini NMO, Andolhe R, Silva L, Dapper SN, Noro E. Caring ability, burden, stress and coping of family caregivers of people in cancer treatment. *Rev Bras Enferm*. 2019;72(6):1541–1546. <https://doi.org/10.1590/0034-7167-2018-0605>.
 39. Teixeira RJ, Applebaum AJ, Bhatia S, Brandão T. The impact of coping strategies of cancer caregivers on psychophysiological outcomes: an integrative review. *Psychol Res Behav Manag*. 2018;11:207–215. <https://doi.org/10.2147/prbm.S164946>.
 40. Marcum CS, Ashida S, Koehly LM. Primary caregivers in a network context. *J Gerontol B Psychol Sci Soc Sci*. 2020;75(1):125–136. <https://doi.org/10.1093/geronb/gbx165>.
 41. Lechner SC, Zakowski SG, Antoni MH, Greenhawt M, Block K, Block P. Do sociodemographic and disease-related variables influence benefit-finding in cancer patients? *Psycho Oncol*. 2003;12(5):491–499. <https://doi.org/10.1002/pon.671>.
 42. Feng CH, Zhang Q, Chen J, et al. Factors influencing age at onset of colorectal polyps and benefit-finding after polypectomy. *Medicine (Baltimore)*. 2023;102(39):e35336. <https://doi.org/10.1097/md.00000000000035336>.
 43. Kapane ARM, Meena KS, Nattala P, Manjunatha N, Sudhir PM. Design and development of a training video for Accredited Social Health Activists (ASHAs) on brief psychological intervention for depression. *J Family Med Prim Care*. 2022;11(7): 3862–3867. <https://doi.org/10.4103/jfmpc.jfmpc.573.21>.
 44. Moreno PI, Stanton AL. Personal growth during the experience of advanced cancer: a systematic review. *Cancer J*. 2013;19(5):421–430. <https://doi.org/10.1097/PPO.0b013e3182a5bbe7>.
 45. Pakenham KI, Cox S. Development of the benefit finding in multiple sclerosis (MS) caregiving scale: a longitudinal study of relations between benefit finding and adjustment. *Br J Health Psychol*. 2008;13(Pt 4):583–602. <https://doi.org/10.1348/135910707x250848>.
 46. Cassidy T. Benefit finding through caring: the cancer caregiver experience. *Psychol Health*. 2013;28(3):250–266. <https://doi.org/10.1080/08870446.2012.717623>.
 47. Zimmaro LA, Deng M, Handorf E, Fang CY, Denlinger CS, Reese JB. Understanding benefit finding among patients with colorectal cancer: a longitudinal study. *Support Care Cancer*. 2021;29(5):2355–2362. <https://doi.org/10.1007/s00520-020-05758-6>.
 48. Wang J, Shen N, Zhang X, et al. Care burden and its predictive factors in parents of newly diagnosed children with acute lymphoblastic leukemia in academic hospitals in China. *Support Care Cancer*. 2017;25(12):3703–3713. <https://doi.org/10.1007/s00520-017-3796-3>.
 49. Mei YX, Lin B, Zhang W, et al. Benefits finding among Chinese family caregivers of stroke survivors: a qualitative descriptive study. *BMJ Open*. 2020;10(10):e038344. <https://doi.org/10.1136/bmjopen-2020-038344>.
 50. Ullrich A, Ascherfeld L, Marx G, Bokemeyer C, Bergelt C, Oechsle K. Quality of life, psychological burden, needs, and satisfaction during specialized inpatient palliative care in family caregivers of advanced cancer patients. *BMC Palliat Care*. 2017;16(1): 31. <https://doi.org/10.1186/s12904-017-0206-z>.
 51. Oechsle K, Ullrich A, Marx G, et al. Prevalence and predictors of distress, anxiety, depression, and quality of life in bereaved family caregivers of patients with advanced cancer. *Am J Hosp Palliat Care*. 2020;37(3):201–213. <https://doi.org/10.1177/1049909119872755>.
 52. Manne SL, Kashy DA, Virtue S, et al. Acceptance, social support, benefit-finding, and depression in women with gynecological cancer. *Qual Life Res*. 2018;27(11): 2991–3002. <https://doi.org/10.1007/s11136-018-1953-x>.
 53. Heid AR, Heppner A, Cheatham D, VanHaitma K, Abbott KM. Emotion-focused communication training online: development and evaluation of acceptability. *Gerontol Geriatr Educ*. 2022;1–14. <https://doi.org/10.1080/02701960.2022.2154765>.
 54. Rueda JR, Solà I, Pascual A, Subirana Casacuberta M. Non-invasive interventions for improving well-being and quality of life in patients with lung cancer. *Cochrane Database Syst Rev*. 2011;2011(9):Cd004282. <https://doi.org/10.1002/14651858.CD004282.pub3>.