

## Original Article

## Benefit finding and its influencing factors in patients with thyroid cancer: A retrospective study

Yingjia Qian<sup>a,b,c</sup>, Lei Zheng<sup>a,b,\*</sup>, Jian Li<sup>d</sup><sup>a</sup> Department of General Surgery, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China<sup>b</sup> Department of Nursing, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China<sup>c</sup> School of Nursing, Shanghai Jiao Tong University, Shanghai, China<sup>d</sup> Clinical Research Center, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China

## ARTICLE INFO

## Keywords:

Thyroid neoplasms  
Benefit finding  
Social support  
Coping behavior  
Logistic models  
Retrospective studies

## ABSTRACT

**Objective:** To understand the level of benefit finding in patients with thyroid cancer and identify its influencing factors.

**Methods:** This retrospective study included 241 patients with thyroid cancer who underwent surgical treatment at a tertiary hospital in Shanghai from October to December 2022. Data were collected using the General Information Questionnaire, the Chinese Benefit Finding Scale, the Social Support Revalued Scale, and the Medical Coping Modes Questionnaire. Logistic regression analysis was performed to explore factors influencing benefit finding.

**Results:** The total benefit finding score among patients with thyroid cancer was 89.00 (76.00, 101.50). Logistic regression analysis indicated that social support (OR = 1.08, 95% CI: 1.02–1.14) and avoidance coping mode (OR = 1.17, 95% CI: 1.00–1.37) significantly impacted benefit finding ( $P < 0.05$ ).

**Conclusions:** Patients with thyroid cancer demonstrated a high level of benefit finding. Social support and medical coping modes were identified as key factors influencing benefit finding. Healthcare professionals should focus on enhancing these aspects to improve benefit finding in patients with thyroid cancer.

**Trial registration:** EC REFERENCE No. 2024-133.

## Introduction

Thyroid cancer is the most common type of cancer in the head and neck region.<sup>1</sup> Recently, the incidence rate of thyroid neoplasms worldwide has been rising rapidly. In 2022, the incidence rate of thyroid cancer in China comprised 9.7% of the total cancer incidence, ranking third and exceeding the global average.<sup>2</sup> Furthermore, one study predicted a continued increase in the incidence rate of thyroid cancer over the next two decades.<sup>3</sup> Due to the relatively advanced treatment currently available, the overall mortality rate for thyroid cancer is relatively low.<sup>4</sup> Studies have indicated that patients diagnosed with thyroid cancer experience varying degrees of psychological distress, anxiety and depression, potentially exerting a detrimental impact to their well-being, which means surviving patients may face challenges in their future lives due to the psychological burden and potential long-term effects of the disease.<sup>5,6</sup>

The burden of cancer often leads to a range of psychological issues for patients.<sup>7,8</sup> However, given advances in psychology, studies have

confirmed that some patients may develop positive coping strategies and discover positive meaning and personal growth from their disease.<sup>9–12</sup> This phenomenon is called “benefit finding” (BF).<sup>10</sup> The theoretical basis of BF has not yet reached a consensus because of differences in the views of various academic schools. Nonetheless, contemporary studies have generally acknowledged Taylor’s cognitive adaptation theory<sup>13</sup> (1983) as a crucial theoretical basis for BF. This theory states that when individuals experience setbacks, they will make three cognitive adaptations: a search for meaning, an attempt to regain mastery, and an effort to restore self-esteem. These adaptations enable individuals to recover from setbacks and potentially surpass their previous level of psychological functioning. On this basis, one study<sup>14</sup> have stated that BF refers to the individual’s perception of positive meaning throughout the illness, which includes two aspects: self-meaning perceived from their personality and social significance perceived from the event itself or the surrounding environment. Studies have confirmed that a certain level of BF may not only benefit psychological well-being by relieving their negative mental

\* Corresponding author.

E-mail address: [z121604@rjh.com.cn](mailto:z121604@rjh.com.cn) (L. Zheng).<https://doi.org/10.1016/j.apjon.2024.100584>

Received 24 January 2024; Accepted 2 September 2024

2347-5625/© 2024 The Author(s). Published by Elsevier Inc. on behalf of Ann & Joshua Medical Publishing LTD. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

status through reducing depression, promoting psychosocial adjustment and thereby enhancing their quality of life,<sup>15–17</sup> but that it also have a positive association with strengthened immunity.<sup>9</sup> Current studies on BF have predominantly focused on patients diagnosed with breast, colorectal, and prostate cancers.<sup>18–23</sup> In patients with breast cancer, one study found that 76% of the patients exhibited BF in the early stages of diagnosis, with those who benefited most showing improvements in health promotion and interpersonal relationships.<sup>18</sup> In patients with prostate cancer, a study found that 59.7% of the survivors had a medium to high level of BF, with the highest benefits observed in acceptance and adaptation.<sup>20</sup> In patients with colorectal cancer, studies have found that the majority of the patients and their spouse caregivers had a moderate to high level of BF and benefited the most in three aspects: attitude, acceptance, and family.<sup>22,23</sup>

Consequently, due to the rising incidence rates, the substantial impact on patients' mental health and the significance of BF, it is important to comprehend BF in patients with thyroid cancer. Currently, limited studies have focused on BF in patients with thyroid cancer. To fill this gap, this study aims to investigate the level of BF in patients with thyroid cancer and identify its influencing factors. The findings of this study may assist clinicians in having a more comprehensive understanding and supporting the psychological status of patients with thyroid cancer, promoting their recovery from the disease. This study hypothesizes that patients with thyroid cancer exhibit higher levels of BF than patients with other type of cancer and that demographic factors, social support, and medical coping mode are the primary factors influencing BF in these patients.

## Methods

### Study participants

This study has a retrospective design. Convenience sampling was used to select 241 patients diagnosed with thyroid cancers who underwent surgery at a tertiary comprehensive hospital in Shanghai, China from October to December 2022. Inclusion criteria: (1) Consent to participate in the study; (2) Age  $\geq 18$  years old and being diagnosed with malignant neoplasms; (3) No communication barriers in terms of language; (4) Clear consciousness; (5) Ability to understand and independently complete the questionnaire. Exclusion criteria: (1) Unable to participate in the study due to physiological, psychological, and other factors (e.g., patients who had not yet recovered from narcotization).

### Procedures

The data for this study were obtained from a database created in a previous study conducted by the author. This database comprised prospectively collected data from patients who provided informed consent. In this process, we created a traditional paper version of the questionnaire and a virtual version of the questionnaire for mobile phones with a QR code. Upon obtaining approval from the hospital and relevant departments, we assessed and identified patients meeting the inclusion criteria. Subsequently, the researchers used standardized language to introduce themselves to patients at the bedside and thoroughly explained the research objectives and significance. After the patients consented, we assisted them in scanning the QR code to access the questionnaire and remained present until they completed the survey. In cases where patients were unable to complete the questionnaire using their phone, we provided them with a paper version. If a patient was over 60 years old or unable to understand the content of the questionnaire, we would explain the items on the questionnaire through objective examples to help them complete it successfully. As the patients filled out the questionnaire, we ensured there was no external interference and confirmed that the questionnaire was completed independently by the patient. We considered any questionnaires suspended due to subjective reasons or force majeure invalid. After enough questionnaires were collected, we implemented quality control

procedures. To ensure the authenticity and completeness of the data, we removed questionnaires that did not meet the requirements (such as randomly filled or incomplete questionnaires). Consideration was given to factors such as the time needed to finish the questionnaires (questionnaires completed within 5 minutes were excluded), patient age, and educational level. For the present study, we conducted a different analysis and filter of the data, focusing on the patients with thyroid cancer. The ethics related to this study complied with the Helsinki Declaration. The approval for the use of this database was provided by Ethics Committee of Ruijin Hospital Affiliated to Shanghai Jiao Tong University School of Medicine (EC REFERENCE No. 2024-133). Fig. 1 illustrates the patient flow of the original data collection process.

### Outcomes and measurements

#### Demographics and disease-related characteristics

The demographic questionnaire contained a total of 14 items including age, gender, employment, education level, ethnicity, marital status, religion, residence, average monthly household income, medical payment method, and exercise times. The disease-related characteristics included the average time since clinical diagnosis, past medical history, and symptoms of discomfort. The variables choosing and option setting for each item was mainly determined by referring to the relevant literature, which has found that the aforementioned variables could impact the level of BF.<sup>17,21,24,25</sup> The entry "discomfort symptoms" meant whether the patients suffered from a host of symptoms such as hoarseness, choking cough, neck pain, or discomfort in swallowing or breathing. The entry "past medical history" included a medical history of previous illness or other surgeries. The entry "education level" referred to the highest level of education that a person has successfully completed.

#### Chinese Benefit Finding Scale

The Chinese Benefit Finding Scale (CBFS) was used to evaluate the level of BF in patients with thyroid neoplasms, this was also the core scale of this study. After cross-cultural adaptation,<sup>26</sup> this scale contains 22 items distributed across six dimensions: personal growth (items 1–3), family relations (items 4–5), world view (items 6–9), acceptance (items 10–16), social relations (items 17–19), and health behaviors (items 20–22). Each item is on a five-point Likert scale that ranges from 1 (no at all) to five (extremely). The total score ranges from 22 to 110 points. The higher the score, the higher the level of BF. The Cronbach's  $\alpha$  coefficient of this scale is 0.95. In the pilot experiment of this study, the coefficient of Cronbach's  $\alpha$  was 0.971.

#### Social Support Revalued Scale

The Social Support Revalued Scale (SSRS), compiled by Xiao Shuiyuan,<sup>27</sup> has 10 items, and it was used to evaluate social support from three dimensions. There are four options in items 1–4 and 8–10, and each option is counted as 1–4 points. The patients may select only one option. Item 5 is divided into four sub-items and each sub-item has "none," "very little," "average," and "full support" as choices that correspond to 1–4 points. In items 6 and 7, patients choosing option 1 score 0 points. If the patients choose option 2, the score is determined by the amount of ticks chosen. Entries with an overall score of less than 22 points indicate a low level of social support, a score of 23–44 indicates a moderate level of social support, and a score of 45–66 indicates a high level of social support.<sup>19</sup> The scale has a Cronbach's  $\alpha$  coefficient of 0.81. In the pilot experiment of this study, the Cronbach's  $\alpha$  coefficient of this scale was 0.642.

#### Medical Coping Mode Questionnaire

The Medical Coping Mode Questionnaire (MCMQ) was translated and revised by Shen Xiaohong and Jiang Qianjin,<sup>28</sup> based on the original scale created by Feifel.<sup>29</sup> This scale is divided into three subscales (confrontation, avoidance, and acceptance) with a total of 20 items and uses a four-point Likert scale, of which eight items must be scored in reverse. Each subscale's total score is respectively calculated. Compared

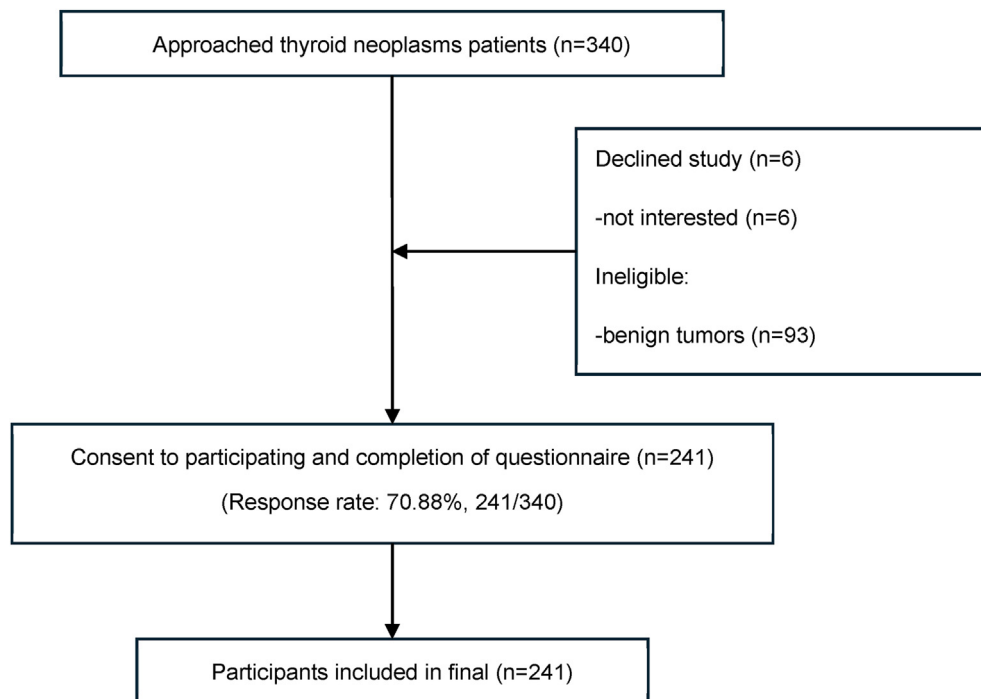


Fig. 1. Patients flow illustrating the original process of data collection and filtering.

with the norm, the total score can reflect which coping style the patients tend to adopt. The regression analysis is carried out in subscales rather than the total score of the whole questionnaire. The coefficients of Cronbach's  $\alpha$  of the three subscales are 0.64, 0.85, and 0.67 respectively. In the pilot experiment of this study, the coefficients of Cronbach's  $\alpha$  were 0.56, 0.64, and 0.63.

Data analysis

The data were processed and analyzed using SPSS 27.0 software. Normality testing showed a non-normal distribution of the quantitative data. Therefore, descriptive statistical methods were used for each dimension of the demographics, disease-related characteristics, and the CBFS. Quantitative data are represented as median (interquartile range) [M (IQR)], and qualitative data are represented as count (percentage) [n (%)]. The whole sample was divided into two parts based on the classification criteria: a BF low-level group (total score of BF below 66) and a BF moderate to high level group (total score of BF above or equal to 66).<sup>30</sup> A univariate analysis involved the  $\chi^2$  test for categorical data and the Wilcoxon rank sum test for ordinal data. If the expected frequencies for the  $\chi^2$  test were not met, Fisher's exact test was applied. We used the one sample Wilcoxon signed rank test to compare the BF scores across dimensions of CBFS measured in this study with those obtained by the authors of the CBFS in a previous study (reference scores).<sup>31</sup> This comparison aimed to assess the relative levels of BF in patients with thyroid cancer compared to other cancer patient populations. Statistically significant factors in the univariate analysis results were included in the logistic regression analysis to explore the influencing factors of BF. The Hosmer and Lemeshow Test was employed to assess the quality of the regression model. A higher  $R^2$  indicates better model fit, while a  $P$ -value greater than 0.05 signifies that the hypothesis of good model fit is supported.<sup>32</sup> Statistical significance was defined as a  $P$ -value of less than 0.05.

Ethical considerations

The ethics related to this study complied with the Helsinki Declaration. The approval for the use of this database was provided by Ethics Committee of Ruijin Hospital Affiliated to Shanghai Jiao Tong University School of Medicine (IRB No. 2024-133). The purpose of the research was

clearly explained to the patients. All individuals provided informed consent to participate in this study. We distributed the questionnaire only to those who understood the study's purpose and consented to participate. All patients' privacy were protected and respected.

Results

Demographics and disease-related characteristics

Table 1.

BF level, social support, and medical coping mode

The total BF score in patients with thyroid cancer was 89.00 (76.00, 101.50). Table 2 shows the results of one sample Wilcoxon signed rank test, which compared each dimension score with the results tested in a previous study.<sup>31</sup> Fig. 2 shows the BF score density plot. Table 1 shows that the BF moderate to high-level group scored higher in the total score

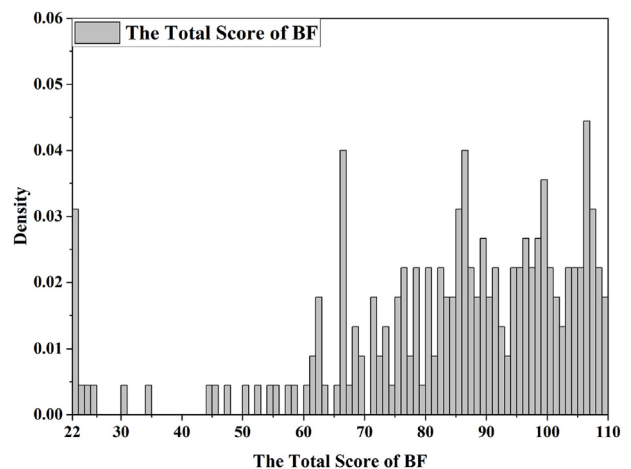


Fig. 2. BF score density plot illustrating the distribution of BF levels per score. BF, benefit finding.

**Table 1**  
Participant characteristics (N = 241).

Variables	BF low level group (n = 30)	BF moderate to high level group (n = 211)	Statistical value	Significant
Age	37.00 (31.00, 49.25)	38.00 (32.00, 45.00)	Z = -0.185 <sup>b</sup>	0.874
Sex				
Male	4 (13.3)	54 (25.6)	$\chi^2 = 2.160$	0.142
Female	26 (86.7)	157 (74.4)		
Employment				
No	8 (26.7)	43 (20.4)	$\chi^2 = 0.622$	0.430
Yes	22 (73.3)	168 (79.6)		
Education level				
Primary school and below	1 (3.3)	7 (3.3)	$\chi^2 = 0.141$	0.932
High school	7 (23.3)	43 (20.4)		
University or above	22 (73.3)	161 (76.3)		
Ethnicity				
Han	30 (100.0)	208 (98.6)	$\chi^2 = 0.432^a$	1.000
Other	0 (0.0)	3 (1.4)		
Marital status				
Married	25 (83.3)	176 (83.4)	$\chi^2 = 0^a$	1.000
Single	5 (16.7)	35 (16.6)		
Religion				
No	29 (96.7)	209 (99.1)	$\chi^2 = 1.216^a$	0.330
Yes	1 (3.3)	2 (0.9)		
Residence				
City	24 (80.0)	159 (75.4)	$\chi^2 = 0.310$	0.578
Suburb/Village	6 (20.0)	52 (24.6)		
Average monthly household income (CNY)				
< 10,000	19 (63.3)	104 (49.3)	$\chi^2 = 2.073$	0.150
≥ 10,000	11 (36.7)	107 (50.7)		
Medical payment method				
Self-funded	2 (6.7)	19 (9.0)	$\chi^2 = 0.181^a$	1.000
Medical insurance	28 (93.3)	192 (91.0)		
The average time since clinical diagnosis (month)				
≤ 1	1 (3.3)	26 (12.3)	$\chi^2 = 4.270^a$	0.206
1~6	10 (33.3)	77 (36.5)		
6~12	3 (10.0)	8 (3.8)		
> 12	16 (53.3)	100 (47.4)		
Past medical history				
No	15 (50.0)	77 (36.5)	$\chi^2 = 2.030$	0.154
Yes	15 (50.0)	134 (63.5)		
Discomfort symptoms				
Yes	4 (13.3)	46 (21.8)	$\chi^2 = 1.145$	0.285
No	26 (86.7)	165 (78.2)		
Exercise times (Times/week)				
≤ 1	22 (73.3)	138 (65.4)	$\chi^2 = 1.263$	0.532
2~3	4 (13.3)	47 (22.3)		
> 3	4 (13.3)	26 (12.3)		
Social support				
Total score	38.50 (31.00, 44.25)	42.00 (37.00, 47.00)	Z = 2.810 <sup>b</sup>	0.005*
Objective support	6.00 (6.00, 9.25)	9.00 (6.00, 11.00)	Z = 3.079 <sup>b</sup>	0.002*
Subjective support	24.50 (17.75, 28.00)	26.00 (22.00, 29.00)	Z = 1.825 <sup>b</sup>	0.068
the Level of social support utilization	7.00 (5.00, 8.00)	7.00 (6.00, 9.00)	Z = 2.184 <sup>b</sup>	0.029*
low Level of social support	2 (6.7)	0 (0.0)	$\chi^2 = 9.499^a$	0.009*
moderate Level of social support	21 (70.0)	133 (63.0)		
high Level of social support	7 (23.3)	78 (37.0)		
Medical coping mode				
Confrontation	18.00 (17.00, 21.00)	20.00 (18.00, 23.00)	Z = 2.439 <sup>b</sup>	0.015*
Avoidance	14.00 (12.75, 15.25)	16.00 (14.00, 18.00)	Z = 3.368 <sup>b</sup>	<0.001*
Acceptance	9.50 (5.75, 11.00)	8.00 (6.00, 10.00)	Z = -1.673 <sup>b</sup>	0.094

\*P < 0.05. BF, benefit finding.

<sup>a</sup> Fisher exact probability.

<sup>b</sup> Wilcoxon rank sum test.

**Table 2**  
BF score (N = 241).

BF scale	Score [M (P25, P75)]	Reference scores <sup>a</sup>
Acceptance	12.00 (9.50, 14.00)	10.14*
Family relations	9.00 (7.00, 10.00)	7.10*
Worldview	14.00 (12.00, 17.00)	10.70*
Personal growth	29.00 (23.00, 35.00)	24.91*
Social relations	12.00 (9.00, 14.00)	14.33*
Health behaviours	13.00 (11.50, 15.00)	11.37*
Total	89.00 (76.00, 101.50)	-

\*The "Reference Score" column displays the median scores obtained from a previous study, which serves as a benchmark for comparison. BF, benefit finding.

<sup>a</sup> One Sample Wilcoxon Signed Rank Test P < 0.05.

of social support, objective support and social support utilization. Moreover, the minimum score of the overall social support was 20, with the maximum being 56. For BF low-level group, the minimum social support score was 20, and the maximum was 51. For BF moderate to high-level group, the minimum social support score was 24, and the maximum was 56. Additionally, in medical copying mode, the BF moderate to high-level group demonstrated higher scores in confrontation and avoidance than the low-level group (P < 0.05).

*Logistic regression*

Logistic regression was performed with BF as the dependent variable. The statistically significant factors in the univariate analysis (the total

**Table 3**  
Logistic regression analysis on the influencing factors of BF.

Independent Variables	B	S.E	Wald $\chi^2$	P	OR (95% CI)
Social support	0.08	0.03	6.97	0.008*	1.08 (1.02–1.14)
Confrontation	0.08	0.07	1.47	0.225	1.09 (0.95–1.24)
Avoidance	0.16	0.08	3.97	0.046*	1.17 (1.00–1.37)
Constant	-5.05	1.75	8.32	0.004	0.01

\* $P < 0.05$ . BF, benefit finding.

score of social support, confrontation and avoidance) were used as independent variables. Hosmer and Lemeshow Test showed that the regression model had a modest degree of fit, which explained 14.4% of the variation in the dependent variable ( $R^2 = 0.144$ ,  $\chi^2 = 8.142$ ,  $P = 0.420$ ). Table 3 shows that social support (OR = 1.08, 95% CI: 1.02–1.14) and avoidance of medical copy mode (OR = 1.17, 95% CI: 1.00–1.37) were factors influencing BF ( $P < 0.05$ ).

## Discussion

### *Patients with thyroid cancer have a high level of BF in China*

In this retrospective study, the total BF score in patients with thyroid cancer was 89.00 (76.00, 101.50), indicating a high level according to the BF evaluation principles.<sup>30</sup> The results of this study were consistent with the research hypothesis and were higher than those reported in several other studies.<sup>18,20,22</sup> This difference may be attributed to the different tumor types of the study subjects. Those studies mainly focused on patients with breast cancer and prostate cancer, which typically had higher mortality and more severe symptoms than patients with thyroid cancer.<sup>4,33</sup> Previous research found that patients with highly malignant cancers and low survival rates tended to adopt more negative coping styles and report lower BF.<sup>21</sup> The financial burden caused by those types of cancer could further worsen patients' psychological state.<sup>17</sup> In patients with thyroid cancer, the characteristics of this disease afforded them more confidence and hope during treatment, and some studies have shown that "hope" could promote positive perception during diagnosis and treatment.<sup>34,35</sup> Based on convenience sampling and the epidemiology of thyroid cancer,<sup>1</sup> 75.93% of the patients in this study were female. Therefore, gender bias may be one reason for the high BF scores measured in this study. Some studies<sup>21,23</sup> found that women encounter more stressors in their daily lives due to physiological factors, thus providing them with more opportunities to develop the ability to find positive meaning from stress.<sup>23</sup> In addition, this study found that the scores of all dimensions of BF in patients with thyroid cancer statistically differed from those of the reference scores tested in a previous study.<sup>31</sup> All of the dimension scores were higher than those of the reference scores except for the dimension of "social relationship," suggesting that patients with thyroid cancer found less benefit in terms of social interaction and support from friends. This could be attributed to the department's policy of "unaccompanied management", which did not allow family members and friends to enter the ward for visits and care during the patient's hospitalization. Therefore, clinical staff should concentrate more on their social relationship with patients.

### *Influencing factors*

#### *Social support*

In this study, we found that social support was an influencing factor of BF in patients with thyroid cancer. Higher levels of social support were associated with higher BF levels ( $P < 0.05$ ). This result was consistent with findings in several previous studies.<sup>25,35–37</sup> Previous research found that social support could directly affect BF perception through four intermediary pathways. It was proposed that social support could mobilize internal resources and encourage patients to adopt positive

medical coping mode in the disease, thereby exerting a direct positive predictive effect on BF levels.<sup>38,39</sup> Social support also can increase BF through its effects on spirituality and the level of hope, helping patients adapt better to their current situations.<sup>35,36</sup> Conversely, a low level of social support during treatment has a negative impact on BF,<sup>18</sup> emphasizing that maintaining social support stability during treatment is important. Therefore, medical staff should continue to maintain and enhance social support during treatment through health education or the establishment of patient associations.

#### *Medical coping mode*

In this study, we found that avoidance coping is one of the positive factors influencing BF in patients with thyroid cancer ( $P < 0.05$ ). It has been suggested that similar to confrontation, avoidance could be classified as a positive coping mode, whereas acceptance is considered a negative coping style.<sup>40</sup> Positive coping, in comparison with negative coping, is associated with a higher likelihood of positive psychological growth and a decrease in patients' sense of disease uncertainty.<sup>41</sup> Proactive coping involves patients being more active and engaging with the outside world during treatment and recovery, promoting positive disease outcomes and enhancing social support, ultimately increasing BF levels.<sup>42</sup> In this study, we discovered that the confrontation coping mode and the acceptance coping mode were not the influencing factors of BF, which was inconsistent with the findings from other studies.<sup>15,25</sup> Those studies found that the confrontation coping mode could increase BF level by reducing the level of distress, whereas the acceptance coping style may directly reduce the quality of life and could be detrimental to physical and mental recovery.<sup>15,25</sup> The discrepancy may be attributed to differences in study design. Previous studies were multicenter and included various cancer types, whereas our study was single-center and focused solely on BF in patients with thyroid cancer. Differences in cancer type can lead to variations in coping mechanisms and how patients perceive and experience BF. This may also explain why demographic characteristics were not found to be influencing factors in BF in this study.

#### *Implications for nursing practice and research*

This study focused on patients with thyroid cancer, exploring the current situation and influencing factors of benefit finding in patients with this disease, which enabled health care professionals to have a more comprehensive understanding of patients' psychological conditions from the perspective of positive psychology. We found that patients with thyroid cancer had a high level of BF in China. Social support and medical coping mode could influence the level of BF. These findings filled the relevant research gap. Moreover, the Chinese Benefit Finding Scale was used to evaluate the patients with thyroid cancer for the first time. The results confirmed the reliability of this scale. In clinical practice, health care professionals should continuously monitor patients' social support levels and medical coping mode, promptly implementing targeted interventions to enhance patients' BF, improving their psychological condition.

#### *Limitations*

This study has several limitations. It was conducted as a single-center study, with samples drawn exclusively from inpatients with thyroid cancer at one tertiary hospital, excluding patients opting for other treatment modalities. Some variables (such as gender, religion and residence) had biased sample proportions due to the convenience sampling and the epidemiological characteristics of thyroid cancer, which could potentially affect experimental outcomes. As an exploratory research, although our study results were statistical significance, the relatively small sample size may impact the generalizability of our findings. The study utilized a cross-sectional design, providing only a snapshot of patients' BF at a particular moment.

## Future directions

In the future, further research can be conducted using a multicenter, longitudinal approach with a controlled sample size and can include patients who choose treatment options other than surgery to obtain a more comprehensive understanding of BF.

## Conclusions

This study found that on average, patients with thyroid cancer had a high level of BF. Social support, and avoidance coping mode were the main factors influencing the level of BF. To enhance the BF of patients with thyroid cancer and improve their mental state, clinical medical staff should promptly pay attention to and utilize personalized interventions by strengthening and maintaining the patient's social support and improving their coping style.

## Ethics statement

This study was provided by Ethics Committee of Ruijin Hospital Affiliated to Shanghai Jiao Tong University School of Medicine (IRB No. 2024-133). All participants provided written informed consent.

## Funding

This study received no external funding.

## CRediT authorship contribution statement

**Yingjia Qian:** Writing – Original and Revised draft preparation, Formal analysis, Investigation, Data Curation. **Lei Zheng:** Methodology, Conceptualization, Investigation, Resources, Supervision, Data Curation. **Jian Li:** Methodology, Validation, 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 no conflict of interest.

## Data availability statement

The data that support the findings of this study are available from the corresponding author, Lei Zheng, upon reasonable request.

## 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

- Si L, Jiayi S, Jianqing Z. Progress of risk factors for thyroid tumors. *Chin J Prev Med*. 2020;54(8):897–901. <https://doi.org/10.3760/cma.j.cn112150-20200609-00846>.
- Liu Z, Li Z, Zhang Y, et al. Interpretation on the report of global cancer statistics 2020. *Journal of Multidisciplinary Cancer Management(Electronic Version)*. 2021;7(2): 1–14. <https://doi.org/10.12151/JMCM.2021.02-01>.
- Cheng F, Xiao J, Shao C, et al. Burden of thyroid cancer from 1990 to 2019 and projections of incidence and mortality until 2039 in China: findings from global burden of disease study. *Front Endocrinol*. 2021;12:738213. <https://doi.org/10.3389/fendo.2021.738213>.
- Zheng RS, Chen R, Han BF, et al. [Cancer incidence and mortality in China, 2022]. *Zhonghua Zhongliu Zazhi*. 2024;46(3):221–231. <https://doi.org/10.3760/cma.j.cn112152-20240119-00035>.
- Lili P, Lin Y, Yan L, Naicong L. Mediating effect of perfectionism on anxiety, depression and social support in patients with benign thyroid nodules. *Chin Nurs Res*. 2022;5: 773–779. <https://doi.org/10.12102/j.issn.1009-6493.2022.05.004>.
- Lei L, Liqin Y, Yan L. Preoperative psychological distress and influencing factors of patients undergoing thyroid cancer surgery. *Chin J Otorhinolaryngology-Skull Base Surg*. 2021;27(1):26–29. <https://doi.org/10.11798/j.issn.1007-1520.202120293>.
- Martinez-Calderon J, Garcia-Muñoz C, Heredia-Rizo AM, Cano-García FJ. The prevalence of anxiety and depression in cancer around the world: an overview of systematic reviews evaluating 128 meta-analyses. *J Affect Disord*. 2024;351:701–719. <https://doi.org/10.1016/j.jad.2024.01.259>.
- Walker ZJ, Xue S, Jones MP, Ravindran AV. Depression, anxiety, and other mental disorders in patients with cancer in low- and lower-middle-income countries: a systematic review and meta-analysis. *JCO Glob Oncol*. 2021;7:1233–1250. <https://doi.org/10.1200/go.21.00056>.
- Pascoe L, Edvardsson D. Benefit finding in cancer: a review of influencing factors and health outcomes. *Eur J Oncol Nurs*. 2013;17(6):760–766. <https://doi.org/10.1016/j.ejon.2013.03.005>.
- Affleck G, Tennen H. Construing benefits from adversity: adaptational significance and dispositional underpinnings. *J Pers*. 1996;64(4):899–922. <https://doi.org/10.1111/j.1467-6494.1996.tb00948.x>.
- Fife BL. The conceptualization of meaning in illness. *Soc Sci Med*. 1994;38(2): 309–316. [https://doi.org/10.1016/0277-9536\(94\)90400-6](https://doi.org/10.1016/0277-9536(94)90400-6).
- Taylor SE. Adjustment to threatening events: a theory of cognitive adaptation. *Am Psychol*. 1983;38(11):1161–1173. <https://doi.org/10.1037/0003-066X.38.11.1161>.
- Taylor SE. Adjustment to threatening events: a theory of cognitive adaptation. *Am Psychol*. 1983;38(11):1161–1173. <https://doi.org/10.1037/0003-066X.38.11.1161>.
- Fife BL. The conceptualization of meaning in illness. *Soc Sci Med*. 1994;38(2): 309–316. [https://doi.org/10.1016/0277-9536\(94\)90400-6](https://doi.org/10.1016/0277-9536(94)90400-6).
- Liu Z, Zhang L, Cao Y, Xia W, Zhang L. The relationship between coping styles and benefit finding of Chinese cancer patients: the mediating role of distress. *Eur J Oncol Nurs*. 2018;34:15–20. <https://doi.org/10.1016/j.ejon.2018.03.001>.
- 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>.
- Zhu P, Chen C, Liu X, Gu W, Shang X. Factors associated with benefit finding and mental health of patients with cancer: a systematic review. *Support Care Cancer*. 2022;30(8):6483–6496. <https://doi.org/10.1007/s00520-022-07032-3>.
- Rankin K, Le D, Sweeny K. Preemptively finding benefit in a breast cancer diagnosis. *Psychol Health*. 2020;35(5):613–628. <https://doi.org/10.1080/08870446.2019.1664740>.
- Bi W, Wang H, Yang G, Zhu C. A longitudinal cohort study on benefit finding evolution in Chinese women breast cancer survivors. *Article. Sci Rep*. 2021;11(1):1–7. <https://doi.org/10.1038/s41598-021-99809-5>.
- Lassmann I, Dinkel A, Marten-Mittag B, et al. Benefit finding in long-term prostate cancer survivors. *Support Care Cancer*. 2021;29(8):4451–4460. <https://doi.org/10.1007/s00520-020-05971-3>.
- Liu Z, Thong MSY, Doege D, et al. Prevalence of benefit finding and posttraumatic growth in long-term cancer survivors: results from a multi-regional population-based survey in Germany. *journal article. Br J Cancer*. 2021;125(6):877–883. <https://doi.org/10.1038/s41416-021-01473-z>.
- 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>.
- 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>.
- Jin X, Tang L, Cao Y, Li T. Status quo and influencing factors of disease benefit finding in patients with bladder cancer undergoing abdominostomy by diversion of urinary flow. *Chin Nurs Res*. 2021;35(13):2425–2430. <https://doi.org/10.12102/j.issn.1009-6493.2021.13.032>.
- Qiu X, Zhang K, Zhang Y, Sun L. Benefit finding and related factors of patients with early-stage cancer in China. *Int J Environ Res Publ Health*. 2022;19(7):4284. <https://doi.org/10.3390/ijerph19074284>.
- Liu Z, Zhang L, Gudenkauf L. Cross-cultural adaptation of the benefit finding scale(BFS) in Chinese cancer patients. *Chin J Nurs*. 2015;50(5):561–566. <https://doi.org/10.3761/j.issn.0254-1769.2015.05.010>.
- Xiao S. The theoretical basis and research application of social support rating scale. *Journal of Clinical Psychological Medicine*. 1994;4(2):98–100. doi:CNKI:SUN:LCJS.0.1994-02-019.
- Shen X, Jiang Q. Report on application of Chinese version of MCMQ in 701 patients. *Chinese Journal of Behavioral Medical Science*. 2000;9(1):22–24. <https://doi.org/10.3760/cma.j.issn.1674-6554.2000.01.008>.
- Feifel H, Strack S, Nagy VT. Coping strategies and associated features of medically ill patients. *Psychosom Med*. 1987;49(6):616–625. <https://doi.org/10.1097/00006842-198711000-00007>.
- Li Z, Liu Z, Zhang L. Benefit finding and influencing factors in patients with early-stage colorectal cancer. *Chinese General Practice*. 2020;23(35):4459–4464. <https://doi.org/10.12114/j.issn.1007-9572.2020.00.597>.
- Liu Z, Gudenkauf L, Zhang L, Wang Z. Application and evaluation of Benefit Finding Scale (BFS) in early-stage cancer patients from China. *Eur J Oncol Nurs*. 2016;23: 87–96. <https://doi.org/10.1016/j.ejon.2016.04.005>.

32. Conklin JD. Applied logistic regression. *Technometrics*. 2002;44(1):81–82. <https://doi.org/10.1198/tech.2002.s650>.
33. China NHCotPsRo. Diagnosis and treatment guidelines for thyroid cancer(2018 edition). *Chinese Archives of General Surgery(Electronic Edition)*. 2019;13(1):1–15. <https://doi.org/10.3877/cma.j.issn.1674-0793.2019.01.001>.
34. Nehir S, Tavşanlı NG, Özdemir Ç, Akyol T. A determination of hopelessness and the perception of illness in cancer. Article. *Omega J Death Dying*. 2019;79(2):115–131. <https://doi.org/10.1177/0030222817704336>.
35. Zhao M, Jiang Y, Xu G, Lin X. The mediating effect of hope level between social support and benefit finding in patients with advanced lung cancer. *Cancer Nurs*. 2023. <https://doi.org/10.1097/ncc.0000000000001295>.
36. Rong H, Yin M, Ren P, Li Y, Qu H, Chen X. Spirituality as a mediator between social support and benefit finding among advanced cancer patients. *Cancer Nurs*. 2023;46(4):E230–e237. <https://doi.org/10.1097/ncc.00000000000001134>.
37. Conley CC, Small BJ, Christie J, et al. Patterns and covariates of benefit finding in young Black breast cancer survivors: a longitudinal, observational study. journal article. *Psycho Oncol*. 2020;29(7):1115–1122. <https://doi.org/10.1002/pon.5398>.
38. Chen C, Chen Y, Liu X, Gu W, Fan G, Zhu P. Construction of structural equation model for influencing factors of benefit finding in patients with lung cancer. *Nursing Journal of Chinese People's Liberation Army*. 2022;39(6):39–43. <https://doi.org/10.3969/j.issn.1008-9993.2022.06.010>.
39. Chen C, Chen Y, Liu X, Gu W, Fan G, Zhu P. Analysis of effect of psychological resilience between social support and benefit finding among patients with lung cancer in yangzhou. *Med Soc*. 2022;35(11):101–105. <https://doi.org/10.13723/j.yxysh.2022.11.019>.
40. Wu X, Zheng M, Xin M, Feng G. Study on correlation between quality of life and anxiety, depression, coping style of phase II and III esophageal carcinoma patients receiving adjuvant chemotherapy. *Chin Nurs Res*. 2015;29(7):813–816. <https://doi.org/10.3969/j.issn.10096493.2015.07.014>.
41. Wen KY, Ma XS, Fang C, et al. Psychosocial correlates of benefit finding in breast cancer survivors in China. *J Health Psychol*. 2017;22(13):1731–1742. <https://doi.org/10.1177/1359105316637839>.
42. Yuan Z, Chai Q, Jin Y, Zhang Q. Investigation on medical coping modes of first stroke patients and its influencing factors. *Chinese General Practice*. 2016;19(2):210–215. <https://doi.org/10.3969/j.issn.1007-9572.2016.02.018>.