Resilience, Self-Perceived Burden, Social Support and Their Correlation in Cancer Patients – A Cross-Sectional Study in China

Zhifu Yu

Cancer Hospital of China Medical University: Liaoning Cancer Institute and Hospital

Tingting Zuo

Cancer Hospital of China Medical University: Liaoning Cancer Institute and Hospital

Guichun Jiang

Cancer Hospital of China Medical University: Liaoning Cancer Institute and Hospital

Qiang Zhang

Cancer Hospital of China Medical University: Liaoning Cancer Institute and Hospital

Shuang Jiang

Cancer Hospital of China Medical University: Liaoning Cancer Institute and Hospital

Haiyang Xing

Cancer Hospital of China Medical University: Liaoning Cancer Institute and Hospital

Li Cao

Cancer Hospital of China Medical University: Liaoning Cancer Institute and Hospital

Lijuan Cai

The Fourth hospital of Fushun city

Jihong Liu

Anshan cancer hospital

Yunyong Liu (✉ liuyycancer@sina.com)

Cancer Hospital of China Medical University: Liaoning Cancer Institute and Hospital <https://orcid.org/0000-0002-5512-3476>

Research

Keywords: Resilience, social support, multi-center cross-sectional

Posted Date: October 21st, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-93144/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Objective: The aim of this study was to explore resilience, self-perceived burden, social support and their correlation in patients with malignant tumors and provide evidence for clinical intervention.

Methods: A multi-center cross-sectional study was performed in China. All the participants completed a questionnaire including sociodemographic information. Resilience, patients' perceptions of burden on their caregivers and the level of social support were evaluated.

Results: A total of 439 cancer patients were analyzed in our study. The level of resilience differed significantly by education grade, employment status, insurance type, household income per year, and treatment type. Patients with no job, rural residents, those with lower household income and those holding new rural cooperative medical scheme (NRCMS) insurance had higher SPB score, with statistical significance. Patients who underwent higher education, those with a full-time job, were married, with higher household income and urban employee's basic medical insurance (UEBMI) had higher social support. Social support was found to be highly related to resilience. Resilience was negatively correlated with emotional burden, and the emotional and physical burden and social support strongly influenced resilience. Path analysis found that social support played an intermediary role in the process of SPB affecting resilience.

Conclusion: The resilience status of cancer patients was low and was affected by the self-burden level through social support. The study reminded us that improving the resilience level by education to improve the social support of cancer patients will improve the quality of life patients.

1. Introduction

Malignant tumors are one of the major causes of death and affect many persons worldwide. In 2018, the number of new cases of cancer worldwide was 18.1 million, and the number of deaths was about 9.6 million [1]. With treatment advances in oncology, and rising costs, a huge burden is placed on families and society. Generally speaking, cancer diagnosis and treatment cause highly significant, stressful events that result in short- and long-term psychosocial problems [2–4]. Heightened anxiety and fear of cancer recurrence, along with decreased quality of life and social wellbeing, are frequently reported among cancer patients [5–6]. However, cancer patients may promote some positive psychosocial reactions related to resilience [7–8]. Resilience is the ability to adapt positively to adverse experiences and difficult situations [9]. Researchers assert that personal factors such as resilience [10] and family support [11] could explain differences in mental health outcomes. Therefore, resilience has been considered as a defense mechanism used to deal with cancer-related psychosocial problems, for example emotional and social stressors [12]. Several studies have reported that cancer patients with similar diseases and treatment status have significantly different levels of quality of life (QOL), which may be due to varying levels of patient resilience [13–14].

The establishment of resilience is inseparable from the education and support of the family and society. Good relationships among family members are significantly associated with emotional comfort and greatly influence life quality [15]. The level of social support is related to the degree of self-understanding and self-feeling for social association which an individual perceives or emphasizes. Studies have shown that good social support promotes psychological resilience and has a positive impact on the prognosis of cancer patients [16]. A large number of studies have shown that the negative psychological feeling that they are a burden on family and caregivers is common in the treatment of cancer patients [17–18]. However, the relationships between resilience, the burden of negative feelings and social support are not clear.

The purpose of our study was to assess the levels of resilience, self-perceived burden and social support among cancer patients, and to identify their correlation. In line with the theory of minority stress, we hypothesized that, following the additional stressor of cancer, emotional and social support would greatly affect resilience. Based on this hypothesis, we conducted a survey including resilience, social support and self-perceived burden among cancer patients and tried to provide information useful for clinical intervention.

2. Materials And Methods

2.1 Participants

A cross-sectional study was designed. We recruited cancer patients, including those with lung cancer, breast cancer, colorectal cancer and gastrointestinal cancer, to participate our study from March 2017 to August 2018 in three hospitals in China: Liaoning Cancer Hospital, Fushun Cancer Hospital and Anshan Cancer Hospital. All the patients diagnosed with cancer were aged from 40 to 79 years old and were able to read and communicate. Patients with life expectancy less than 6 months and no longer undergoing treatment were excluded. Informed consent was obtained from all patients. All the participants were interviewed face-to-face by well-trained interviewers using a structured questionnaire. Information was collected about demographic characteristics (age, gender, education, marital status, occupation, residence and insurance type), detailed medical history and family history of cancer, as well as resilience status, patients' perceptions of burden on their caregivers and the level of social support during the past month.

2.2 Instruments

Chinese version of Connor–Davidson Resilience Scale (CD-RISC)

The Resilience Scale (CD-RISC) was designed by Connor & Davidson in 2003 to measure participant resilience. A revised Chinese version of the CD-RISC scale, translated by Yu et al., consists of 25 items, and each item was scored on a 5-point scale with the three subscales tenacity, strength and optimism. The participants were asked to respond on a 5-point Likert scale, from 0 (*not true at all*) to 4 (*true all the time*). The total score ranges from 0 to 100 points, in which higher scores indicate higher resilience. The scale has a Cronbach's α coefficient of 0.914, internal consistency coefficient of 0.89 and test–retest reliability of 0.87 [19].

Self-Perceived Burden Scale

Self-perceived burden (SPB) was evaluated by the Self-Perceived Burden Scale (SPBS), which is currently the only validated and effective measurement tool for SPB. Developed by Cousineau et al. [20] in 2003, it has been used to measure the self-perceived burden of patients with chronic diseases. The scale was a self-rating scale originally developed in the study of hemodialysis patients. In the development process, the 25 items were revised to 10 items, including physical factors, emotional factors, and economic burden. A 1–5 scoring system was adopted to measure the degree of SPB of the patient. A higher score indicated a heavier burden. SPBS has good internal consistency (Cronbach's $\alpha = 0.85$).

Social Support Rating Scale

The Social Support Rating Scale (SSRS) has a total of 10 items, including the three dimensions objective support (3 items), subjective support (4 items), and utilization of support (3 items). The scale is a self-assessment scale, and each item uses a four-point scoring method (1–4). The total social support score reflects the total degree of social support experienced by the individual. The higher the score, the higher the social support obtained. The internal consistency coefficient is 0.81, and the retest reliability is 0.92. The table has been widely used in various countries, with good reliability and validity.

2.3 Data collection and quality control

The overall study protocol, standard operational procedure, and instructions for interviews were formulated by an expert panel. Face-to-face interviews or self-administered questionnaires were conducted or managed by local, well-trained interviewers to ensure that the questionnaires were fully completed. A two-stage training procedure included the study protocol, introduction of the questionnaire, interview procedures, and communication skills.

2.4 Data analysis

The Statistical Package for the Social Sciences (SPSS) 23.0 was used for data analysis. Descriptive statistics were calculated for major variables, including means and standard deviations. The *t*-test and one way ANOVA was used to analyze differences in predictor and outcome variables. Partial correlation analysis was performed to assess correlations among resilience, SPBS and SSRS. Generalized linear models were used to estimate the relation between resilience and SSRS and SPBS. To avoid undesirable issues of transformation of estimates, generalized models with a gamma distribution and log link were used. These models estimate the log of resilience, SSRS and SPBS. This model represents the association between resilience and other variables after adjustment for patient characteristics. To ease the interpretation of the nonlinear, regression-based coefficients, we report the main effect of SPBS and SSRS on resilience using the parameter estimates from the regression models. We used the bootstrap method to calculate 95% confidence intervals for these estimates. Path analyses were conducted by linear regression.

3. Results

3.1 Participants

A total of 453 cancer patients were recruited, and 439 with integral data were analyzed in our study, including 139 with lung cancer, 116 with breast cancer, 108 with colorectal cancer and 76 with gastrointestinal cancer. Of the participants, 45.79% ($n=201$) were male and 54.21% ($n=238$) were female. Average age at diagnosis was 57.08 ± 9.23 years. Most participants (92.71%) were married. Regarding disease severity (stage of cancer), most participants were at stage III ($n=150$, 34.17%) and stage II ($n=138$, 31.44%); 120 participants (27.33%) had continuously received comprehensive treatment including surgery and adjuvant radiotherapy or chemotherapy. Other demographic information is presented in Table 1.

3.2 Descriptive analysis of resilience, SPB and social support

The basic descriptive statistics for resilience, SPB and social support are shown in Tables 1–3. The average standard score for the CD-RISC was 61.48 ± 14.43 , which was lower than the 65.34 ± 14.27 points reported for the Chinese norm. The mean score for SPB was 31.80 ± 7.68 . The total score for social support was 41.82 ± 7.47 points, which is lower than the 44.34 ± 8.38 points for the Chinese norm.

3.2.1 Resilience and its influencing factors

The mean scores for the three subscales for resilience were 31.26 ± 7.87 for tenacity, 20.58 ± 5.01 for strength and 9.64 ± 2.38 for optimism. Patients more than 60 years old were more optimistic than younger ones ($F=4.48$, $p=0.035$). Patients with colorectal cancer had the highest score (65.40 ± 16.46) for resilience and breast cancer patients had the lowest (58.52 ± 12.69) ($F=5.51$, $p=0.001$). The mean score for resilience decreased as cancer stage increased, but no significant difference was found. The mean score for resilience in male patients was higher than for females, especially in the tenacity dimension ($F=4.48$, $P=0.035$). The mean score for resilience increased as education level increased ($F=3.50$, $P=0.031$), as did that of the strength dimension ($F=3.98$, $P=0.019$). Patients with a full-time job had a higher mean score for resilience on all three factors than unemployed patients ($F=8.25$, $P=0.004$). No significant difference was found between urban and rural residents, or between married and unmarried status. Resilience level differed significantly by insurance type ($F=2.99$, $P=0.031$), household income per year ($F=3.97$, $P=0.020$), and treatment type ($t=4.70$, $P=0.031$), and the same trend was found in the three dimensions.

3.2.2 SPB and its influencing factors

The scores on the subscales of the SPB were 12.49 ± 3.75 for the emotional dimension, 15.61 ± 3.55 for the physical dimension and 3.70 ± 1.13 for the economic dimension. Patients with no job ($t=8.09$, $P=0.005$), rural residents ($t=15.07$, $P=0.000$), those with a lower household income ($F=8.68$, $P=0.000$) and those holding the new rural cooperative medical scheme (NRCMS) ($F=4.55$, $P=0.040$) had a higher SPB score, with statistical significance. The same difference was

seen with the three subscales. For the economic dimension, patients with a lower education level had higher scores ($F=4.68$, $P=0.010$). No significant difference was found for other factors.

3.2.3 Social support and its influencing factors

The mean score for subjective support was 25.46 ± 4.25 , for objective support 9.10 ± 2.97 and for utilization of support 7.26 ± 2.07 . Patients who had undergone higher education ($F=7.22$, $P=0.001$), those with a full-time job ($t=8.11$, $P=0.005$), who were married ($t=22.22$, $P<0.001$), with higher household income ($F=14.69$, $P<0.001$) and urban employee's basic medical insurance (UEBMI) ($F=3.73$, $P=0.011$) had higher social support. Consistent results were obtained across all dimensions except employment status and insurance type for subjective support and marital status and insurance type for utilization of support.

3.3 Correlation analysis among resilience, SPB and social support

The correlations among resilience, SPB and social support are shown in Table 4. After adjusting for sex, age at diagnosis, occupation, marital status, education, family income and type of insurance, resilience was negatively correlated with emotional burden ($r=-0.114$, $P=0.018$), and positively correlated with total social support ($r=0.354$, $P<0.001$). SPB was negatively correlated with utilization of social support ($r=0.179$, $P<0.001$).

3.4 Factors affecting analysis for resilience

We estimated the factors affecting resilience using generalized linear models (Table 5). After adjusting for the groups with different demographic and clinical characteristics with significant independent main effects, the emotional and physical burden and social support strongly influenced resilience.

3.5 Path analysis of SPB in the process of resilience affected by social support

The specific results are shown in Table 6. The results of the regression analysis of SPB on social support showed R^2 of 1.70%, indicating that SPB could explain 1.70% of the variance in social support. The results of the regression analysis of SPB on resilience showed R^2 of 1.30%, indicating that SPB could explain 1.30% of the variance of resilience. The results of the regression analysis of SPB and social support on resilience showed R^2 of 14.20%, indicating that SPB and social support could explain 53.2% of the variance in resilience. At the same time, the SPB showed no effect on resilience, indicating that the effects of SPB on resilience acted through social support. Social support therefore plays an intermediary role in the process of SPB affecting resilience.

4. Discussion

This study aimed to explore the relationships between resilience, SPB and social support in cancer patients. The results showed that resilience was negatively correlated with emotional SPB and positively correlated with social support. In addition, social support played a full mediating role in resilience and SPB in cancer patients.

In terms of the resilience levels of cancer patients, the total scores obtained were low. Among the cancer patients in our study, low scores were recorded for resilience (61.48 on the CD-RISC scale), below those reported in previous studies conducted in Spain for populations composed of healthy adults aged 18–60 years (72.5) [21]. Significant differences were recorded for some of the sociodemographic and clinical characteristics analyzed. Cancer diagnosis and treatment is a critical hit for both the physical and emotional wellbeing of cancer patients, especially among the economically disadvantaged. However, usually with the passage of time since the diagnosis of the disease, the understanding of the disease obtained during the consultation, and the relief of communication among patients, the mental stress to cancer patients improves. According to our findings, when the patients first received diagnosis and treatment, their level of resilience was lower than that of long-term survivors of breast cancer, as reported by Chisa Ozawaa et al. [22]. Our study found that the resilience scores for patients with colorectal cancer were highest (65.40), followed by lung cancer (62.38) and breast cancer (58.52), and those for upper digestive cancer (58.39) were the lowest. Moreover, as the stage of the tumor increased, the resilience scores of patients decreased. These findings may be related to the better prognosis of colorectal cancer and the milder physical symptoms in the early stage of the disease, which would temporarily cause less physical and mental harm to patients.

A sociodemographic factor found to be significantly correlated with total resilience (in a positive association) was that of the patients' level of education and occupational status. These findings corroborated the notion of "empowered patients", because an active patient with educational and social resources and control over their own life and health, tends to have greater capacity to make decisions, to satisfy their needs, and to solve problems [23]. Although in the present study we did not evaluate the patients' degree of knowledge about the disease and its diagnostic process, it was striking that participants with a higher educational level or full-time employment obtained higher scores in the dimensions of tenacity, strength, and optimism. It would be interesting, in future research, to consider this aspect in greater detail with a larger sample. In addition, higher levels of resilience were observed in patients who had higher household income, which reminded us that a good economic condition is a significant factor for cancer patients. However, the correlation analysis was inconsistent: no association was found between resilience and economic burden. On the other hand, an inverse relationship was found between levels of resilience and self-perceived economic burden in the generalized linear mixed model analysis. These findings demonstrated that the economic dimension in one item of the SPBS was insufficient for the measurement of financial burden. Regarding an evaluation scale for financial distress, the COmprehensive Score for financial Toxicity (COST) is an 11-item instrument designed to measure financial toxicity, with a single item on financial spending, two items on financial resources and eight items on the psychosocial response of cancer patients. This instrument was developed in 2014 by de Souza et al. [24] and has recently been validated with patients in the United States and cancer patients in other countries. Our team has been working on the Chinese version of the scale, and relevant results will be announced in due course.

In our research, we also explored the relationships among SPB, social support and resilience. Patients with no job ($t=8.09$, $p=0.005$), rural residents ($t=15.07$, $p=0.000$), those with lower household income ($F=8.68$, $p=0.000$) and those holding the new rural cooperative medical scheme (NRCMS) insurance ($F=4.55$,

$p = 0.040$) had higher SPB score, with statistical significance. Patients who had achieved a higher level of education, those with a full-time job, who were married, with a higher household income and urban employee's basic medical insurance (UEBMI) had higher social support. Social support was found to be highly related to resilience ($r = 0.354$). Resilience was negatively correlated with emotional burden, and the emotional and physical burden and social support strongly influenced resilience. Path analysis found that social support played an intermediary role in the process of SPB affecting resilience. This result was similar to those of Kukiwara's research [25]. Good social support is an important line of defense for patients in overcoming the psychological burden of cancer and may result in a better quality of life [26]. However, a study by Tang et.al did not find a relationship between support from others and cancer survivorship [27]. Thus, further research is necessary.

This study has several limitations. First, the cross-sectional design prevented us from drawing conclusions about causality. Second, we assessed sociodemographic factors in the period immediately following diagnosis; therefore, we were unable to determine if the experience of the disease changed the profile of our patients in terms of employment and personal status. Accordingly, further research should be undertaken to measure resilience with respect to social and cultural factors, taking patients' status before and after the diagnosis of cancer into account, as well as the evolution of resilience from the first diagnosis and during and after treatment.

5. Conclusion

In summary, the resilience status of cancer patients was low and it was affected by the level of self-burden mediated through social support. This study reminds us that improving the resilience level of cancer survivors will improve their quality of life. These findings are of direct practical importance because they make it possible to select patients and to focus attention on aspects whereby resilience can be improved. The results obtained in this study lead us to conclude that sociodemographic and clinical factors have a positive impact on the level of resilience among cancer patients. A background of higher education, a stable job, sufficient economic income, and care or support from family and the social circle are all positive factors for resilience.

List Of Abbreviations

Connor–Davidson Resilience Scale (CD-RISC); SPB, self-perceived burden; The Social Support Rating Scale (SSRS) ;The Statistical Package for the Social Sciences (SPSS);the COmprehensive Score for financial Toxicity (COST); NRCMS, New rural cooperative medical scheme; RMB, renminbi; UEBMI, urban employee's basic medical insurance; URBMI, urban resident's basic medical insurance.

Declarations

Ethical Approval and Consent to participate

The study was approved by the Ethics Committee of Liaoning Cancer Hospital and all participants provided written informed consent.

Consent for publication

All authors have approved the manuscript and agree with its publication.

Availability of supporting data

Our data was stored as an Excel form and available for providing.

Competing interests

The authors declare that there are no conflicts of interest.

Funding

This work was supported by Key Research and Development Program project of Liaoning Province (2019JH2/10300013).

Authors' contributions

Yu Zhifu participated in analysis of data and drafting the manuscript. Zuo tingting participated in analysis of data. Jiang guichun participated in controlling quality of the data. Zhang qiang participated in collecting samples. Jiang shuang participated in collecting samples. Xing Haiyang participated in collecting samples. Cao Li participated in collecting samples. Cai Lijuan participated in collecting samples. Liu Jihong participated in collecting samples. Liu yunong participated in the design and drafting of the manuscript.

Acknowledgements

We are especially grateful to all of the individuals who conducted this research.

References

1. Ferlay J, Colombet M, Soerjomataram I, Mathers C, Parkin DM, Pineros M, Znaor A, Bray F (2019) Estimating the global cancer incidence and mortality in 2018: GLOBOCAN sources and methods. *International journal of cancer* 144: 1941-1953

2. Watts S, Leydon G, Birch B, Prescott P, Lai L, Eardley S, Lewith G (2014) Depression and anxiety in prostate cancer: a systematic review and meta-analysis of prevalence rates. *BMJ open* 4: e003901
3. Inhestern L, Beierlein V, Bultmann JC, Moller B, Romer G, Koch U, Bergelt C (2017) Anxiety and depression in working-age cancer survivors: a register-based study. *BMC cancer* 17: 347
4. Mitchell AJ, Ferguson DW, Gill J, Paul J, Symonds P (2013) Depression and anxiety in long-term cancer survivors compared with spouses and healthy controls: a systematic review and meta-analysis. *The Lancet Oncology* 14: 721-732
5. Boyes AW, Girgis A, D'Este CA, Zucca AC, Lecathelinais C, Carey ML (2013) Prevalence and predictors of the short-term trajectory of anxiety and depression in the first year after a cancer diagnosis: a population-based longitudinal study *Journal of clinical oncology. official journal of the American Society of Clinical Oncology* 31: 2724-2729
6. Custers JAE, Gielissen MFM, Janssen SHV, de Wilt JHW, Prins JB (2016) Fear of cancer recurrence in colorectal cancer survivors Supportive care in cancer. *Supportive Care in Cancer* 24: 555-562
7. Loprinzi CE, Prasad K, Schroeder DR, Sood A (2011) Stress Management and Resilience Training (SMART) program to decrease stress and enhance resilience among breast cancer survivors: a pilot randomized clinical trial *Clinical. breast cancer* 11: 364-368
8. Dubey C, De Maria J, Hoeppli C, Betticher DC, Eicher M (2015) Resilience and unmet supportive care needs in patients with cancer during early treatment: A descriptive study *European journal of oncology nursing. European Oncology Nursing Society* 19: 582-588
9. Richardson GE (2002) The metatheory of resilience and resiliency. *Journal of clinical psychology* 58: 307-321
10. Kukiwara H, Yamawaki N, Uchiyama K, Arai S, Horikawa E (2014) Trauma, depression, and resilience of earthquake/tsunami/nuclear disaster survivors of Hirono, Fukushima, Japan. *Psychiatry and clinical neurosciences* 68: 524-533
11. Bahremand M, Rai A, Alikhani M, Mohammadi S, Shahebrahimi K, Janjani P (2014) Relationship Between Family Functioning and Mental Health Considering the Mediating Role of Resiliency in Type 2 Diabetes Mellitus Patients. *Global Journal of Health Science* 7
12. Hou WK, Law CC, Yin J, Fu YT (2010) Resource loss, resource gain, and psychological resilience and dysfunction following cancer diagnosis: a growth mixture modeling approach *Health psychology. Health Psychology* 29: 484-495
13. Li MY, Yang YL, Liu L, Wang L (2016) Effects of social support, hope and resilience on quality of life among Chinese bladder cancer patients: a cross-sectional study. *Health and quality of life outcomes* 14: 73
14. Zhang H, Zhao Q, Cao P, Ren G (2017) Resilience and Quality of Life: Exploring the Mediator Role of Social Support in Patients with Breast Cancer. *Medical science monitor.*23: 5969-5979
15. Oeki M, Mogami T, Hagino H (2012) Self-perceived burden in patients with cancer: scale development and descriptive study *European journal of oncology nursing. European Oncology Nursing Society* 16: 145-152
16. Li X, Chen S, Zhang J, Li L, Li Y, Ye M (2020) Resilience process and its protective factors in long-term survivors after lung cancer surgery: a qualitative study *Supportive care in cancer. Supportive Care in Cancer*
17. Libert Y, Borghgraef C, Beguin Y, Delvaux N, Devos M, Doyen C, Dubrulle S, Etienne AM, Lienard A, Merckaert I, Reynaert C, Slachmuylder JL, Straetmans N, Van Den Neste E, Bron D, Razavi D (2017) Factors associated with self-perceived burden to the primary caregiver in older patients with hematologic malignancies. an exploratory study *Psycho-oncology* 26: 118-124
18. Ting CY, Teh GC, Yu KL, Alias H, Tan HM, Wong LP (2020) Self-perceived burden and its associations with health-related quality of life among urologic cancer patients. *European journal of cancer care* 29: e13248
19. Wu L, Tan Y, Liu Y (2017) Factor structure and psychometric evaluation of the Connor-Davidson resilience scale in a new employee population of China. *BMC psychiatry* 17: 49
20. Natalie C, Ian M, Steve H, Paul H, (2003) Measuring Chronic Patients' Feelings of Being a Burden to their Caregivers. *Medical Care* 41:110-118
21. Blanca NP, Montserrat SM, María D SP, Raquel BG, Javier GC and Vicente MV (2011) Reliability and validity of the Spanish version of the 10-item Connor-Davidson Resilience Scale (10-item CD-RISC) in young adults. *Health and Quality of Life Outcomes* 9: 63-69
22. Ozawa C, Suzuki T, Mizuno Y, Tarumi R, Yoshida K, Fujii K, Hirano J, Tani H, Rubinstein EB, Mimura M, Uchida H (2017) Resilience and spirituality in patients with depression and their family members: A cross-sectional study. *Comprehensive psychiatry* 77: 53-59
23. Barlow C, Cook D, Mulligan k, Beck E, Newman S (2010) A Critical Review of Self-Management and Educational Interventions in Inflammatory Bowel Disease. *Gastroenterol Nurs* 33:11-18
24. de Souza JA, Yap BJ, Wroblewski K, Blinder V, Araujo FS, Hlubocky FJ, Nicholas LH, O'Connor JM, Brockstein B, Ratain MJ, Daugherty CK, Cella D (2017) Measuring financial toxicity as a clinically relevant patient-reported outcome: The validation of the COmprehensive Score for financial Toxicity (COST). *Cancer* 123: 476-484
25. Kukiwara H, Yamawaki N, Ando M, Nishio M, Kimura H, Tamura Y (2020) The mediating effect of resilience between family functioning and mental well-being in hemodialysis patients in Japan: a cross-sectional design. *Health and quality of life outcomes* 18: 233
26. Nuworza K, Kwaku OA, Anna MW (2020) Depression, anxiety and quality of life among women living with breast cancer in Ghana: mediating roles of social support and religiosity. *Supportive Care in Cancer* 28
27. Tang ST, Hsieh CH, Chiang MC, Chen JS, Chang WC, Chou WC, Hou MM (2017) Impact of high self-perceived burden to others with preferences for end-of-life care and its determinants for terminally ill cancer patients: a prospective cohort study. *Psycho-oncology* 26: 102-108

Tables

Table 1
Resilience in Groups with Different Demographic and Clinical Characteristics (n = 439)

Variable		Num	Percent(%)	Resilience (Mean ± Std.)	F/t value/P value	Tenacity (Mean ± Std.)	F/t value/P value	Strength (Mean ± Std.)	F/t value/P value	Optimism (Mean ± Std.)	F/t valu value
Total		439		61.48 ± 14.43		31.26 ± 7.87		20.58 ± 5.01		9.64 ± 2.38	
Gender	Male	201	45.79	62.92 ± 14.33	3.69/0.055	32.12 ± 7.81	4.48/0.035	20.99 ± 4.92	2.40/0.122	9.81 ± 2.40	1.91
	Female	238	54.21	60.27 ± 14.43		30.53 ± 7.87		20.24 ± 5.06		9.50 ± 2.37	
Age(y) at diagnosis	< 60	243	55.35	60.72 ± 13.85	1.50/0.222	30.96 ± 7.56	0.76/0.384	20.36 ± 4.80	1.10/0.295	9.40 ± 2.32	5.43
	≥ 60	196	44.65	62.42 ± 15.09		31.62 ± 8.25		20.86 ± 5.26		9.93 ± 2.44	
Education	Middle school or lower	268	61.05	60.36 ± 14.99	3.50/0.031	30.66 ± 8.18	3.01/0.050	20.24 ± 5.16	3.98/0.019	9.47 ± 2.44	2.27
	High school	99	22.55	61.67 ± 12.75		31.46 ± 7.000		20.43 ± 4.53		9.77 ± 2.28	
	College or above	72	16.40	65.39 ± 13.94		33.19 ± 7.61		22.08 ± 4.86		10.11 ± 2.26	
Employment status	Full-time job	82	18.68	65.57 ± 12.02	8.25/0.004	33.38 ± 6.43	7.42/0.007	22.01 ± 4.45	8.35/0.004	10.18 ± 2.12	5.28
	Unemployed	357	81.32	60.54 ± 14.78		30.77 ± 8.12		20.25 ± 5.08		9.52 ± 2.43	
Marital status	Married	407	92.71	61.59 ± 14.45	0.30/0.582	31.32 ± 7.91	0.37/0.541	20.61 ± 5.02	0.22/0.643	9.65 ± 2.37	0.12
	Non-Married	32	7.29	60.12 ± 14.32		30.44 ± 7.47		20.19 ± 4.92		9.50 ± 2.53	
Residence	Urban	277	63.10	61.96 ± 14.06	0.83/0.363	31.44 ± 7.48	0.42/0.517	20.78 ± 5.05	1.20/0.274	9.73 ± 2.35	1.14
	Rural	162	36.90	60.66 ± 15.04		30.94 ± 8.52		20.24 ± 4.93		9.48 ± 2.43	
Disease site	Lung	139	31.66	62.38 ± 13.10	5.51/0.001	31.88 ± 7.31	5.45/0.001	20.73 ± 4.56	3.60/0.014	9.77 ± 2.20	6.51
	Gastrointestinal	76	16.40	58.39 ± 14.89		29.79 ± 8.10		19.92 ± 4.90		9.08 ± 2.58	
	Colorectal	108	24.60	65.40 ± 16.46		33.28 ± 8.84		21.76 ± 5.90		10.36 ± 2.50	
	Breast	116	26.42	58.52 ± 12.69		29.59 ± 6.93		19.75 ± 4.49		9.18 ± 2.17	
Stage	Ⅰ	72	16.40	62.86 ± 13.40	1.24/0.295	31.92 ± 7.30	1.06/0.377	20.93 ± 4.64	1.48/0.207	10.01 ± 2.42	1.21
	Ⅱ	138	31.44	62.05 ± 14.01		31.43 ± 7.62		21.01 ± 4.96		9.61 ± 2.24	
	Ⅲ	150	34.17	61.95 ± 14.82		31.57 ± 8.26		20.65 ± 4.94		9.72 ± 2.47	
	Ⅳ	40	9.11	57.70 ± 14.25		29.12 ± 7.43		19.25 ± 5.43		9.32 ± 2.28	
Present type of treatment	Single	319	72.67	62.39 ± 14.41	4.70/0.031	31.76 ± 7.85	4.89/0.028	20.87 ± 4.95	3.81/0.052	9.76 ± 2.45	2.90
	Comprehensive	120	27.33	59.06 ± 14.25		29.91 ± 7.82		19.82 ± 5.10		9.32 ± 2.18	
Household income per year	≤ 50000	315	71.75	60.69 ± 14.55	3.97/0.020	30.78 ± 8.03	3.69/0.026	20.34 ± 5.00	3.92/0.021	9.57 ± 2.41	2.76
	50000–100000	90	20.50	61.82 ± 13.82		31.69 ± 7.31		20.58 ± 4.93		9.56 ± 2.26	

Abbreviations: NRCMS, New rural cooperative medical scheme; RMB, renminbi; UEBMI, urban employee's basic medical insurance; URBMI, urban resident's ba
medical insurance.

Variable		Num	Percent(%)	Resilience (Mean ± Std.)	F/t value/P value	Tenacity (Mean ± Std.)	F/t value/P value	Strength (Mean ± Std.)	F/t value/P value	Optimism (Mean ± Std.)	F/t valu valu
≥ 10000		34	7.74	67.94 ± 13.57		34.53 ± 7.23		22.85 ± 4.84		10.56 ± 2.36	
Assurance type	UEBMI	228	51.94	63.07 ± 13.44	2.99/0.031	32.00 ± 7.23	2.36/0.071	21.17 ± 4.81	3.23/0.022	9.90 ± 2.25	2.76
	URBMI	53	12.07	62.51 ± 15.44		31.81 ± 8.34		20.91 ± 5.31		9.79 ± 2.48	
	NRCMS	125	28.47	59.25 ± 15.33		30.25 ± 8.52		19.78 ± 5.17		9.22 ± 2.49	
	Other	33	7.52	57.27 ± 14.60		29.03 ± 8.33		19.06 ± 4.69		9.18 ± 2.58	
Abbreviations: NRCMS, New rural cooperative medical scheme; RMB, renminbi; UEBMI, urban employee's basic medical insurance; URBMI, urban resident's ba medical insurance.											

Table 2
Self-perceived Burden in Groups with Different Demographic and Clinical Characteristics (n = 439)

Variable		Num	Percent(%)	Total SPB (Mean ± Std.)	F/t value/P value	Emotional burden (Mean ± Std.)	F/t value/P value	Physical burden (Mean ± Std.)	F/t value/P value	Economic burden (Mean ± Std.)	F/t value/P value
Total		439		31.80 ± 7.68		12.49 ± 3.75		15.61 ± 3.55		3.70 ± 1.13	
Gender	Male	201	45.79	31.55 ± 7.90	0.39/0.528	12.33 ± 3.84	0.69/0.408	15.59 ± 3.63	0.01/0.911	3.63 ± 1.17	1.4
	Female	238	54.21	32.02 ± 7.50		12.63 ± 3.68		15.63 ± 3.48		3.76 ± 1.10	
Age(y) at diagnosis	< 60	243	55.35	32.15 ± 7.59	1.12/0.291	12.68 ± 3.72	1.39/0.240	15.69 ± 3.53	0.24/0.625	3.79 ± 1.05	3.0
	≥ 60	196	44.65	31.37 ± 7.79		12.26 ± 3.80		15.52 ± 3.57		3.60 ± 1.22	
Education	Middle school or lower	268	61.05	32.37 ± 7.59	2.51/0.082	12.79 ± 3.73	3.22/0.041	15.75 ± 3.60	0.74/0.480	3.82 ± 1.07	4.6
	High school	99	22.55	31.46 ± 8.09		12.34 ± 3.89		15.54 ± 3.48		3.59 ± 1.19	
	College or above	72	16.40	30.15 ± 7.26		11.56 ± 3.54		15.19 ± 3.32		3.40 ± 1.24	
Employment status	Full-time job	82	18.68	29.65 ± 7.82	8.09/0.005	11.45 ± 3.54	7.84/0.005	14.88 ± 3.74	4.36/0.037	3.32 ± 1.13	11.1
	Unemployed	357	81.32	32.30 ± 7.57		12.73 ± 3.77		15.78 ± 3.48		3.79 ± 1.12	
Marital status	Married	407	92.71	31.76 ± 7.72	0.17/0.680	12.45 ± 3.77	0.72/0.397	15.62 ± 3.55	0.02/0.893	3.70 ± 1.15	0.1
	Non-Married	32	7.29	32.34 ± 7.25		13.03 ± 3.57		15.53 ± 3.61		3.78 ± 0.94	
Residence	Urban	277	63.10	30.73 ± 7.90	15.07/0.000	12.00 ± 3.84	12.93/0.000	15.22 ± 3.64	9.37/0.002	3.51 ± 1.18	22.1
	Rural	162	36.90	33.64 ± 6.94		13.32 ± 3.46		16.28 ± 3.28		4.03 ± 0.97	
Disease site	Lung	139	31.66	32.45 ± 6.46	1.97/0.118	12.81 ± 3.46	1.95/1.21	15.96 ± 2.62	2.45/0.063	3.68 ± 1.06	0.0
	Gastrointestinal	76	17.31	33.04 ± 7.88		13.12 ± 3.61		16.18 ± 3.89		3.74 ± 1.11	
	Colorectal	108	24.60	31.30 ± 9.15		12.13 ± 4.36		15.44 ± 4.33		3.73 ± 1.13	
	Breast	116	26.42	30.69 ± 7.29		12.03 ± 3.52		14.98 ± 3.40		3.67 ± 1.13	
Stage	I	72	16.40	32.53 ± 6.77	0.41/0.798	12.78 ± 3.67	0.54/0.705	16.03 ± 2.72	0.68/0.605	3.72 ± 1.08	0.2
	II	138	31.44	31.63 ± 7.82		12.29 ± 3.60		15.64 ± 3.77		3.70 ± 1.17	
	III	150	34.17	31.58 ± 7.93		12.50 ± 3.83		15.37 ± 3.83		3.71 ± 1.15	
	IV	40	9.11	31.10 ± 8.40		12.08 ± 4.24		15.25 ± 3.66		3.78 ± 1.14	
	Unknown	39	8.88	32.67 ± 7.24		13.05 ± 3.72		16.05 ± 2.81		3.56 ± 1.07	
Present type of treatment	Single	319	72.67	31.67 ± 7.61	0.35/0.554	12.50 ± 3.67	0.01/0.914	15.50 ± 3.58	1.21/0.271	3.67 ± 1.13	0.8
	Comprehensive	120	27.33	32.16 ± 7.90		12.46 ± 3.98		15.92 ± 3.44		3.78 ± 1.15	

Abbreviations: SPB, self-perceived burden; NRCMS, New rural cooperative medical scheme; RMB, renminbi; UEBMI, urban employee's basic medical insurance; URBMI, urban resident's basic medical insurance.

Variable		Num	Percent(%)	Total SPB (Mean ± Std.)	F/t value/P value	Emotional burden (Mean ± Std.)	F/t value/P value	Physical burden (Mean ± Std.)	F/t value/P value	Economic burden (Mean ± Std.)	F/t value/P value
Household income per year	≤ 50000	315	71.75	32.67 ± 7.62	8.68/0.000	12.91 ± 3.77	8.11/0.000	15.88 ± 3.57	4.18/0.016	3.88 ± 1.07	17.1
	50000–100000	90	20.50	30.27 ± 7.13		11.71 ± 3.46		15.19 ± 3.27		3.37 ± 1.12	
	≥ 10000	34	7.74	27.82 ± 7.96		10.68 ± 3.53		14.24 ± 3.70		2.91 ± 1.24	
Assurance type	UEBMI	228	51.94	30.54 ± 7.43	4.55/0.040	11.91 ± 3.56	3.98/0.008	15.13 ± 3.49	3.21/0.023	3.50 ± 1.15	5.6
	URBMI	53	12.07	32.83 ± 8.19		12.85 ± 4.13		16.23 ± 3.75		3.75 ± 1.09	
	NRCMS	125	28.47	33.48 ± 7.57		13.26 ± 3.81		16.22 ± 3.41		4.01 ± 1.03	
	Other	33	7.52	32.52 ± 7.76		13.00 ± 3.71		15.70 ± 3.74		3.82 ± 1.24	
Abbreviations: SPB, self-perceived burden; NRCMS, New rural cooperative medical scheme; RMB, renminbi; UEBMI, urban employee's basic medical insurance; URBMI, urban resident's basic medical insurance.											

Table 3
Social Support in Groups with Different Demographic and Clinical Characteristics (n = 439)

Variable		Num	Percent(%)	Total support (Mean ± Std.)	F/t value/P value	Subjective support (Mean ± Std.)	F/t value/P value	Objective support (Mean ± Std.)	F/t value/P value	Utilization of support (Mean ± Std.)
Total		439		41.82 ± 7.47		25.46 ± 4.25		9.10 ± 2.97		7.26 ± 2.07
Gender	Male	243	55.35	41.91 ± 7.61	0.08/0.782	25.52 ± 4.31	0.12/0.730	9.16 ± 3.12	0.164/0.686	7.24 ± 2.05
	Female	196	44.65	41.71 ± 7.32		25.38 ± 4.19		9.04 ± 2.77		7.30 ± 2.10
Age(y) at diagnosis	< 60	201	45.79	41.77 ± 7.73	0.02/0.881	25.40 ± 4.36	0.06/0.812	9.14 ± 3.11	0.05/0.823	7.22 ± 2.09
	≥ 60	238	54.21	41.87 ± 7.27		25.50 ± 4.17		9.08 ± 2.85		7.30 ± 2.06
Education	Middle school or lower	268	61.05	40.87 ± 7.30	7.22/0.001	25.04 ± 4.27	3.64/0.03	8.76 ± 2.75	7.01/0.001	7.07 ± 2.03
	High school	99	22.55	42.53 ± 7.80		25.91 ± 4.22		9.24 ± 3.01		7.37 ± 2.23
	College or above	72	16.40	44.43 ± 7.01		26.39 ± 4.05		10.21 ± 3.42		7.83 ± 1.91
Employment status	Full-time job	82	18.68	43.93 ± 8.13	8.11/0.005	25.89 ± 4.10	1.05/0.305	10.30 ± 3.59	17.07/0.000	7.73 ± 2.14
	Unemployed	357	81.32	41.34 ± 7.24		25.36 ± 4.29		8.83 ± 2.74		7.16 ± 2.04
Marital status	Married	407	92.71	42.29 ± 7.23	22.22/0.000	25.72 ± 4.17	22.21/0.000	9.28 ± 2.87	20.32/0.000	7.29 ± 2.06
	Non-Married	32	7.29	35.97 ± 8.17		22.12 ± 3.93		6.88 ± 3.34		6.97 ± 2.25
Residence	Urban	277	63.10	42.11 ± 7.35	1.08/0.299	25.52 ± 4.13	0.15/0.696	9.29 ± 3.03	3.01/0.083	7.30 ± 2.07
	Rural	162	36.90	41.34 ± 7.69		25.35 ± 4.47		8.78 ± 2.84		7.20 ± 2.08
Disease site	Lung	139	31.66	42.12 ± 7.70	1.17/0.322	25.42 ± 4.17	1.04/0.376	9.18 ± 2.79	1.31/0.269	7.52 ± 2.10
	Gastrointestinal	76	17.31	40.41 ± 6.99		24.87 ± 4.04		8.58 ± 2.63		6.96 ± 1.99
	Colorectal	108	24.60	41.90 ± 8.16		25.38 ± 4.77		9.44 ± 3.43		7.07 ± 2.17
	Breast	116	26.42	42.34 ± 6.79		25.96 ± 3.96		9.04 ± 2.91		7.34 ± 1.97
Stage	I	72	16.40	44.14 ± 6.58	4.18/0.002	26.42 ± 3.52	3.45/0.009	9.81 ± 2.82	2.77/0.027	7.92 ± 2.10
	II	138	31.44	42.66 ± 7.08		26.05 ± 4.03		9.39 ± 3.02		7.22 ± 1.94
	III	150	34.17	40.75 ± 7.98		25.03 ± 4.70		8.56 ± 3.01		7.17 ± 2.03
	IV	40	9.11	39.38 ± 7.36		24.10 ± 4.09		8.78 ± 3.21		6.50 ± 1.91
	Unknown	39	8.88	41.23 ± 7.29		24.62 ± 4.08		9.23 ± 2.32		7.38 ± 2.50
Present type of treatment	Single	319	72.67	41.88 ± 7.74	0.06/0.808	25.46 ± 4.32	0.01/0.946	9.13 ± 3.01	0.07/0.785	7.29 ± 2.16
	Comprehensive	120	27.33	41.68 ± 6.76		25.43 ± 4.09		9.04 ± 2.87		7.21 ± 1.80

Abbreviations: NRCMS, New rural cooperative medical scheme; RMB, renminbi; UEBMI, urban employee's basic medical insurance; URBMI, urban resident's basic medical insurance.

Variable		Num	Percent(%)	Total support (Mean ± Std.)	F/t value/P value	Subjective support (Mean ± Std.)	F/t value/P value	Objective support (Mean ± Std.)	F/t value/P value	Utilization of support (Mean ± Std.)
Household income per year	≤ 50000	315	71.75	40.76 ± 7.41	14.69/0.000	25.02 ± 4.40	6.79/0.001	8.72 ± 2.88	11.99/0.000	7.02 ± 1.99
	50000–100000	90	20.50	43.63 ± 6.87		26.26 ± 3.72		9.77 ± 2.94		7.61 ± 2.11
	≥ 10000	34	7.74	46.94 ± 6.70		27.35 ± 3.35		10.94 ± 2.96		8.65 ± 2.12
Assurance type	UEBMI	228	51.94	42.68 ± 7.28	3.73/0.011	25.74 ± 3.99	2.31/0.076	9.49 ± 3.12	3.66/0.013	7.46 ± 2.07
	URBMI	53	12.07	40.43 ± 6.64		24.79 ± 3.94		8.85 ± 2.69		6.79 ± 1.93
	NRCMS	125	28.47	41.70 ± 7.73		25.63 ± 4.62		8.84 ± 2.72		7.23 ± 2.07
	Other	33	7.52	38.61 ± 8.11		23.91 ± 4.77		7.88 ± 2.90		6.82 ± 2.20
Abbreviations: NRCMS, New rural cooperative medical scheme; RMB, renminbi; UEBMI, urban employee's basic medical insurance; URBMI, urban resident's basic medical insurance.										

Table 4
Correlations among resilience, SPB and social support

variable	1	2	3	4	5	6	7	8
1Resilience	1							
2Tenacity	–	1						
3Strength	–	–	1					
4Optimism	–	–	–	1				
5Self-perceived Burden	-0.071	-0.070	-0.051	-0.086	1			
6Emotional	-0.114*	-0.110*	-0.105*	-0.104*	–	1		
7Physical	-0.020	-0.019	-0.002	-0.054	–	–	1	
8Economic	-0.039	-0.053	0.003	-0.068	–	–	–	1
9Social support	0.354*	0.332*	0.367*	0.274*	-0.073	-0.122*	-0.005	-0.078
10Objective	0.237*	0.213*	0.254*	0.193*	-0.039	-0.084	0.026	-0.069
11Subjective	0.298*	0.282*	0.316*	0.207*	-0.011-	-0.064	0.047	-0.008
12Support utilization	0.303*	0.290*	0.289*	0.261*	-0.179*	-0.179*	-0.147*	-0.159*
Abbreviations: SPB, self-perceived burden;								
*Indicates statistically significant after adjusting for sex, age at diagnosis, occupation, marital status, education, family income and type of insurance.								

Table 5
Generalized Linear Mixed Models Analysis for Factors Affecting Resilience.

Variable	B(95%CI0)	Std. Error	χ ² value	Pvalue
Sex-male	2.18(1.98,2.37)	0.098	495.55	0.000
Age at diagnosis<60	-1.75(-1.94,-1.56)	0.098	318.73	0.000
Employment status- Full-time job	2.96(1.98,2.37)	0.129	522.00	0.000
Emotional Burden	-0.61(-0.65,-0.56)	0.021	803.789	0.000
Physical Burden	0.38(0.34,0.43)	0.023	285.929	0.000
Economic Burden	0.44(0.33,0.55)	0.059	57.220	0.000
Objective support	0.55(0.52,0.57)	0.0138	1576.494	0.000
Subjective support	0.39(0.35,0.43)	0.0195	405.916	0.000
Support utilization	1.43(1.38,1.49)	0.0267	2883.590	0.000

Table 6
Path Analysis of SPB in the Process of Resilience being Affected by Social Support

Path analysis	Variable	<i>B</i>	<i>Beta</i>	<i>t</i>	<i>P</i>	R ²	Adjusted R ²	F value
Regression analysis of SPB on social support	Constant	45.842		30.361	< 0.001	0.017	0.015	7.492
	SPB	-0.126	-0.130	-2.737	0.006			
Regression analysis of SPB on resilience	Constant	68.196		18.051	< 0.001	0.013	0.010	5.592
	SPB	-0.211	-0.112	-2.365	0.018			
Regression analysis of SPB and social support on resilience	Constant	36.120		7.513	< 0.001	0.142	0.138	36.019
	SPB	-0.123	-0.065	-1.460	0.145			
	Social support	0.700	0.362	8.101	< 0.001			
Abbreviations: SPB, self-perceived burden;								