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The Association Between Frailty and Depression of Older Adults with Cancer in China: The Mediating Effect of Social Support

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Purpose: This study aimed to explore the mediating role of social support between depression and frailty in older adults with cancer and the regulatory role of the income level.

Patients and Methods: A convenient sampling method was used to select 448 older adults with cancer from the cancer-related departments of 3 hospitals in Bengbu City, Anhui Province, China. The sociodemographic and disease-related data were collected and examined using the frailty phenotype scale, social support scale, and older adults depression scale. We examined the mediating effects using Models 4 and 59 in the SPSS PROCESS 3.5 macro program.

Results: Depression was negatively correlated with social support and its various dimensions ($P < 0.05$, r = -0.249 to -0.100). Frailty was positively associated with depression ($P < 0.01$, $r = 0.388$). The frailty was negatively correlated with the total score of social support and objective support ($P< 0.01$, r= = -0.232 to –0.182). Social support partially mediated depression and frailty, with the mediating effect accounting for 15.74% of the total development. The income level regulated only the first stage path in the mediating model (B = -0.227, P<0.001), and the mediating effect of the income level displayed individual differences.

Conclusion: The frailty of older adults with cancer is associated with depression and social support. A good level of social support can alleviate depression and reduce the risk of frailty, while a low level of social support may exacerbate the vicious cycle between depression and frailty, with income levels playing a regulatory role in this process.

Keywords: Depression, Frail older adults, Cancer Survivors, Social Support

Introduction

With the rapid development of the social economy and changes in people's lifestyles, malignant tumors have become one of the critical factors affecting people's physical and mental health.[1] The aging of the human body closely correlates with the prevalence of malignant tumors. Older adults aged more than 65 years with cancer account for more than 60% of the total age group, and their prevalence rate and mortality are 8.47 and 13.96 times higher than those of young patients with cancer, respectively.[2,3]

Frailty is a nonspecific state in which the ability of older adults to resist stress decreases due to a decline in physiological reserves, involving physiological changes in multiple systems, including neuromuscular, metabolic, and immune systems. This state increases the risk of adverse events such as death, disability, and falls.[1,2] The prevalence of frailty in the older adults with cancer is 6%–86%, with a median prevalence of 42%.[3] Frailty is considered an important cause of heterogeneity in the health status of older adults with cancer.[4] Some studies have shown that frailty can further reduce the treatment tolerance of patients with cancer, increase the risk of postoperative complications, disease progression, and death, seriously affect the treatment compliance of patients, lead to an increase in adverse outcomes in older adults, and seriously affect the quality of life of these patients.[5]

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Older adults with cancer are more prone to negative emotions such as depression and anxiety due to their age, multiple complications, and extended treatment cycles. The prevalence of depression in older adults with cancer is as high as 9%–15%, and 20%–30% of these patients have depressive symptoms,[6] which is far higher than the prevalence rate of adults with cancer at other age stage.[7] Frailty and depression have similar intrinsic mechanisms and predictors, such as decreased physiology, cognitive decline, lack of social support, and so forth.[8] Frailty is an independent predictor of not only the onset of geriatric depression but also the development of pre-existing depressive symptoms.[8,9] Collard et al conducted a prospective study on the relationship between frailty and depression.[10] They found that the risk of depression in frail older adults without depression increases over time, and the likelihood of remission of their original depressive condition is less. Therefore, frailty is also a risk factor for depression. Woods et al[11] found, during a 3-year follow-up of depressed older adults with depression compared with other groups, that these people had a higher risk of frailty.

In summary, frailty and depression are processes of mutually reinforcing decline, and having a causal and interactive relationship.[12]

Moreover, some scholars believe that family income and medical expenses are the essential factors affecting depression in older adults.[13] Valdes-Stauber et al[14] pointed out that economic and family care issues were among the most critical factors for depressive symptoms in patients with malignant tumors during long-term treatment. Similarly, Giannouli also found in his research that older women who suffer from financial exploitation are more likely to experience frailty compared to men.[15] From this, it can be inferred that economic level has a certain impact on depression and frailty in older adults. This might be because a better income level also affects more straightforward access of individuals to high-quality medical resources and related knowledge, which plays an essential role in patients' understanding of tumors and coordination with prevention, screening, and treatment,[16] However, its specific mechanism of action is not yet clear.

Although a few studies have explored the mechanism between depression and frailty in older adults with cancer, research on frailty in China is still in its infancy. Recently, a review exploring the impact of social isolation on the physical and mental health of older adults pointed out that social isolation can generate a series of complex brain-body interactions, ultimately making the entire organism more susceptible to psychological and physical health conditions. There is still a lack of relevant data, an urgent need for improvement.[17]

Therefore, this study assumed that social support might mediate depression and frailty in older adults with cancer, and introduced the income level of these patients as a regulatory variable to explore frailty. The correlation and mechanism between depression and social support can provide some reference and basis for clinical medical workers to make predictive treatment and nursing decisions based on the health status of patients.

Material and Methods

Study Participants

A convenient sampling method was used to select such patients from tumor-related departments of three Class III hospitals in Bengbu City, Anhui Province, China, from February to May 2022 as the study participants. Inclusion criteria: ① Age ≥ 60 years old; ② Pathological examination diagnosed that he has a malignant tumour, and he has fully known his condition; ③ Individuals with regular reading, comprehension, and expression abilities can undergo physical assessment tests; ④ Sign an informed consent form and voluntarily participate in this study. Exclusion criteria: ① Mental illness, Disorders of consciousness, Communication disorder; ② Those who have participated in other clinical trials or are currently participating in other clinical trials within 3 months before the date of obtaining informed consent; ③ After communication, unwilling to participate in this study; ④Expected life ≤ 3 months.

Sample Size Calculation

This study referred to the prevalence of frailty in older adults with cancer in China (P= 0.42).[6] Based on the sample size calculation formula, where the statistic $Z_{a/2} = 1.96$, the statistical test level $\alpha = 0.05$. The allowable error d was considered

as 5% to obtain a sample size of $n = 374$. Considering the ineffective response, the sample size was expanded by 10~20% and the final sample size was estimated to be approximately 441~449 cases.

$$N = \frac{Z^2_{\alpha/2} \times [P \times (1 - P)]}{d^2}$$

Data Collection

The data collection was made using the following instruments:

(1) Self-compiled social demography and disease data questionnaire: age, sex, education level, marital status, income level (per capita monthly income of the family), tumor type, metastasis, surgical type, and so forth.

(2) Frailty phenotype (FP): FP was proposed by Fried et al[18] in 2001 and included five dimensions, such as weight loss, low grip strength, fatigue, stand-up walking timing test, and low physical activity. Physical activity was evaluated using the International Physical Activity Short Questionnaire.[19] The scoring method was as follows: "Yes" meant 1 point, "No" meant 0 points, and the total score range was 0–5 points. The FP evaluation criteria were as follows: 0 points for no frailty, 1–2 points for pre-frailty, and ≥3 points for frailty. In this study, Cronbach's α was 0.811, with good reliability.

(3) Social support rating scale (SSRS): The scale was compiled by Xiao[20] in 1986 and included three dimensions: objective support (three items), emotional support (four items), and utilization of social support (three items). The total score of 10 studies using four-level and multiple scoring methods indicated the complete social support score. The higher the score, the better the social support. In this study, the scale with Cronbach's α of 0.831 and good reliability was suitable for this study.

(4) Geriatric depression scale (GDS): This scale was first compiled by American psychologists Brinkt and Yesavage in 1982 and is widely used to measure depression in older adults.[21,22] In 1986, Yesavage and Sheikh[1] designed a simplified version of the GDS (GDS-15), which included 15 items. The overall score of the 15 items represented the total score of geriatric depression. A score of ≤4 points indicated no depression, a score of 5–9 points indicated possible depression, and a score of ≥10 points indicated the presence of depression. In this study, this scale had Cronbach's α of 0.792 and good reliability and was suitable for this study.

Two researchers conducted data collection, and inpatients did not repeatedly participate during the data collection.

Statistical Analysis

The SPSS Statistics 24.0 software was used for data analysis. The count data were expressed as frequency and composition ratio. The measurement data with normal distribution were expressed as mean and standard deviation, and the measurement data with non-normal distribution were expressed using median and quartile. Pearson correlation was used to analyze the correlation between social support, weakness, and depression in older adults with cancer. Model 4 in the PROCESS 3.5 macro program was used to analyze the mediating effect of social support between debilitation and depression in older adults with cancer, and Model 59 was used to test the regulatory impact of the income level.

Results

Sociodemographic Characteristics

In this study, the distribution of frailty, depression and social support in older adults with cancer rejected the normal distribution, so the median and quartile described their essential characteristics. Of the 448 older adults with cancer, 216 were male (48.2%) and 232 were female (51.8%). Further, 133 people (29.7%) were uneducated, 114 people (25.4%) had primary school education, 66 people (14.7%) studied at junior high school, 75 people (16.7%) obtained senior high school/technical secondary school education, and 60 people (13.4%) received education up to junior high school level or above. Also, 296 patients (66.1%) were married and 152 (33.9%) were divorced/widowed/unmarried (Supplementary Table S1). The detailed process of recruiting subjects was shown in Supplementary Figure S1.

Scale Scores

The overall prevalence of frailty in older adults with ranged from 1 to 3 points, with a median score of 2 (2,3) points, 46 without frailty (10.3%), 222 pre-frailty (49.6%), and 180 frailty (40.2%); Older adults depression scores ranged from 2 to 14 points, with a median score of 8 (5,10) points; The total score range for social support is 35 to 50 points, with a median score of 42 (20,44) points, a median score of 23 (22,24) points for subjective support, a median score of 15 (14,16) points for objective support, and a median score of 4 (3,5) points for support utilization.

Association Analysis of Depression, Social Support, and Frailty in Older Adults with Cancer

The Spearman correlation analysis showed that depression was negatively correlated with social support and its various dimensions in older adults with cancer ($P < 0.05$, $r = –0.249$ to $–0.100$). Frailty was positively correlated with depression in old age ($P < 0.01$, $r = 0.388$). Frailty was negatively correlated with the total score of social support and objective support ($P < 0.01$, $r = –0.232$ to $–0.182$), whereas no correlation was found between frailty and emotional support and support utilization ($P > 0.05$) (Table 1).

Analysis of the Mediating Effects of Social Support

Harman univariate test was used to analyze the bias effect of the standard method. The results showed that the percentage of variance explained by the first common factor was 14.43%, which was less than 40%. Therefore, no common severe method bias existed.

The possible mediating relationship between depression and frailty was examined using PROCESS 3.5 and Model 4 to further explore the correlation between depression, social support, and frailty in older adults with cancer, using Age, Living situation, Disease course, ADL and BMI, as control variables. The results showed that the total effect (path c) between depression and frailty in older adults with cancer was 0.128 [95% confidence interval (CI): 0.001–0.054], and the coefficient between indirect path depression and social support and between social support and frailty was –0.246 (95% CI: –0.350 to –1.142) and –0.082 (95% CI: –0.149 to –0.015), respectively. The indirect effect ($a \times b$) was 0.020 (95% CI: 0.095 to –0.042), which was statistically significant. This indicated that the mediating effect of social support between depression and debilitation was established as a partial mediating effect, accounting for 15.74% (Table 2 and Figure 1).

Analysis of the Moderating Effect of Economic Level on Frailty, Social Support, and Depression

Based on simple mediation analysis, this study assumed that the income level of older adults with cancer plays a role in mediating the mediation model of depression – social support–frailty. In the control of age, living situation, disease course, ADL and BMI, based on the income level as the adjustment variable, by running PROCESS macro Model 59. The results showed that the income level only adjusted the first stage path in the mediation model (depression × financial

Table 1 Correlation Between Depression, Social Support and Frailty (r) (n = 448)

Variables	1	2	3	4	5
1. Subjective support	1				
2. Objective support	0.084	1			
3. Support utilization	0.177***	0.141**	1		
4. Social support	0.799***	0.510***	0.593***	1	
5. Depression	–0.177***	–0.215***	–0.100*	–0.249***	1
6. Frailty	–0.085	–0.232**	–0.076	–0.182***	0.388***

Note: *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

Table 2 Analysis of the Mediating Effect of Social Support Between Depression and Frailty (n = 448)

Dependent variable	Independent variable	R^2	*F*	*B*	SE	t	*P*	95% CI
Social support	Depression	7.03%	5.555***	–0.246	0.053	–4.641	<0.001	–0.350 to –1.142
Frailty	Depression	52.82%	70.369**	0.108	0.639	2.792	0.006	0.032 to 0.184
	Social support			–0.082	0.034	–2.426	0.016	–0.149 to –0.015
	Control variable							
	Age			0.392	0.038	10.359	<0.001	0.318 to 0.467
	Living situation			0.092	0.034	2.725	0.006	0.026 to 0.158
	Disease course			0.041	0.034	1.215		–0.027 to 0.108
	BMI			0.054	0.034	1.600		–0.012 to 0.120
	ADL			0.339	0.042	8.067	<0.001	0.256 to 0.421
Total effect				0.128	0.038	3.375	0.001	0.053 to 0.203
Direct effect				0.108	0.039	2.792	0.005	0.032 to 0.184
Indirect effect				0.020	0.011			0.095 to 0.042

Notes: P < 0.05; **P < 0.01; ***P < 0.001: Statistically significant differences.
Abbreviations: SE, Standard error; CI, confidence interval.

income: *B*= –0.227; 95% CI: –0.319 to –0.135), which was statistically significant. The details on the second stage of the indirect path (depression × income: *B*=–0.061; 95% CI: –0.136 to 0.013) and the third stage (social support × income level: *B* = 0.032, 95% CI: –0.037 to 0.102) did not play adjustment role, which is presented in Table 3. In conclusion, the income level had a mediating effect between depression, social support, and frailty (Figure 2).

The indirect effect of social support between depression and frailty was tested under the regulatory effect. The simple slope method and the deviation-corrected percentile bootstrap method were used to categorize self-efficacy into high, medium, and low groups by adding or subtracting one standard deviation so as to explain the regulatory effect of income level more clearly. The scores of income levels higher than one standard deviation and lower than one standard deviation were considered for self-sampling (bootstrap sample = 5000) testing. The results showed that the indirect effects of social support on depression and frailty were –0.019 (95% CI: –0.1563 to 0.1171; *P* > 0.05), –0.246 (95% CI: –0.3481 to –

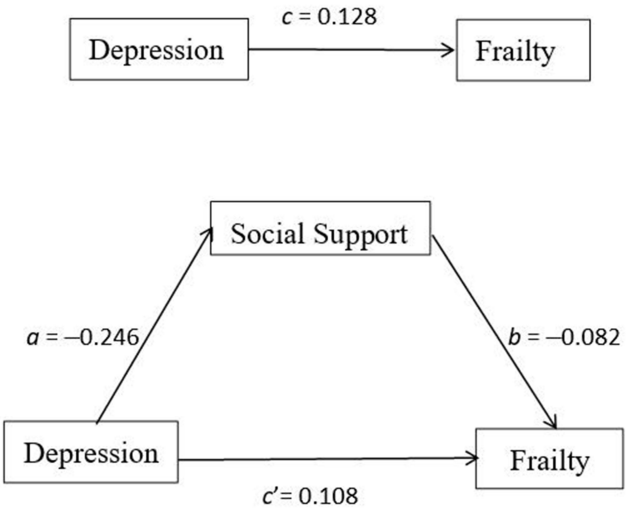

Figure 1 Mediating effect of social support between depression and frailty.

Table 3 Regression Analysis Results of the Income Level as a Regulatory Variable (n = 448)

Control variable	Model 1 Frailty			Model 2 Social support			Model 2 Frailty		
	B	T	95% CI	B	T	95% CI	B	T	95% CI
Age	0.384 (p<0.001)	9.755	0.306,0.461	–0.041	–0.764	−0.147,0.065	0.384	9.755	0.306,0.461
Living situation	0.095 (p<0.01)	2.766	0.027,0.162	0.065	1.399	−0.026,0.156	0.095	2.766	0.027,0.162
Disease course	0.042	1.237	−0.025,0.109	–0.036	–0.764	−0.127,0.056	0.042	1.237	−0.025,0.109
BMI	0.056	1.624	−0.012,0.124	–0.030	–0.634	−0.123,0.063	0.056	1.624	−0.012,0.124
ADL	0.335 (p<0.001)	7.616	0.249,0.422	–0.016	–0.273	−0.130,0.099	0.335	7.616	0.249,0.422
Independent variable									
Depression	0.107 (p<0.01)	2.755	−0.073,0.056	–0.246 (p<0.001)	–4.764	−0.348,-0.145			
Income level	–0.007	–0.182	−0.077,0.064	–0.008	–0.163	−0.105,0.089			
Depression × income level	–0.061	–1.617	−0.136,0.013	–0.227 (p<0.001)	–4.854	−0.319,-0.135			
Social support							–0.100 (p<0.01)	–2.863	−0.168,-0.013
Social support × income level							0.032	0.912	−0.037,0.102
ΔR^2	0.003			0.119			0.001		
F	2.616			7.442 (p<0.001)			0.831		

Abbreviations: FP, Frailty Phenotype; SSRS, Social Support Rating Scale; GDS, Geriatric Depression Scale; SD, Standard Deviation; CI, Confidence Interval; BMI, Body Mass Index; ADL, Activity of Daily Living.

0.1448; $P < 0.001$), and –0.4733 (95% CI: –0.6106 to –0.3360; $P < 0.001$) at low, medium, and high income levels, respectively.

In a word, depression was less predictive of social support when the income level was low (M–1SD); moderate income level predicted social support; and depression predicted social support when the income level was high (M+1SD) (Supplementary Figure S2).

Discussion

Correlation Between Depression, Social Support, and Frailty in Older Adults with Cancer

This study showed a positive correlation between depression and frailty scores in older adults with cancer. Depression, as a negative emotional experience, affects the frailty state of such older adults with cancer. The more severe the depressive

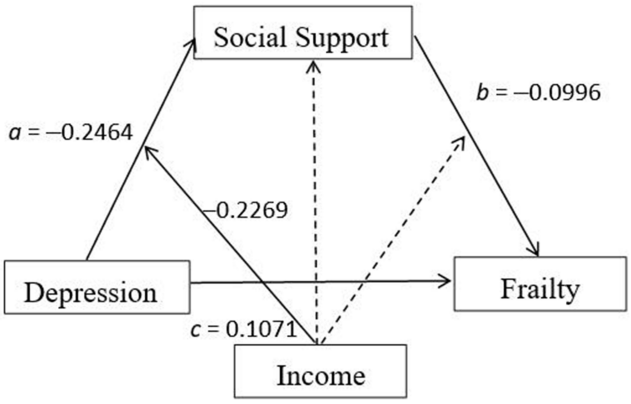

Figure 2 Income level in depression–social support–frailty regulation.

mood of older adults with cancer, the more severe their frailty condition is. Sui Chenguang et al also found that the prevalence of depression in older adults with cancer was far higher than the prevalence of depression in all age groups.[23] Currently, depression has been proved to be related to pessimistic treatment outcomes, adverse treatment decisions, and adherence to long-term treatment, resulting in high suicide rates in such patients.[24] Gilmore et al[25] believed that a correlation existed between the frailty of older adults with cancer and depression, and patients with depressive emotions had a higher degree of frailty compared with patients with non-depressive emotions. This might be because the older adults, as a group with a high prevalence of cancer, had unique psychological characteristics and behavioral habits, such as frugality, fear of increasing the financial burden on their children, and other factors, that increase the prevalence of depression in older adults with cancer.

Social support refers to the summation of various social relationships, which is a relationship established in social networks that can improve individual coping abilities, including multiple forms of support provided by relatives, friends, family members, colleagues, governments, social groups, and so forth.[26] For older adults with cancer, good social support means that they can obtain good emotional experience, stable economic supply, and rich medical and health resources, which can alleviate the frailty state of the older adults at different levels. This study showed that the frailty of older adults with cancer was negatively correlated with the total score of social support and objective support dimension; the higher the social support level, the less frailty such patients will be. Zhou et al[27] believed that social support could effectively improve the quality of life of older adults with breast cancer. Wu and Liu[28] also hypothesized that effective social support could reduce disease uncertainty and cancer-related fatigue in older adults with cancer. The aforementioned studies confirmed the beneficial effects of social support on the physical and mental health of older adults with cancer from different aspects.

Mediating Role of Social Support Between Depression and Frailty in Older Adults with Cancer

The analysis results of this study suggested that social support and depression had a predictive effect on the frailty of older adults with cancer. Social support and depression are predictive factors for the frailty of such patients, and social support partially mediates depression and frailty in older adults with cancer. On the one hand, social support can play a psychological buffering role for older adults with cancer in a state of illness, enhance their individual coping ability, improve their compliance with treatment, and alleviate their frailty condition. On the other hand, social support plays a vital role in maintaining a good emotional experience for such patients, helping them establish a positive and optimistic attitude, enhance information about long-term treatment of the disease, and thereby relieve their depressive emotions. Of course, some researchers believe that the assessment of depression in older adults with cancer can consider obtaining objective information from caregivers or family members to more comprehensively evaluate the patient's overall emotional and social support.[29]

Therefore, social support can be used as a focus to improve the depression and frailty status of these patients. Medical personnel can evaluate the level of social support of these patients, build a benign social support system, and improve the frailty status of such patients by alleviating their depression level, thereby improving their life expectancy and quality of life.

Regulatory Role of Income Level in Depression, Social Support, and Frailty

The results of this study showed that income level played a regulatory role in the first stage of the indirect path of the mediating model of depression, social support, and debilitation, suggesting that older adults with cancer having low levels of depression and high income levels also had better social support and lower incidence of debilitation. The predictive effect of income level on depression was more significant among individuals with higher income levels compared with those with lower income levels.

The results of this study indicated that the income level was a protective factor for the decline of older adults with cancer in terms of social support, which also validated the findings of previous studies that the income level of the family significantly affected the health status of the older adults.[30] An excellent income level indicated that patients were unaffected by external pressures as much as possible, such as financial pressure and family pressure. This minimized the

sense of debt and guilt that they experienced when facing social relationships such as family, relatives, and friends, thereby reducing the incidence of patient weakness to a certain extent. On the one hand, a higher income level means that more resources can be mobilized, including but not limited to medical help, support from relatives and friends, and social attention, implying that patients are more likely to obtain better medical aid and emotional experience. On the other hand, cancer treatment is a long-term and costly process for patients and their families.

Limitations

This study had certain limitations. The samples of this study were obtained from only the hospitals in Bengbu City, Anhui Province, China; hence the representativeness of the selected study group was affected to some extent. Moreover, the cross-sectional survey was conducted, and therefore the dynamic causality among variables could not be inferred. Further longitudinal studies with large sample size should be conducted to validate the findings of this study.

Conclusions

The degree of depression in older adults with cancer not only directly acts on frailty but also can affect frailty through the mediating effect of social support; this process is modulated by the income level. This finding suggested that clinical medical staff could alleviate the depression status of older adults with cancer and improve the level of social support, reduce the frailty of older adults with cancer and improve their quality of life, and provide specific references and basis for clinical medical workers to make predictive care decisions based on the health status of patients.

Ethical Approval

The study was approved by the ethics review board of Key Humanities and Social Sciences Project of Bengbu Medical College (No. 2023[257]) in accordance with the Declaration of Helsinki. All methods were carried out in accordance with relevant guidelines and regulations. Written informed consent was obtained from all individual patients included in the study.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; JN, YC and YL took part in drafting, revising or critically reviewing the article; YL gave final approval of the version to be published; All authors have agreed on the journal to which the article has been submitted; and All authors agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

References

1. Yesavage JA, Sheikh JI. 9/Geriatric depression scale (GDS) recent evidence and development of a shorter version. *Clin Gerontol*. 1986;5(1–2):165–173. doi:10.1300/J018v05n01_09
2. Brink TL, Yesavage JA, Lum O, et al. Screening tests for geriatric depression. *Clin Gerontol*. 1982;1(1):37–43. doi:10.1300/J018v01n01_06
3. Handforth C, Clegg A, Young C, et al. The prevalence and outcomes of frailty in older cancer patients: a systematic review. *Ann Oncol*. 2015;26(6):1091–1101. doi:10.1093/annonc/mdu540

4. Kenig J, Szabat K, Mituś J, et al. Usefulness of eight screening tools for predicting frailty and postoperative short- and long-term outcomes among older patients with cancer who qualify for abdominal surgery. *Eur J Surg Oncol*. 2020;46(11):2091–2098. doi:10.1016/j.ejso.2020.07.040
5. Saracino RM, Weinberger MI, Roth AJ, et al. Assessing depression in a geriatric cancer population. *Psycho-Oncology*. 2017;26(10):1484–1490. doi:10.1002/pon.4160
6. Nelson CJ, Balk EM, Roth AJ. Distress, anxiety, depression, and emotional well-being in African-American men with prostate cancer. *Psycho-Oncology*. 2010;19(10):1052–1060. doi:10.1002/pon.1659
7. Tang LL, Zhang YN, Pang Y, et al. Validation and reliability of distress thermometer in Chinese cancer patients. *Chin J Cancer Res*. 2011;23(1):54–58. doi:10.1007/s11670-011-0054-y
8. Feng L, Nyunt MS, Feng L, et al. Frailty predicts new and persistent depressive symptoms among community-dwelling older adults: findings from Singapore longitudinal aging study. *J Am Med Dir Assoc*. 2014;15(1):76.e77–76.e12. doi:10.1016/j.jamda.2013.10.001
9. Makizako H, Shimada H, Doi T, et al. Physical frailty predicts incident depressive symptoms in elderly people: prospective findings from the Obu Study of Health Promotion for the Elderly. *J Am Med Dir Assoc*. 2015;16(3):194–199. doi:10.1016/j.jamda.2014.08.017
10. Collard RM, Comijs HC, Naarding P, et al. Frailty as a predictor of the incidence and course of depressed mood. *J Am Med Dir Assoc*. 2015;16(6):509–514. doi:10.1016/j.jamda.2015.01.088
11. Woods NF, LaCroix AZ, Gray SL, et al. Frailty: emergence and consequences in women aged 65 and older in the Women's Health Initiative Observational Study. *J Am Geriatr Soc*. 2005;53(8):1321–1330. doi:10.1111/j.1532-5415.2005.53405.x
12. Katz IR. Depression and frailty: the need for multidisciplinary research. *Am J Geriatr Psych*. 2004;12(1):1–6.
13. Wang Y, Yan LX, Chen WZ. The incidence rate and related factors of depression in elderly patients with malignant tumors. *Guide China Med*. 2015;13(28):94–95.
14. Valdes-Stauber J, Vietz E, Kilian R. The impact of clinical conditions and social factors on the psychological distress of cancer patients: an explorative study at a consultation and liaison service in a rural general hospital. *BMC Psychiatry*. 2013;13:226. doi:10.1186/1471-244x-13-226
15. Giannouli V. Letter to the Editor: does higher prevalence of frailty in Greek older community-dwelling women also relate to higher prevalence of perceived financial exploitation? A new question to ponder upon. *J Frailty Aging*. 2022;11(4):436–437. doi:10.14283/jfa.2022.57
16. Zhang S, Wang H, Liu B, et al. Shadow of socioeconomic status on breast cancer screening behavior among adult women in Anhui Province. *J Bengbu Med Coll*. 2022;47(10):1421–1426.
17. Tragantzopoulou P, Giannouli V. Social isolation and loneliness in old age: exploring their role in mental and physical health. *Psychiatriki*. 2021;32(1):59–66. doi:10.22365/jpsych.2021.009
18. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. *J Gerontol Ser a Biol Sci Med Sci*. 2001;56(3):M146–M157. doi:10.1093/gerona/56.3.M146
19. Qu N, Li K. Study on the reliability and validity of international physical activity questionnaire (Chinese Vision, IPAQ). *Chin J Epidemiol*. 2004;25(3):265–268. doi:10.3760/j.issn:0254-6450.2004.03.021
20. Xiao S. Theoretical basis and research application of Social Support Rating Scale. *J Clin Psych*. 1994;4(2):98–100.
21. Cheng ST, Chan AC. Comparative performance of long and short forms of the Geriatric Depression Scale in mildly demented Chinese. *Int J Geriatr Psych*. 2005;20(12):1131–1137. doi:10.1002/gps.1405
22. Launeanu M, Hubley AM. Measurement Invariance of the Geriatric Depression Scale-15 (GDS-15): does gender, age, or education bias one's scores? *Arch Clin Neuropsyc*. 2010;25(6):555–556.
23. Sui C, Zhou Y. Analysis of the factors influencing anxiety and depression in elderly cancer patients. *Chin J Clin Oncol Rehabil*. 2022;29(4):390–393. doi:10.13455/j.cnki.cjcor.2022.04.02
24. Weiss Wiesel TR, Nelson CJ, Tew WP, et al. The relationship between age, anxiety, and depression in older adults with cancer. *Psycho-Oncology*. 2015;24(6):712–717. doi:10.1002/pon.3638
25. Gilmore N, Kehoe L, Bauer J, et al. The relationship between frailty and emotional health in older patients with advanced cancer. *Oncologist*. 2021;26(12):e2181–e2191. doi:10.1002/onco.13975
26. Yang L, Song WP, Chen ZL, et al. Correlation between social support and quality of life in patients with breast cancer at different periods of treatment. *Chin J Oncol*. 2017;39(3):202–206. doi:10.3760/cma.j.issn.0253-3766.2017.03.009
27. Zhou Y, Huo X, Yang C, et al. The impact of social support on psychology and quality of life in elderly patients with breast cancer. *Heilongjiang Med J*. 2019;32(4):995–997. doi:10.14035/j.cnki.hljyy.2019.04.117
28. Wu Y, Liu Y. Research on the correlation between disease uncertainty, cancer fatigue and social support in elderly breast cancer radiotherapy patients. *Chin Gen Pract Nurs*. 2021;19(4):540–542.
29. Giannouli V. Predictive factors of depressive symptoms of elderly patients with cancer: a critical comment. *Psycho-Oncology*. 2017;26(6):870. doi:10.1002/pon.4422
30. Li F, Gao X. Health promotion: the impact of family level on the health of middle-aged and elderly people. *J Yunnan Natl Univ*. 2020;37(3):124–132. doi:10.13727/j.cnki.53-1191/c.20200507.016