

# The Relationship Between Symptom Burden and Death Anxiety in Ovarian Cancer Patients: The Mediating Effect of Alexithymia

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**Purpose:** This study aimed to reveal the relationship between death anxiety, symptom burden and alexithymia in ovarian cancer patients, and to explore the potential mediating role of alexithymia in the relationship between symptom burden and death anxiety.

**Patients and Methods:** 247 patients with ovarian cancer in five tertiary hospitals in Sichuan, China were investigated by convenient sampling method from March 2024 to March 2025. Participants completed demographic questionnaires, the MD Anderson Symptom Inventory, the Toronto Alexithymia Scale, and the Templer-Death Anxiety Scale. SPSS 27.0 software was used for Pearson correlation analysis and analysis of variance, and mediation analysis was conducted with Model 4 in the Process v4.2.

**Results:** Most patients were aged 45 years or older, had a senior high school education or below, were married, had medical insurance under the New Rural Cooperative Medical Scheme or Resident Basic Medical Insurance, and had a household income between 5000 and 10,000 yuan. The score of the Templer-Death Anxiety scale for ovarian cancer patients was  $(46.38 \pm 6.92)$ , which was at a high level. Statistically Significant differences were observed in death anxiety scores among patients of different ages, educational levels, tumor stages, disease duration, and marital status. Correlation analysis revealed significant correlations among symptom burden, alexithymia, and death anxiety. Symptom burden had a significant positive influence on alexithymia and death anxiety. Additionally, alexithymia had a significant positive impact on death anxiety. Mediation analysis revealed that alexithymia partially mediated the relationship between symptom burden and death anxiety.

**Conclusion:** We should focus on patients who are younger, unmarried or divorced/widowed, have lower educational attainment, are at a later stage of tumor progression, and have a shorter disease course. Symptom burden influences death anxiety in ovarian cancer patients by affecting alexithymia. Focusing solely on symptom burden without addressing patients' alexithymia may not be sufficient to reduce their death anxiety.

**Keywords:** ovarian cancer, psychological factors, symptom assessment, emotional regulation

## Introduction

Ovarian cancer is one of the three most common gynecological malignancies and has the highest mortality rate.<sup>1</sup> China has the highest incidence and mortality rates for ovarian cancer worldwide.<sup>2</sup> The ovaries are located deep within the abdomen. Due to the insidious nature of symptoms and the lack of effective early screening methods, ovarian cancer is often diagnosed at an advanced stage. Approximately 70% of patients experience recurrence, with a five-year survival rate of only 46%, posing a serious threat to women's health.<sup>3,4</sup> Patients with ovarian cancer endure significant psychological distress due to treatment uncertainties and concerns about metastasis and recurrence. Among the numerous psychological issues faced by ovarian cancer patients, death anxiety is particularly noteworthy.

A multicenter study showed that the prevalence of anxiety and depression among advanced cancer patients in China was 29% and 11%, respectively.<sup>5</sup> A meta-analysis of 129 studies involving 34,147 participants demonstrated a significant positive correlation between death anxiety and psychological distress such as anxiety, depression, and suffering.<sup>6</sup> Death anxiety is a form of existential anxiety that arises when patients become aware of the approaching and inevitable nature of death, leading to negative emotions such as anxiety, depression, frustration, and a sense of meaninglessness.<sup>7</sup> Existential anxiety is the root cause of many psychological issues in advanced cancer patients, making it crucial to identify the factors influencing death anxiety.<sup>8</sup> Understanding the relationship between symptom burden, alexithymia, and death anxiety will help determine intervention strategies aimed at improving patients' mental health.

Death anxiety is associated with various adverse outcomes for patients. Death anxiety is a risk factor for patients' fear of cancer progression and recurrence,<sup>9</sup> and is also associated with lower levels of mental health and quality of life.<sup>10</sup> A recent meta-analysis showed that death anxiety is significantly associated with mortality in cancer patients.<sup>11</sup> Eggen et al<sup>12</sup> surveyed 78 patients with metastatic non-small cell lung cancer and found that 43% of advanced lung cancer patients experienced moderate to severe death anxiety, which was associated with cancer symptoms and perceived cognitive impairment. Different racial and cultural backgrounds also influence patients' death anxiety, with Asian populations exhibiting significantly higher rates of death anxiety than European and American populations.<sup>13</sup> Previous studies have shown that for advanced cancer patients, physical symptoms, concerns about family, age, and reduced self-esteem all exacerbate the experience of death anxiety.<sup>14</sup>

Ovarian cancer patients are one of the groups with the heaviest symptom burden among cancer patients. Symptom burden refers to the physical and psychological distress experienced by patients due to symptoms resulting from the disease or its treatment.<sup>15</sup> Surgery and chemotherapy are important treatment modalities for ovarian cancer patients, leading to various complications such as anemia, mucositis, dehydration, peripheral neuropathy, sexual dysfunction, and menopausal syndrome.<sup>16,17</sup> These symptoms are interrelated and synergistically influence one another, causing significant suffering for patients.<sup>18</sup> Symptom burden is associated with anxiety, depression, and even suicidal ideation in patients, further exacerbating their psychological issues.<sup>19</sup> Although studies have demonstrated the relationship between symptom burden and death anxiety,<sup>20</sup> the underlying mechanisms remain to be further investigated. Cancer symptoms are cognitively assessed before triggering anxiety and fear responses in patients.<sup>21</sup> Research on emotion recognition and regulation can help us better understand the relationship between the two, which is beneficial for improving the quality of life of ovarian cancer patients.

Alexithymia was first proposed by Peter Sineos,<sup>22</sup> a psychiatrist at Harvard University, and refers to a deficiency in an individual's ability to recognize, process, and regulate emotions and feelings, and has been identified as a risk factor for numerous mental disorders and psychosomatic illnesses. The ability to recognize, accept, and regulate emotions is the foundation of mental health, and nearly all forms of psychological pathology involve difficulties in emotional regulation.<sup>23</sup> Alexithymia is associated with various psychopathological symptoms, including depression, anxiety, somatization, hostility, and paranoia. It is also related to an increased susceptibility to mental illness, causing patients to experience more severe negative consequences.<sup>24</sup> A systematic review of cancer patients found that the prevalence of alexithymia reached 37%, with higher rates in developing countries.<sup>25</sup> Alexithymia is part of an individual's personality traits and is also associated with social life experiences, including illness experiences. To our knowledge, no studies have explored the relationship between alexithymia and death anxiety in ovarian cancer patients. Limited research has examined the impact of alexithymia on death anxiety among emergency medical technicians.<sup>26</sup>

Pollatos et al<sup>27</sup> demonstrated that individuals with higher scores on emotional neglect exhibit greater difficulties in emotional processing. Alexithymia has been linked to patients' failure to recognize and express their emotions, with these patients often manifesting anxiety, depression, and physical symptoms as a result.<sup>28</sup> Previous studies have also shown that alexithymia is significantly correlated with the severity of post-traumatic stress disorder.<sup>29</sup> Symptom burden, as a stressor, is associated with alexithymia, and symptom burden serves as a predictor of alexithymia.<sup>30</sup> To our knowledge, this study is the first to assess the impact of symptom burden on death anxiety in ovarian cancer patients and the mediating role of alexithymia in this relationship.

This study is grounded in the theoretical frameworks of Terror Management Theory (TMT) and Emotion Regulation Theory. According to TMT, humans inevitably face death, and this unique self-awareness generates profound anxiety and

fear. Consequently, we develop psychological defense mechanisms to cope with reminders of death and alleviate this anxiety.<sup>31</sup> TMT has several prominent hypotheses, including the death salience hypothesis and the dual-processing model. A series of adverse symptoms in patients can trigger a strong death salience effect, leading to fear of death and subsequent death anxiety. The dual-processing model posits that when faced with death-related information, we consciously or unconsciously employ two defensive mechanisms: proximal defense and distal defense.<sup>32</sup> Proximal defense is the first mechanism employed; when exposed to death-related cues, individuals use rationalization strategies to mitigate their anxiety. People first adopt avoidance strategies to ignore and deny the existence and threat of death.<sup>33</sup> This passive, repressive coping style leads to patients losing the ability to seek external help and the tendency to use their own psychological adjustment methods. This avoidance-based coping style is a defense mechanism for cancer patients and also an important predictor of negative emotions.<sup>34</sup>

Emotional Regulation Theory posits that emotions are influenced by external stimuli or one's own condition. Emotional regulation can occur consciously or unconsciously. After being stimulated, individuals may adopt regulatory strategies to reduce emotional stress, such as avoidance through actions or attention.<sup>35</sup> Emotional suppression, a common emotion regulation strategy, inhibits impending emotional expression behaviors. However, its effect merely controls the expression and external manifestation of emotions, while internal emotional experiences remain unchanged, requiring continuous regulation and occupying psychological resources.<sup>36</sup>

Physical pain induced by symptoms can lead to emotional suppression, depletion of cognitive resources, and impaired emotional recognition and expression. Research has also confirmed an association between symptom burden and alexithymia. However, while symptom burden has a direct impact on death anxiety, its underlying emotional regulation mechanisms remain unclear. This study aims to reveal the relationship between symptom burden, alexithymia, and death anxiety, and to explore whether alexithymia mediates the relationship between symptom burden and death anxiety. Due to the cultural and economic specificity of China, death anxiety in ovarian cancer patients may exhibit unique characteristics. Understanding the underlying mechanisms of these three factors can provide a theoretical basis for reducing death anxiety in ovarian cancer patients and propose new strategies for managing their mental health and end-of-life quality of life. To our knowledge, no previous studies have examined the impact of symptom burden on death anxiety in ovarian cancer patients and analyzed the mediating role of alexithymia. Given this gap, this study proposes the following hypotheses:

Hypothesis 1: Death anxiety in ovarian cancer patients varies across different sociodemographic and disease characteristics.

Hypothesis 2: Symptom burden in ovarian cancer patients would have a direct effect on alexithymia and death anxiety.

Hypothesis 3: Alexithymia in ovarian cancer patients would have a direct effect on death anxiety.

Hypothesis 4: Symptom burden in ovarian cancer patients would have an indirect effect on death anxiety through its influence on alexithymia.

## Methods

### Research Design

This study was designed as a descriptive, cross-sectional study. The data were collected between March 2024 and March 2025.

### Participants and Sample

A convenience sampling method was used to select ovarian cancer patients from five tertiary hospitals in Sichuan Province for this study. This sampling method was chosen due to limitations in funding and time, as well as the difficulty in accessing ovarian cancer patients. Inclusion criteria: ①Pathological examination confirmed ovarian cancer; ②Age $\geq$ 18 years; ③Patients were aware of their actual condition; ④Patients could independently complete the survey in writing or orally; ⑤No cognitive impairments or mental illnesses; ⑥Voluntary participation in this study. Exclusion criteria:

①Current infection or high fever; ②End-stage organ failure; ③Concurrent other malignant tumors. Termination or withdrawal criteria: Participants who were unwilling to continue participating or whose condition did not permit further participation during the survey. According to Kendall's sample size estimation method, the sample size should be 5–10 times the number of variables. In this study, the death anxiety scale with the largest number of items, totaling 20 items, was used as the estimation benchmark for the "number of variables". The maximum number of items in this study's questionnaire is 20. Considering a 20% dropout rate, the sample size should be at least  $N=20 \times 5 \times (1+20\%)=120$ .

## Measures

### Demographic Questionnaire

Based on the objectives of this study and a review of the literature, the demographic questionnaire included in the survey consists of the following eight items: age, marital status, educational attainment, household income, type of medical insurance, tumor stage, duration of illness, and treatment method.

### Toronto Alexithymia Scale (TAS-20)

The scale was developed by Taylor et al<sup>37</sup> and consists of three dimensions with 20 items: seven items for identifying emotional disorders, five items for describing emotional disorders, and eight items for extroverted thinking. The scale uses a 5-point Likert scale, with total scores ranging from 20 to 100 points. Higher scores indicate more severe alexithymia in patients. This study used the Chinese version translated and adapted by Chaoyun Xia et al,<sup>38</sup> with a Cronbach's  $\alpha$  coefficient of 0.802, suitable for assessing alexithymia in cancer patients. The Cronbach's  $\alpha$  coefficient in this study was 0.911.

### Templer-Death Anxiety Scale (T-DAS)

The scale was developed by Templer<sup>39</sup> and consists of a single dimension with 15 items, using a 5-point Likert scale. The total score ranges from 15 to 75, with higher scores indicating greater levels of death anxiety in patients. This study used the Chinese version translated and adapted by Hong Yang et al,<sup>40</sup> with a Cronbach's  $\alpha$  coefficient of 0.71. The Cronbach's  $\alpha$  coefficient for this study was 0.846.

### MD Anderson Symptom Inventory (MDASI)

MDASI is a specific multi-symptom assessment tool developed by the University of Texas MD Anderson Cancer Center for cancer patients.<sup>41</sup> The Chinese version consists of two parts. This study utilized the first part of the scale to assess symptom burden in cancer patients, which includes 13 items related to the severity of core symptoms. Each symptom item is scored on an 11-point scale from 0 to 10, with higher scores indicating more severe symptom burden. The Cronbach's  $\alpha$  coefficient for the scale ranges from 0.83 to 0.90. The Cronbach's  $\alpha$  coefficient for this study was 0.858.

### Pilot Study

To ensure the scientific rigor of the survey, we conducted a preliminary survey of 10 patients who met the inclusion criteria. Based on patient feedback, we optimized the layout of the questionnaire to make it clearer and easier for patients to complete. The average survey time was less than 15 minutes, which was easily acceptable to patients and avoided the risk of prolonged survey duration affecting the accuracy of the results.

### Procedure

Prior to the study, investigators underwent rigorous training, including interpretation of questionnaire items, survey techniques, and survey procedures. The survey was conducted in a private space in a communication room or private ward, using a face-to-face survey method to collect data from patients. Investigators explained the purpose of the study to patients and obtained informed consent. The data that support the findings of this study are available from the corresponding author upon reasonable request.

## Ethical Considerations

This study was approved by the Ethics Review Committee of Deyang People's Hospital, with the approval code 2023–04-082-K01. The study is conducted in accordance with the Declaration of Helsinki. All methods were carried out in accordance with relevant guidelines and regulations, and all participants consented to participate in this study. During the study, participants could withdraw at any time if they felt any discomfort. All data were stored in encrypted form and were used solely for research purposes.

## Data Analysis

Data were organized and analyzed using SPSS version 27.0 and Process v4.2 program developed by IBM Corporation. Continuous data are expressed as mean  $\pm$  standard deviation, and demographic information is presented as frequency and percentage. Cronbach's  $\alpha$  coefficient was used to test internal consistency. One-way analysis of variance was employed to compare death anxiety scores among ovarian cancer patients with different demographic characteristics. Pearson correlation analysis was used to assess the correlation among the three variables. Furthermore, the mediating effect of alexithymia was analyzed using Model 4 in the Process v4.2 program of SPSS software. The test was conducted using the percentile bootstrap confidence intervals, with 5,000 samples calculated to obtain a 95% confidence interval (95% CI). If the 95% CI did not include zero, it indicated a significant mediating effect. All statistical tests were two-tailed, with a significance level of  $\alpha$  set at 0.05.

## Results

### Common Method Bias Test

After testing all items using Harman's single-factor method, it was found that the maximum factor variance explanation rate was 25.78%, which was less than the critical standard of 40%, indicating that there was no obvious common method bias in this study.

## Descriptive Analysis

### Demographic Characteristics of Participants

The participants in this study consisted of 247 ovarian cancer patients from five tertiary hospitals in Sichuan Province, China. The patient inclusion diagram is shown in [Figure 1](#).

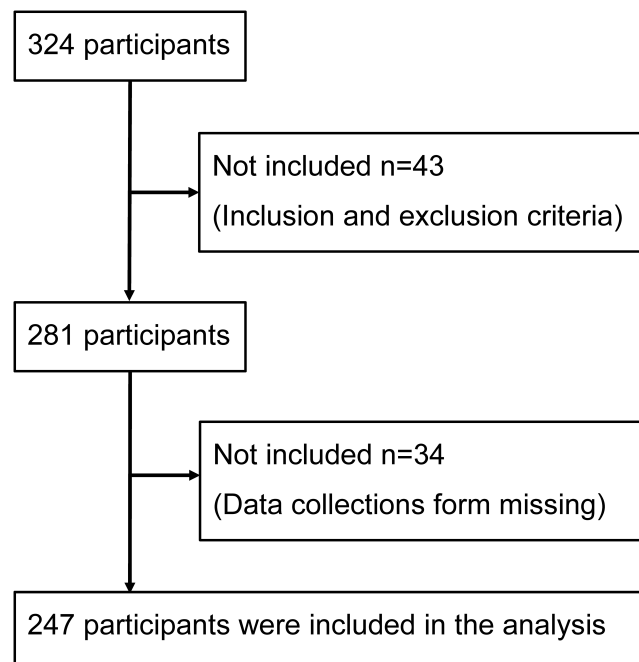
Most patients were aged 45 years or older, had a senior high school education or below, were married, had medical insurance under the New Rural Cooperative Medical Scheme or Resident Basic Medical Insurance, and had a household income between 5,000 and 10,000 yuan. In terms of disease information, most patients had tumor stages 2–3, a disease duration of more than six months, and received treatment involving surgery combined with chemotherapy. There were statistically significant differences in death anxiety between groups of patients with different ages, educational levels, marital statuses, tumor stages, and disease durations. Our Hypothesis 1 holds true. [Table 1](#) shows the results of the statistical analysis comparing death anxiety across different demographic groups among the surveyed patients.

### Descriptive Statistics and Correlations of Study Variables

Among all participants, ovarian cancer patients had symptom burden scores of (48.25 $\pm$ 9.55), alexithymia scores of (61.94 $\pm$ 10.18), and death anxiety scores of (46.38 $\pm$ 6.92). Furthermore, correlation analysis indicated significant positive correlations between symptom burden and alexithymia ( $r=0.420$ ,  $p<0.001$ ), symptom burden and death anxiety ( $r=0.425$ ,  $p<0.001$ ), and alexithymia and death anxiety ( $r=0.396$ ,  $p<0.001$ )(See [Table 2](#)).

## Direct Effects Between Symptom Burden, Alexithymia, and Death Anxiety

Before conducting the mediation analysis, the direct effects between symptom burden, alexithymia, and death anxiety were assessed. The test of direct relationships found that symptom burden had a significant predictive effect on alexithymia ( $\beta=0.4475$ ,  $p<0.001$ ) and death anxiety ( $\beta=0.2278$ ,  $p<0.001$ ). Additionally, alexithymia also had a significant predictive effect on death anxiety ( $\beta=0.1795$ ,  $p<0.001$ ). Symptom burden explained 17.61% of the variance in alexithymia, and symptom burden and alexithymia together explained 23.85% of the variance in death anxiety (See



**Figure 1** Flowchart of the study.

Table 3). Symptom burden had a direct effect on alexithymia and death anxiety, and alexithymia had a direct effect on death anxiety. Our Hypothesis 2 and Hypothesis 3 are supported.

## Mediating Effect Analysis of Alexithymia

Symptom burden was used as the independent variable, alexithymia as the mediating variable, and death anxiety as the dependent variable (See Figure 2). Mediating analysis was conducted to examine the mediating role of alexithymia between symptom burden and death anxiety. In this study, the mediating effect of alexithymia was examined using the

**Table 1** Demographic Characteristics of Participants (N =247)

Variable	N (%)	Death Anxiety (Mean ± SD)	p
Age (year)			0.000**
18~44	63(25.5%)	50.21±8.69	
45~59	87(35.2%)	46.80±6.58	
60 and above	97(39.3%)	43.52±4.11	
Educational level			0.045*
Junior high school and below	107(43.3%)	47.51±7.96	
Senior high school	95(38.5%)	45.94±5.18	
University and above	45(18.2%)	44.62±7.14	
Type of medical insurance			0.296
New rural cooperative medical system	96(38.9%)	45.85±6.62	
Resident Basic Medical Insurance	139(56.3%)	46.49±7.06	
Commercial health insurance	3(1.2%)	46.00±4.58	
Self-financing	9(3.6%)	50.44±7.94	
Marital status			0.001*
Unmarried	41(16.6%)	49.49±8.46	
Married	184(74.5%)	45.41±6.31	
Divorced/Widowed	22(8.9%)	48.68±6.66	

(Continued)

**Table 1** (Continued).

Variable	N (%)	Death Anxiety (Mean ± SD)	p
Tumor stage			0.002*
1	47(19.0%)	44.11±5.16	
2	81(32.8%)	45.74±6.09	
3	104(42.1%)	47.18±7.29	
4	15(6.1%)	51.40±9.94	
Disease duration			0.013*
<6 months	102(41.3%)	47.85±7.06	
6~12 months	101(40.9%)	45.03±6.06	
>12 months	44(17.8%)	46.07±7.84	
Household income			0.667
3000 and below	25(10.1%)	47.32±6.90	
3000-5000	66(26.7%)	46.88±7.35	
5000-10000	113(45.7%)	46.22±7.19	
10000 and above	43(17.4%)	45.49±5.47	
Treatment modality			0.206
Surgery	78(31.6%)	46.55±7.56	
Chemotherapy	49(19.8%)	44.84±4.16	
Surgery combined with chemotherapy	120(48.6%)	46.90±7.33	

Note: \*  $p < 0.05$ . \*\*  $p < 0.001$ .

**Table 2** Descriptive Statistics and Correlations Between the Study Variables

Variable	Mean	SD	1	2	3
1.Symptom Burden	48.25	9.55	/	0.420**	0.425**
2.Alexithymia	61.94	10.18	/	/	0.396**
3.Death Anxiety	46.38	6.92	/	/	/

Note: \*\*  $p < 0.001$ .

bias-corrected, nonparametric percentile Bootstrap method, with 5,000 Bootstrap samples randomly selected from the original data and their 95% CI calculated.

The mediating effect of symptom burden on the influence of death anxiety through alexithymia was significant ( $\beta=0.0803$ , 95% CI [0.0458, 0.1182]). Since the BootLLCI and BootULCI values did not include zero, the indirect effect was positive and significant. The results indicated that alexithymia partially mediated the effect of symptom burden on death anxiety, with a mediation effect coefficient of 0.0803, accounting for 26.05% of the total effect (See Table 4). Alexithymia was a significant variable in the relationship between symptom burden and death anxiety, and our hypothesis 4 holds true.

## Discussion

This study investigated the mediating role of alexithymia in the relationship between symptom burden and death anxiety, as well as the relationships among symptom burden, alexithymia, and death anxiety. Additionally, this study explored the influence of various demographic and disease-related factors on death anxiety. Significant statistical differences in death anxiety were observed among patients of different ages, educational levels, marital statuses, tumor stages, and disease durations. Symptom burden has a positive impact on both alexithymia and death anxiety, and alexithymia was a predictor of death anxiety. Furthermore, alexithymia partially mediated the relationship between symptom burden and death anxiety, meaning that the influence of symptom burden on death anxiety was partially mediated through alexithymia.

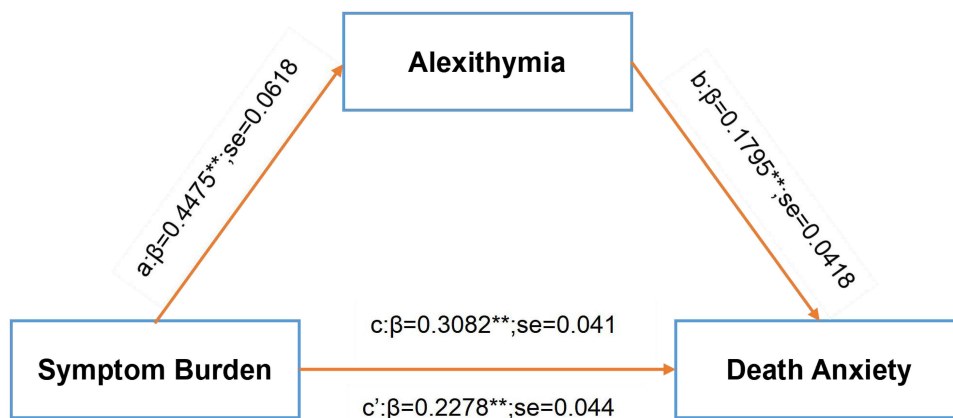
**Table 3** Unstandardised Coefficients for the Mediation Model

Predictor	Outcome			
	M (Alexithymia)			
	Coeff.	SE	t	p
X (Symptom burden)	0.4475	0.0618	7.2370	0.000
Constant	40.3410	3.0415	13.2637	0.000
R <sup>2</sup> =0.1761				
F=52.3746; p<0.01				
Predictor	Outcome			
	Y (Death anxiety)			
	Coeff.	SE	t	p
X (Symptom burden)	0.2278	0.0446	5.1094	0.000
M (Alexithymia)	0.1795	0.0418	4.2930	0.000
Constant	24.2692	2.6093	9.3012	0.000
R <sup>2</sup> =0.2385				
F=38.2010; p<0.01				

**Note:** Number of bootstrap samples for percentile bootstrap confidence intervals: 5000.

**Abbreviations:** Coeff, unstandardised coefficient; M, mediator variable; SE, standard error; X, independent variable; Y, outcomes variable.

Death anxiety is a form of existential anxiety faced by patients. While fear of death is a normal part of the adaptive process in cancer, this fear is chronic and distressing. Death anxiety is closely associated with mental health status<sup>42</sup> and is linked to a range of adverse psychological states, including anxiety, depression, panic disorder, and poor sleep quality.<sup>43</sup> Death anxiety also influences patients’ willingness to accept and the effectiveness of palliative care, which is detrimental to patients’ ability to spend the end of their lives with dignity.<sup>44</sup> Death anxiety also affects patients’ tendency to engage in healthy behaviors, which is detrimental to their prognosis.<sup>45</sup> Death anxiety reduces an individual’s



**Figure 2** The Mediated model.

**Note:** The mediated model. \*\*p<0.001. path a: relation between symptom burden and alexithymia; path b: relation between alexithymia and death anxiety; path c: relation between symptom burden and death anxiety, total effect; path c': relation between symptom burden and death anxiety, direct effect.

**Table 4** Unstandardised and Standardised Total, Direct and Indirect Effects of Symptom Burden on Death Anxiety

Effect	Path	Effect	SE	BootLLCI	BootULCI
Total effect	Symptom burden → Death anxiety	0.3082	0.0419	0.2257	0.3907
Direct effect	Symptom burden → Death anxiety	0.2278	0.0446	0.1400	0.3157
Indirect effect	Symptom burden→ Alexithymia→ Death anxiety	0.0803	0.0184	0.0458	0.1182
Standardised indirect effect	Symptom burden→ Alexithymia→ Death anxiety	0.1109	0.0211	0.0697	0.1532

sense of well-being and life satisfaction. Identifying the factors influencing death anxiety in cancer patients has become an urgent public health issue.<sup>46</sup> Understanding its influencing factors and pathways is of great significance for improving the mental health of ovarian cancer patients.

Ovarian cancer is a significant threat to women's health, with its high recurrence rate and mortality rate causing patients to experience severe death anxiety. In this study, the death anxiety score for ovarian cancer patients was  $(46.38 \pm 6.92)$ , the symptom burden score was  $(48.25 \pm 9.55)$ , and the alexithymia score was  $(61.94 \pm 10.18)$ . Research indicated that patients undergoing anticancer treatment experience heavier symptom burden due to treatment-related side effects.<sup>5</sup> All patients in this study received surgery, chemotherapy, or a combination of both treatments. Combined with the diverse symptoms inherent to ovarian cancer, patients face multiple symptom-related challenges. Therefore, strengthening symptom management for patients is particularly important.<sup>47</sup> A meta-analysis revealed that emotional regulation disorders are more pronounced in populations that feel a loss of control over the future and whose safety needs are unmet, such as cancer patients.<sup>48</sup>

The results of this study showed that death anxiety in ovarian cancer patients varies significantly across different age groups, educational levels, marital statuses, tumor stages, and disease durations. Patients aged 18–44 had the highest mean death anxiety  $(50.21 \pm 8.69)$ . Younger patients often face issues related to the care of their children and parents, leading to higher levels of death anxiety. According to Neel et al,<sup>14</sup> the primary source of death anxiety in advanced cancer patients stems from concerns about the impact of death on others. Patients with junior high school education or below had the highest mean death anxiety  $(47.51 \pm 7.96)$ , while those with high school and college education or below had a lower level of death anxiety. Patients with higher educational attainment exhibit lower levels of death anxiety. This is because they tend to have more knowledge regarding death and life cognition and can adopt a more enlightened and mature attitude towards death. When confronted with death anxiety, they can also take more professional and proactive measures.<sup>49</sup> Unmarried ovarian cancer patients had higher levels of death anxiety than married and divorced patients, consistent with the findings of Xiao et al. Close relationships such as family and social support are effective resources for coping with death anxiety, enabling individuals to maintain a more positive attitude toward disease management.<sup>50</sup>

As is well known, patients with tumor stages 3 and 4 often have a higher degree of metastasis and malignancy, resulting in greater symptom burden and psychological stress, as well as deeper levels of death anxiety. This aligns with the findings of Ogce et al,<sup>51</sup> who reported that tumor stage influences patients' mental health levels. Patients with a disease duration of less than 6 months had the highest mean death anxiety  $(47.85 \pm 7.06)$ , which was significantly higher than that in patients with a disease duration of 6 to 12 months and over 12 months. Perhaps it is because newly diagnosed patients are still in the denial period and adaptation stage of cancer, with high levels of psychological stress and shock, and corresponding death anxiety is also relatively high. As the disease progresses, patients have continuously carried out psychological adjustment and adaptation during the process of coping with the disease, and the level of death anxiety has decreased to a certain extent.<sup>14</sup> Modern medical technologies have extended the survival period of cancer patients, making the continuous assessment and management of death anxiety even more necessary. We should recognize the individual uniqueness and complexity of each patient and implement targeted, effective intervention measures.<sup>52</sup>

To our knowledge, there is currently limited literature on the relationship between alexithymia and death anxiety, and no studies have explored the mediating role of alexithymia in the symptom burden and death anxiety of ovarian cancer patients. After conducting a systematic literature review, we proposed four main hypotheses, all of which were validated based on our research findings. Additionally, the results of the correlation analysis indicated that death anxiety was significantly positively correlated with symptom burden and alexithymia, and symptom burden was significantly

positively correlated with alexithymia. Previous studies have also found a significant positive correlation between symptom burden and death anxiety in patients with advanced breast cancer.<sup>53</sup> Individuals with high symptom burden often experience greater fear and distress related to death.<sup>54</sup> Studies on patients with depression have found that somatic symptoms are a factor influencing alexithymia.<sup>30</sup>

This study confirmed the positive correlation between alexithymia and death anxiety in ovarian cancer patients, with death anxiety increasing as the severity of alexithymia deepens. The results of this study indicated that alexithymia partially mediated the relationship between symptom burden and death anxiety. The reserved and introverted manner of emotional expression in the Chinese population, coupled with an avoidance-oriented coping attitude toward death, makes alexithymia more prominent among Chinese cancer patients. Research shows that physical symptom burden, as a stressor, can lead to impairments in emotional recognition and regulation, thereby further suppressing patients' emotions.<sup>30</sup> Inappropriate stress coping strategies such as denial and avoidance can lead to greater psychological distress, such as anxiety and depression.<sup>55</sup> Death anxiety, as a conscious or unconscious fear of death that may occur at any time, does not disappear with avoidance or denial but rather intensifies.<sup>56</sup>

## Implications of the Findings

### Theoretical Implications

The findings indicate that both symptom burden and alexithymia can influence death anxiety. Furthermore, this study emphasizes that focusing solely on symptom burden is insufficient to reduce death anxiety. Death anxiety is a complex phenomenon influenced by variables such as symptom burden and alexithymia, providing new insights into the existing literature. This study highlights the importance of alexithymia as a key factor in understanding the relationship between symptom burden and death anxiety. The core characteristics of alexithymia are difficulty in emotion recognition and difficulty in emotion description and expression. Because patients are unable to recognize and process emotions through language, they lack effective emotional regulation strategies and cannot be guided through communication, seeking help or cognitive re-evaluation. Instead, they rely on "passive and repressive coping methods" such as denial, avoidance and suppressed thinking to excuse the emotional distress caused by symptom burden. This ineffective coping approach makes it impossible to handle and digest the fear and threats related to death, thereby intensifying death anxiety. The findings of this study complement the TMT, suggesting that proximal defense mechanisms such as denial and avoidance may temporarily reduce patients' death anxiety in the short term, but in the long term, they may lead to deficits in emotional recognition and expression, thereby exacerbating death anxiety levels.

### Practical Implications

Our findings have important practical implications for nursing managers, clinical nursing staff, and patients' families. By alleviating symptom burden and alexithymia in ovarian cancer patients and addressing related risk factors, death anxiety can be reduced. Patients with lower alexithymia levels are better able to assess, identify, and express their anxiety, thereby enhancing their disease coping ability and quality of life. Developing detailed strategies to manage symptoms and improve emotional recognition may be beneficial in reducing death anxiety. Understanding the interaction between symptom burden, alexithymia, and death anxiety is a critical step toward improving patients' mental health.

### Limitations

This study proposes a relationship between symptom burden, alexithymia, and death anxiety in ovarian cancer patients based on the TMT. Additionally, our findings validate the TMT and supplement the model from the perspectives of proximal and distal defense mechanisms, providing theoretical references for future research on death anxiety. However, due to time and funding constraints, only patients from five hospitals were selected as research subjects. These patients may not fully represent cancer patients from primary care institutions, other provinces, or groups with different socio-economic and cultural backgrounds, future studies could expand the scope of the investigation. The data collected in this study are based on patients' self-reports, which are susceptible to self-reporting biases and limitations.

## Conclusions

This study identified sociodemographic and disease-related factors influencing death anxiety in ovarian cancer patients, providing a theoretical basis for personalized patient management. We should prioritize young patients, those with lower educational attainment, those with limited social support, patients with advanced cancer, and those recently diagnosed. Additionally, this study emphasized the role of symptom burden and alexithymia in death anxiety, as physical and psychological issues often intertwine. Clinical care should prioritize addressing symptom burden and alexithymia in ovarian cancer patients. This study confirmed the mediating role of alexithymia in the relationship between symptom burden and death anxiety, providing new management pathways for intervening in death anxiety. This study is a cross-sectional design that can only reveal the associations among variables but cannot infer causal relationships. Moreover, the levels of alexithymia and death anxiety in patients with ovarian cancer may fluctuate as the disease progresses and the treatment process changes. Future research could adopt longitudinal study methods to explore changes in symptom burden, alexithymia, and death anxiety during disease progression, clarifying the specific mechanisms underlying these changes. Future efforts should focus on enhancing training in psychological regulation methods related to distal defense mechanisms, such as strengthening patients' perception of the value and meaning of life, to reduce their levels of death anxiety. Additionally, the role of symptom burden as a death-related factor in death anxiety should be emphasized, with a focus on identifying synergistic effects between symptom clusters and sentinel symptoms, and actively managing patients' symptoms. Concurrently, attention should be given to enhancing ovarian cancer patients' emotional recognition, expression, and regulation abilities to improve their mental health outcomes.

## Data Sharing Statement

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

## Ethics Statement

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Deyang People's Hospital (Date.10.13.2023/No. 2023-04-082-K01). This study was conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this 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; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and 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.

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