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Predictors of spiritual needs in Chinese cancer patients: The prominent roles of time since diagnosis, depression severity, and residential area

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Abstract

Introduction: Cancer patients often experience psychological distress that accompanies their physical symptoms; consequently, heightened spiritual needs may reflect an important coping response. In Chinese cultural settings, the manifestation of spirituality is significantly different from that suggested by Western paradigms, with greater emphasis on non-religious aspects of spirituality, including harmony between people and inner peace, than on traditional religious beliefs.

Objective: The current study aims to assess the spiritual needs of Chinese cancer patients in the hospital and to define sociodemographic, psychological, and clinical variables correlated with these needs using Chinese-validated instruments.

Methods: A cross-sectional study was conducted between February and April 2025, involving 189 cancer patients who presented to Shanxi Bethune Hospital in China. Participants were requested to complete the Chinese version of the 27-item Spiritual Needs Questionnaire (SpNQ-Ch-27), the Patient Health Questionnaire-9, and the Multidimensional Scale of Perceived Social Support. The data were analyzed using descriptive statistics, correlation analyses, and multiple linear regression.

Results: Participants reported moderate spiritual needs, with an average SpNQ-Ch-27 overall score of 37.23 (standard deviation = 16.91). The highest scores were obtained in the domains of active giving and inner peace, and the lowest in the religious domains, indicating a prevalence of a non-religious spiritual orientation. The predictors of spiritual needs identified using multivariate regression included a time since diagnosis of <6 months ($\beta = 0.52$, $p<0.001$), greater severity of depressive symptoms ($\beta = 0.21$, $p=0.002$), rural residence ($\beta = 0.19$, $p=0.003$), and low household income <3,000 RMB/month), which also showed a significant negative association ($\beta = -0.14$, $p=0.029$). The final model explained 78.9% of the variance in spiritual-needs scores.

Conclusion: Recently diagnosed cancer patients demonstrate the highest spiritual needs, with depression and socioeconomic vulnerability serving as additional risk factors. Chinese patients prioritize relational and existential spiritual dimensions over religious practices.

Keywords: Spirituality; Neoplasms; Depression; Social support; Cross-sectional study

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1. Introduction

Cancer is one of the leading global public health problems. A 2020 report from Global Cancer Observatory (GLOBOCAN) estimated 19.3 million new cancer cases and 10.0 million cancer deaths worldwide, with Asia, which has nearly 60% of the global population, contributing about half of incident cases and a majority of deaths.[1]

In Asia, China is estimated to account for approximately 22% of new diagnoses globally, indicating an increase in oncology workloads and the continued strain on the healthcare systems.[2,3]

Other than the somatic manifestations, cancer patients are usually in a state of psychological distress, including anxiety and depression, aggravating their pursuit of meaning, connectedness, and emotional stability,[4] factors that are generally referred to as spiritual needs. Unlike emotional or social needs, spiritual needs relate to the interpersonal regulation of comfort or mood; they involve existential meaning, transcendence, and inner peace.[5] They are mirrors of how a person seeks meaning in pain, how individuals try to come to peace with death, and how they try to preserve decency in the conditions of sickness.

These spiritual needs can be met through activities such as meditation, reflection on life, compassionate giving, and mentoring other patients, which foster individual growth and a sense of peace. Certainly, "altruistic giving" in its specific form is a type of spiritual satisfaction that can be achieved when patients participate in life-affirming, compassionate, or legacy-making activities, which may include comforting fellow patients, sharing life experiences, or volunteering on the ward. These manifestations of spirituality contrast with Western religious formulations that focus on prayer or ritual; in Chinese settings, spirituality is less theistic and more relational, based on harmony and self-transcendence through social association. Spiritual needs and related psychological constructs can be assessed using various questionnaires (e.g., the Chinese version of the 27-item Spiritual Needs Questionnaire [SpNQ-Ch-27], the Patient Health Questionnaire-9 [PHQ-9], and the Multidimensional Scale of Perceived Social Support [MSPSS]).[6]

This study is based on the 1997 theory of religious/spiritual Coping of 2010 Pargament and the Meaning-Making Model of Park, in conceptualizing spiritual needs as existential needs that emanate when people feel troubled and lack coherence, rather than coping behaviors that seek to enlist internal or social resources to re-establish meaning.[7] In this context, the SpNQ-Ch-27 serves as a measure of perceived unmet spiritual or existential needs, such as meaning, inner peace, and active giving, rather than coping techniques.[8]

By contrast, spiritual/religious coping refers to the reactions or resources that people use to fulfill these demands (e.g., prayer, pensive reactions, and selfless behaviors). The distinction between these constructs helps to understand the direction of the predictive model. Demographic and psychosocial factors influence spiritual needs, but not the coping processes themselves.[9]

The objectives of the current study are: (i) To measure the extent of spiritual needs among adult cancer patients at Shanxi Bethune Hospital in China using SpNQ-Ch-27; (ii) to explore the relationships between spiritual needs and depressive symptoms (PHQ-9), perceived social support (MSPSS) and key sociodemographic/clinical variables (e.g., residence, education, income, cancer type, time since diagnosis); (iii) determine the individual predictors of higher spiritual needs through parsimonious multivariable modeling; and (iv) characterize domain-level spiritual needs to inform culturally responsive nursing assessment and supportive care in routine clinical practice.[10]

Empirical evidence suggests that the satisfaction of these needs not only increases emotional well-being but also the quality of life, especially by reducing depressive and anxious symptoms. However, a considerable number of Chinese cancer patients do not have the necessary vocabulary, awareness, and culturally specific channels of expression and gratification of their spiritual needs.[11] The conceptualization of spirituality also depends on cultural differences: The focus of Western patients on religious practices or faith and the Chinese on emotional comfort, harmony, and family support.[12,13]

Spiritual needs have been associated with a range of sociodemographic and clinical factors, such as age, gender, marital status, education level, income, and religious affiliation.[14] In addition, illness-related characteristics—such as time since diagnosis, cancer type, presence of depressive symptoms—and perceived social support also appear to play significant roles.[15-18] Despite the increasing emphasis on spiritual care, quantitative research in mainland China is limited. Few studies have concurrently analyzed depressive symptoms, perceived social support, and sociodemographic or cancer-related factors using validated Chinese scales; the quantitative evidence from the Chinese context remains limited. Therefore, this study aims to assess the level of spiritual needs and identify associated factors, including depression, social support, and key sociodemographic and clinical characteristics among hospitalized cancer patients in a tertiary hospital in China. The findings are expected to inform culturally sensitive and patient-

centered spiritual care strategies in oncology nursing practice.[19-21]

To position the present work within existing Chinese oncology research using the SpNQ-Ch-27, this study replicates and extends prior investigations by Nejat *et al.*[22] and Forouzi *et al.*[23] in two ways: First, by evaluating hospitalized adult patients across multiple cancer types with the validated SpNQ-Ch-27; and second, by concurrently examining depressive symptoms (PHQ-9) and perceived social support (MSPSS) as correlates of spiritual needs within a single analytic framework. In line with these aims, the primary outcome was the SpNQ-Ch-27 total score (0–81; higher scores indicate greater spiritual needs). Domain-level SpNQ-Ch-27 scores were treated as secondary outcomes.[24,25]

A priori, we pre-specified three confirmatory hypotheses:

(i) Hypothesis 1: Higher depression severity (PHQ-9) is positively associated with higher spiritual needs (SpNQ-Ch-27 total).
(ii) Hypothesis 2: Rural residence is associated with higher spiritual needs compared to urban residence.
(iii) Hypothesis 3: Lower monthly income is associated with higher spiritual needs.

In addition, we planned exploratory tests of associations with time since diagnosis, education level, and cancer type, interpreting the results cautiously given the cross-sectional design.

2. Materials and methods

2.1. Study design

A cross-sectional study was conducted at Shanxi Bethune Hospital, China, from February to April 2025. Data were obtained from the surgical, medical oncology, and palliative care wards of Shanxi Bethune Hospital, a tertiary general hospital. Recruitment was conducted throughout the week in all shifts to minimize potential selection bias.

The results of this study were analyzed according to the guidelines of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE), as recommended by the Enhancing the Quality and Transparency of Health Research Network (https://www.equator-network.org). A completed STROBE checklist is provided in the supplementary materials to ensure transparency and replicability.[26]

2.2. Sample size calculation and participant recruitment

We recruited 189 cancer patients using convenience sampling to identify eligible participants who were available during the data collection period; thus, the results might be biased toward the characteristics of hospitalized patients rather than the general cancer population. Inclusion criteria were as follows: Patients diagnosed with cancer, aged 18 years or older, and able to communicate in a stable condition (not bedridden, not in an unconscious state, intubated or dependent on mechanical ventilation).[27] Patients were excluded if they declined to participate, had cognitive impairment or mental illness, or had a history of depression or were currently taking antidepressant medications. The sample size was determined using Equation (1):

$$n = \left(\frac{Z \times \sigma}{\Delta}\right)^2 \quad (1)$$

where $Z = 1.96$ corresponds to a value of the standard normal distribution, $\sigma = 0.67$ is the estimated standard deviation (SD), and $\Delta = 0.1$ represents the allowable margin of error from the population mean. The initial calculated sample size was 172. To account for the non-response rate, an additional 10% was added, bringing the final target sample size to 189 participants.

The flow diagram in Figure 1 shows that 250 individuals were screened, of whom 61 were excluded for not meeting criteria, declining participation, or providing incomplete data. Ultimately, 189 participants met all requirements and were included in the final analysis. This chart summarizes the screening and selection process for the study sample.

The sampling approach employed in the current study was convenience sampling, as all eligible patients available during the study period were invited. Despite its practicality, this method can impose selection bias (e.g., patients included in the data collection can be different in terms of socioeconomic or clinical characteristics compared to the patients not admitted), and findings should be viewed with caution regarding applicability.

This paper was written according to the STROBE reporting guidelines of cross-sectional studies. The final STROBE checklist has been put in the Appendix.

The STROBE flowchart in Figure 1 shows that out of 250 patients assessed for eligibility, 61 were excluded (35 did not meet criteria, 16 declined participation, and 10 with incomplete data), leaving a final sample of 189 patients included in the analysis.

2.3. Eligibility and exclusion criteria

The eligible participants were adults (age ≥18 years) with a diagnosis of cancer, clinically stable, and competent to communicate in Chinese. Patients who were bedridden, intubated, cognitively impaired, with a prior history of

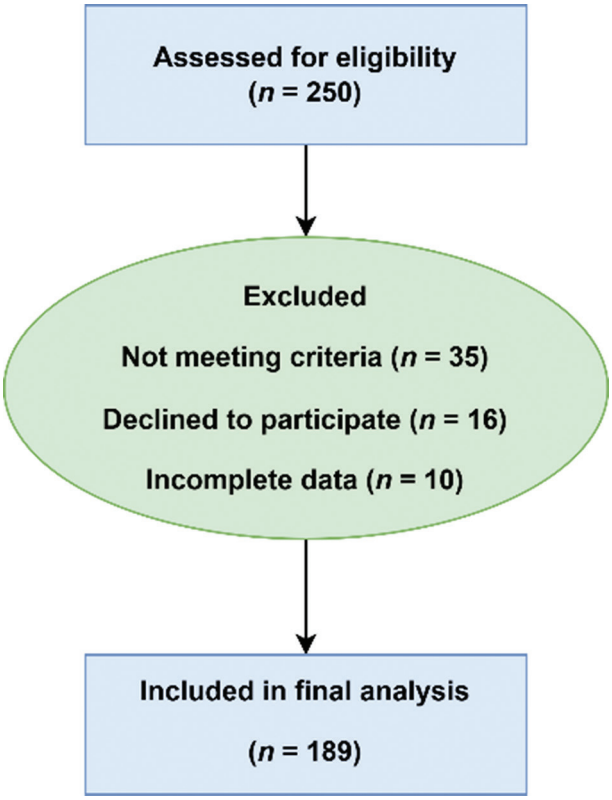

Figure 1. Strengthening the reporting of observational studies in epidemiology flowchart illustrating inclusion and exclusion of participants

depression, or who were on antidepressant medication were excluded.

Patients with a history of depression or those currently taking antidepressant medication (n = 17) were excluded because of the potential confounding effect on the primary outcome (SpNQ-Ch-27 total).

Severe depression is highly associated with spiritual distress; therefore, the inclusion of patients with pre-existing psychiatric disorders may affect the reported relationship between PHQ-9 scores and spiritual needs, precluding interpretation. This method allowed the assessed depressive symptoms to be interpreted as indicators of the psychological burden of cancer, rather than of broader psychiatric morbidity.

2.4. Sample size required for analysis

We calculated the required sample size for a clinically meaningful difference (Δ) in the SpNQ-Ch-27 total score (range 0–81; higher scores = greater spiritual need) between two key subgroups (e.g., rural vs. urban, or low vs. higher income), because these contrasts are central to our hypotheses. The assumption of an SD of 16 for the SpNQ-Ch-27 total score was derived from prior Chinese oncology studies and supported by our pilot data, to ensure a conservative, methodologically sound estimate. We defined the minimum clinically important difference as Δ = 7 points (~0.44 σ, ~9% of the scale), which we identified to be the smallest difference warranting a change in screening intensity or supportive intervention. The required per-group sample size for a two-sided comparison of means is shown in Equation (2):

$$n_{per\ group} = \frac{2(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 \sigma^2}{\Delta^2} \quad (2)$$

- σ = standard deviation of the outcome
- Δ = minimum detectable difference (effect size)
- $Z_{1-\frac{\alpha}{2}}$ = Z-value for the chosen significance level (typically 1.96)
- $Z_{(1-\beta)}$ = Z-value for desired power (typically 0.84 for 80% power)

substituting σ = 16 and Δ = 7 results in:

$$n_{per\ group} \approx \frac{2(1.96 + 0.84)^2}{\Delta^2}(16)^2 \approx 82$$

or 164 participants in total. With an additional 10% contingency for non-response, the target sample size is n = 180. The number of participants recruited (n = 189) exceeded this requirement.

To ensure adequate power for the confirmatory regression (with a limited set of pre-specified covariates per our parsimony plan), we also considered the overall model effect size using Cohen's f^2. For a small-to-moderate effect f^2 = 0.05–0.08 and k = 10–12 predictors, the required total sample size is shown in Equation (3):

$$N = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2}{f^2} + k + 1 \quad (3)$$

A *post hoc* power analysis for multiple linear regression was conducted using G*Power (v3.1, Heinrich-Heine-Universität Düsseldorf, Germany), considering eight predictors, an α = 0.05, and a medium effect size (f^2 = 0.05, 0.08, and 0.15). The analysis yielded a minimum sample size of 170, 111, and 109, respectively. Therefore, our sample size of 189 exceeded this threshold, ensuring sufficient statistical power for the regression analyses.

This two-fold reasoning (clinically significant between-group difference on the primary outcome and parsimonious multivariable modeling of SpNQ-Ch-27 total) supersedes the previously used margin-of-error method, is consistent with the methodological expectations of previous studies, and does not contradict our measurement framework.

2.5. Questionnaires

2.5.1. Chinese version of the SpNQ-Ch-27

Spiritual needs of the participants were assessed using SpNQ-Ch-27, translated and validated by Büssing and Koenig[5] and Zhao *et al.*[12] The SpNQ-Ch-27 comprised five subscales:

- Religious needs—praying (five items, range: 0–15),
- Religious needs—resources (three items, range: 0–9),
- Reflect/release (six items, range: 0–18),
- Inner peace (six items, range: 0–18), and
- Active giving (seven items, range: 0–21).

Items are rated on a 4-point Likert scale (0 = not at all, 3 = very strong). The total score ranges from 0 to 81, with higher scores indicating greater spiritual needs. In this study (n = 189), all instruments demonstrated good to excellent internal consistency (Table 1).

2.5.2. PHQ-9

Depressive symptoms were assessed using the PHQ-9, developed by Kroenke *et al.*,[28] and validated in Chinese populations by Zhao *et al.*[12] This instrument includes nine items scored from 0 (not at all) to 3 (nearly every day), for a total score range of 0–27. Higher scores indicate greater depressive symptom severity, with common cutoffs for interpretation:

- 0–4: Minimal/no depression
- 5–9: Mild
- 10–14: Moderate
- 15–19: Moderately severe
- 20–27: Severe

In this study, internal consistency was excellent, with α = 0.88 (95% confidence interval [CI]: 0.84–0.91).

2.5.3. MSPSS

Perceived social support was assessed using the 12-item MSPSS, developed by Garduno-Ortega *et al.*[29] and Usman *et al.*,[30] and adapted for Chinese populations by Chou.[19] It includes three subscales:

- Family support (four items),
- Friend support (four items), and
- Significant others (four items).

Items are scored on a 7-point Likert scale (1 = very strongly disagree, 7 = very strongly agree). Total scores range from 12 to 84, with higher scores indicating greater perceived social support. In the current study:

- Total MSPSS: α = 0.91 (95% CI: 0.89–0.94),
- Family: α = 0.88 (95% CI: 0.85–0.91),
- Friends: α = 0.86 (95% CI: 0.82–0.90), and
- Significant others: α = 0.85 (95% CI: 0.81–0.89).

2.6. Reliability of measurement instruments

The study instruments demonstrated strong internal consistency. The SpNQ-Ch-27 showed excellent reliability (Cronbach's α = 0.89, 95% CI: 0.86–0.92), the PHQ-9 demonstrated good reliability (α = 0.87, 95% CI: 0.83–0.90), and the MSPSS showed excellent reliability (α = 0.93, 95% CI: 0.91–0.95).

2.7. Data collection

The data were gathered through face-to-face interviews and the administration of a structured questionnaire to eligible cancer patients at the oncology wards of the Shanxi Bethune Hospital. Before the study, all respondents were well informed of the aims and purpose of the study, and their right to withdraw at any time without any penalty. The interviews lasted about 10–15 min. The interviewers

Table 1. Internal consistency of study instruments (n=189)

Instrument	Domain/total	No. of items	Score range	Cronbach's α (95% CI)	Interpretation
SpNQ-Ch-27	Total	27	0–81	0.89 (0.86–0.92)	Excellent
	Religious needs—praying	5	0–15	0.74 (0.68–0.80)	Acceptable
	Religious needs—resources	3	0–9	0.76 (0.70–0.82)	Acceptable
	Reflect/release	6	0–18	0.83 (0.79–0.87)	Good
	Inner peace	6	0–18	0.85 (0.81–0.89)	Good
	Active giving	7	0–21	0.87 (0.83–0.90)	Good–Excellent
PHQ-9	Total	9	0–27	0.88 (0.84–0.91)	Excellent
MSPSS	Total	12	12–84	0.91 (0.89–0.94)	Excellent
	Family support	4	4–28	0.88 (0.85–0.91)	Good–Excellent
	Friend support	4	4–28	0.86 (0.82–0.90)	Good
	Significant others	4	4–28	0.85 (0.81–0.89)	Good

Abbreviations: CI: Confidence interval; MSPSS: Multidimensional Scale of Perceived Social Support; PHQ-9: Patient Health Questionnaire-9; SpNQ-Ch-27: Chinese version of the 27-item Spiritual Needs Questionnaire.

were trained to reduce bias, use neutral questioning, and be consistent in data collection. All the data gathered remained confidential and stored in password-protected files. The data were de-identified to protect participants' anonymity.

2.8. Data analysis

Data analysis was performed using Statistical Package for Social Sciences (SPSS 29.0, IBM, United States). Characteristics of the participants were summarized using descriptive statistics. Parsimonious multiple linear regression was performed to determine the predictors of the SpNQ-Ch-27 total score, with only the MSPSS total score (no subscales) to prevent multicollinearity. The following categories of reference points were used as dummy variables: more than 12 months since diagnosis, urban residence, college education, income exceeding 5000 RMB, and cancer type: other (relative to stomach).

Model assumptions were checked using residual plots, normal probability (P–P) plots, and homoscedasticity (scatterplots). Collinearity diagnostics (tolerance >0.70, VIF < 2.0) indicated no problematic multicollinearity. Both standardized (β) and unstandardized (*B*) coefficients with 95% CI and *p*-values were reported.

Influential observations were assessed using Cook's distance, standardized residuals, and leverage statistics.[31] Internal validation was conducted using bootstrap resampling (1000 iterations) and 10-fold cross-validation, with shrinkage and optimism reported.[32] All analyses used complete-case data (n = 189), and a Bonferroni correction was applied to multiple bivariate comparisons. Mediation or moderation analyses were not conducted because the sample size was optimized for main-effects testing and the cross-sectional design precluded directional inference.

2.9. Model diagnostics

Inferential analysis was conducted after verifying all regression assumptions. The residuals showed approximate homoscedasticity (Jarque–Bera test, p=0.159) and normality (Breusch–Pagan test, p=0.132), indicating constant variances and the correct CI. The multicollinearity was not a problem, as collinearity diagnostics (tolerance >0.70, VIF < 2) indicated it. The independence of the residuals was found to be supported by the Durbin–Watson statistic (=2.08), and the influence diagnostics (Cook's distance <1 in all cases) did not show outlier bias. Consistent regression coefficients were obtained through bootstrap and 10-fold cross-validation, indicating the robustness of the model.

2.10. Ethical considerations

This study received ethical approval from both the Institutional Review Board of Shanxi Bethune Hospital, China (Approval No: SBH/IRB/2025/021) and the Human Research Ethics Committee of Universiti Sains, Malaysia (USM/JEPeM/KK/24080744). All participants provided written informed consent in Mandarin, their native language, after being informed of the study's purpose, voluntary nature, confidentiality safeguards, and the right to withdraw at any stage. All responses were anonymized and stored in password-protected databases to ensure participant privacy. Those who scored 15+ on the PHQ-9 were referred to the hospital's mental healthcare team for additional assessment.

3. Results

3.1. Missing data analysis

Complete data were available for all 189 participants across all study variables. No missing values were detected for demographic characteristics, clinical variables, and any of the three validated instruments (SpNQ-Ch-27, PHQ-9, MSPSS). Therefore, a complete-case analysis was conducted without the need for imputation procedures.

3.2. Participant characteristics

3.2.1. Sociodemographic and clinical characteristics

A total of 189 cancer patients participated in this study, with a mean age of 57.4 years (SD = 11.72, range: 28–84 years). The sample was predominantly male (54.5%) and entirely of Han ethnicity (100%). Religious affiliation was reported by only 6.3% of participants. Most patients were married or cohabiting (84.1%), whereas 13.2% were divorced and 2.6% were single. Educational attainment varied: 47.6% completed junior high school or lower, 34.9% completed high school, and 17.5% completed college or higher. Economic status showed that 46.0% earned <3000 RMB monthly, 31.2% earned 3000–5000 RMB, and 22.8% earned more than 5000 RMB. Rural residence was reported by 55.0% of participants, and 39.7% had comorbidities. The most common cancer types were lung cancer (21.7%), breast cancer (20.1%), and rectal cancer (17.5%). Regarding time since diagnosis, 35.4% had been diagnosed within the past 6 months, 30.7% between 6 and 12 months, and 33.9% more than 12 months ago.

3.3. Internal consistency of instruments

To assess the internal consistency of the measurement instruments used in this study, Cronbach's α values with 95% CIs were calculated for all scales and subscales based on the full sample (n = 189). The results are presented in Table 1 below.

All scales demonstrated strong internal consistency in this sample (n = 189). Cronbach's α for the SpNQ-Ch-27 total score was 0.89 (95% CI: 0.86–0.92), with subscale values ranging from 0.74 to 0.87. The PHQ-9 showed excellent reliability (α = 0.88, 95% CI: 0.84–0.91), and the MSPSS total and subscales also exhibited high internal consistency (total α = 0.91, subscales range: 0.89–0.94).

Table 2 summarizes the total and domain scores of all instruments. For SpNQ-Ch-27, the overall spiritual needs score was moderate (mean = 37.23, SD = 16.91). The highest domain was active giving (mean = 8.59), followed by inner peace, whereas the lowest was religious needs—resources (mean = 1.21), highlighting the non-religious orientation of patients' needs. The PHQ-9 scores indicate mild depression on average, whereas MSPSS scores suggest relatively strong perceived social support, especially from family and significant others. The inclusion of medians and interquartile ranges provides complete information on data distribution, confirming that the results are not heavily skewed by outliers. Figure 2 illustrates the overall central tendency and variability of spiritual needs (SpNQ-Ch-27), psychological distress (PHQ-9), and social support (MSPSS) among cancer patients.

Figure 2 illustrates the mean scores of the key study variables, showing moderate spiritual needs (M = 18.94), mild depressive symptoms (M = 9.90), and high perceived social support (M = 56.57) among participants (Figure 2). Error bars represent 95% confidence intervals, indicating stable and reliable estimates across the sample.

The PHQ-9 scores fell between 0 and 24 (mean = 8.45, SD = 5.28), and the results showed an average level of mild depression. With regard to clinical thresholds:

- 34.4% of patients scored 0–4 (minimal),
- 28.0% scored 5–9 (mild),
- 22.2% scored 10–14 (moderate),
- 12.7% scored 15–19 (moderately severe),
- 2.6% scored ≥ 20 (severe).

Table 3 shows the severity of depressive symptoms in the participants. More than one-third (34.4%) had no or minimal symptoms, whereas 37.5% of the participants suffered from moderate-to-severe depression, indicating a substantial burden of mental health problems in this sample of cancer patients.

3.4. Correlation analysis and collinearity assessment

A Pearson correlation matrix (Table 4) indicated that there were significant positive correlations between total spiritual needs (SpNQ-Ch-27 total) and psychological distress (PHQ-9; r = 0.34, p<0.001), perceived social support (MSPSS total; r = 0.67, p<0.001) and all four core

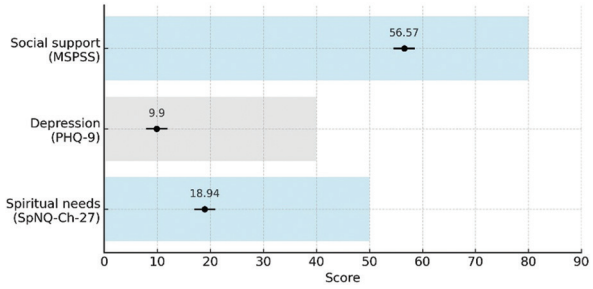

Figure 2. Mean scores and 95% confidence intervals for spiritual needs, depression, and social support among participants (n = 189)
Abbreviations: MSPSS: Multidimensional Scale of Perceived Social Support; PHQ-9: Patient Health Questionnaire-9; SpNQ-Ch-27: Chinese version of the 27-Item Spiritual Needs Questionnaire.

Table 2. Descriptive statistics and normality assessment (n=189)

Variable	Mean	SD	Range	Median	IQR	Skewness	Kurtosis	Shapiro–Wilk p-value
SpNQ-Ch-27 total	37.23	16.91	0–81	35.00	24.00–48.00	0.31	−0.52	0.089
Religious needs—praying	3.69	2.44	0–12	3.00	2.00–5.00	0.89	0.45	<0.001
Religious needs—sources	1.21	1.37	0–6	1.00	0.00–2.00	1.45	1.98	<0.001
Reflect/release	3.90	2.17	0–12	4.00	2.00–5.00	0.52	0.18	0.012
Inner peace	6.17	2.79	0–14	6.00	4.00–8.00	0.21	−0.31	0.156
Active giving	8.59	3.47	0–18	9.00	6.00–11.00	0.08	−0.45	0.421
PHQ-9 total	8.45	5.28	0–24	8.00	4.00–12.00	0.67	0.15	0.003
MSPSS total	58.23	12.45	24–84	59.00	49.00–67.00	−0.28	−0.41	0.067
Family	19.87	4.82	8–28	20.00	17.00–24.00	−0.35	−0.52	0.089
Friends	18.92	4.91	7–28	19.00	16.00–23.00	−0.18	−0.48	0.134
Significant others	19.44	4.76	8–28	20.00	16.00–23.00	−0.22	−0.43	0.156

Abbreviations: IQR: Interquartile range; MSPSS: Multidimensional Scale of Perceived Social Support; PHQ-9: Patient Health Questionnaire-9; SD: Standard deviation; SpNQ-Ch-27: Chinese version of the 27-item spiritual needs questionnaire.

dimensions of SpNQ-Ch-27, which included, but were not limited to, religious engagement, reflection, inner peace and altruism (range: r: 0.68–0.84, all $p<0.001$). Spiritual needs were not found to be significantly related to age ($r = -0.12$, $p=0.059$), which is in line with the literature that spiritual needs might be age-independent in the conditions of severe illness.

The subscale data from the MSPSS were not included in this matrix to avoid interpretive confusion and collinearity because only the total MSPSS score was included in the regression model. The high intercorrelations among subdomains of spiritual needs (e.g., r range: 0.71–0.84) also confirm the construct validity of the SpNQ-Ch-27 structure in this population. Cronbach's α was interpreted according to conventional cutoffs: ≥0.70 acceptable, ≥0.80 good.[31]

A strong positive correlation was observed between SpNQ-Ch-27 and inner peace (r = 0.84), while high collinearity among MSPSS subscales supports using only the total score in regression. Table 4 indicates strong links between spiritual needs and subdimensions such as inner peace (r = 0.84) and active giving (r = 0.81). High intercorrelations among MSPSS subscales (r > 0.85) indicate collinearity, warranting the use of the MSPSS total score only. PHQ-9 shows moderate correlation with SpNQ-Ch-27 but minimal correlation with age.

Table 3. Distribution of depression severity levels among participants based on patient health questionnaire-9 total scores (n=189)

PHQ-9 category	Score range	n (%)
Minimal/none	0–4	65 (34.4)
Mild	5–9	53 (28.0)
Moderate	10–14	42 (22.2)
Moderately severe	15–19	24 (12.7)
Severe	20–27	5 (2.6)

Abbreviation: PHQ-9: Patient Health Questionnaire-9.

3.5. Bivariate associations

Table 5 presents the bivariate associations between sociodemographic and clinical characteristics and spiritual needs (SpNQ-Ch-27 total score). Spiritual needs were significantly higher among patients diagnosed within 6 months (mean = 53.25, η^2 = 0.57), those with lower educational attainment (≤ junior high school; mean = 42.51, η^2 = 0.17), and patients earning <3000 RMB/month (mean = 44.33, η^2 = 0.20). Rural residents also reported significantly higher spiritual needs compared to urban patients, while gender and cancer type showed weaker or non-significant associations after correction.

Figure 3 shows the average total scores of spiritual needs (SpNQ-Ch-27) in the main demographic and clinical categories. The spiritual needs of those who had been diagnosed within 6 months, people with lower educational levels, those with lower incomes, and individuals who live in rural areas were significantly higher. In contrast, patients who had been diagnosed for more than 12 months, with a college education or above, and higher levels of income scored the lowest, highlighting the socioeconomic and clinical disparities as a source of spiritual distress.

3.6. Variable selection strategy

This study followed a methodological paradigm oriented toward developing a parsimonious model subject to empirically derived restrictions. The following steps were included:

(i) The model included significant bivariate predictors (p, Bonferroni-adjusted $p<0.05$).
(ii) Applied backward elimination with a removal criterion of $p>0.10$.
(iii) Assessed model assumptions and collinearity.
(iv) Performed internal validation.

Table 4. Pearson correlation matrix among key continuous variables

Variable	1	2	3	4	5	6	7	8	9
1. SpNQ-Ch-27 total	1.00								
2. Age	−0.12	1.00							
3. PHQ-9	0.34***	−0.08	1.00						
4. MSPSS total	0.67***	−0.15*	0.28***	1.00					
5. Religious: praying	0.71***	−0.09	0.19*	0.45***	1.00				
6. Religious: sources	0.68***	−0.11	0.22**	0.42***	0.78***	1.00			
7. Reflect/release	0.78***	−0.13	0.31***	0.52***	0.54***	0.51***	1.00		
8. Inner peace	0.84***	−0.10	0.28***	0.58***	0.45***	0.43***	0.65***	1.00	
9. Active giving	0.81***	−0.14	0.25***	0.55***	0.38***	0.36***	0.58***	0.71***	1.00

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

Table 5. Bivariate associations with spiritual needs (Chinese version of the 27-item spiritual needs questionnaire, total score, *n*=189)

Variable	Category	*n*	Mean (SD)	Test statistic	*p*-value (Bonferroni adjusted)	Effect size (Cohen's *d*/η^2)
Gender	Male	103	35.89 (16.45)	t=−1.82	0.070	d=0.27
	Female	86	38.89 (17.41)			
Residence	Urban	85	32.82 (15.23)	t=−2.91	0.004**	d=0.42
	Rural	104	40.71 (17.56)			
Education	≤Junior high	90	42.51 (17.89)	F=18.67	<0.001***	η^2=0.17
	High school	66	35.68 (14.32)			
	≥College	33	25.00 (12.45)			
Income (RMB)	<3000	87	44.33 (17.12)	F=22.89	<0.001***	η^2=0.20
	3000–5000	59	32.47 (14.23)			
	>5000	43	28.95 (13.78)			
Time since diagnosis	≤6 months	67	53.25 (15.89)	F=123.78	<0.001***	η^2=0.57
	6–12 months	58	35.19 (13.67)			
	>12 months	64	26.58 (11.45)			
Cancer type	Stomach	26	39.77 (18.12)	F=2.18	0.059	η^2=0.06
	Others (lung, breast, rectal, liver, etc.)	163	35.9 (15.9)			

Note: *p*-values adjusted using Bonferroni correction. *p<0.05; **p<0.01; ***p<0.001.
Abbreviation: SD: Standard deviation.

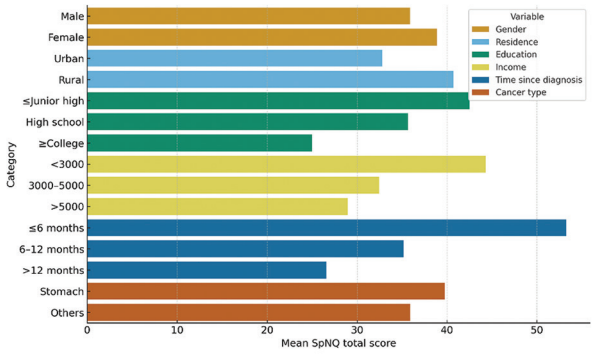

Figure 3. Bivariate associations between sociodemographic/clinical variables and spiritual needs (total score of the Chinese version of the 27-item Spiritual Needs Questionnaire [SpNQ-Ch-27]). Colors denote variable categories (e.g., gender, education, and income).

3.7. Collinearity diagnostics

Collinearity diagnostics for the final regression model showed all tolerance values above 0.70 and VIFs below 2.0, with condition indices under 15, indicating no concerning multicollinearity among predictors. This confirms that the independent variables could be interpreted without inflation of standard errors (Table 6).

3.8. Final parsimonious linear regression

Table 7 displays the results of the final parsimonious regression model predicting spiritual needs. After adjusting for all predictors, time since diagnosis of ≤6 months emerged as the strongest factor (β = 0.52, p<0.001), followed by depressive symptoms (β = 0.21, p=0.002) and rural residence (β = 0.19, p=0.003). Education at the high school level, stomach cancer diagnosis, and lower income also showed smaller but significant effects. The model explained 78.9% of the variance, with diagnostics confirming validity and no evidence of collinearity or influential outliers. The regression model statistics showed an adjusted R^2 of 0.789, F(8, 180) = 86.34, p<0.001, and a root mean square error of 7.78.

The replacement of sr^2 with adjusted R^2 is not appropriate because adjusted R^2 describes the overall model rather than individual predictors; therefore, we retain Cohen's f^2 values, which correctly represent predictor-specific effect sizes.

Figure 4 illustrates the independent effects of key predictors on spiritual needs scores (SpNQ-Ch-27 total). The strongest positive influence was observed among patients diagnosed in ≤6 months, followed by depressive symptoms and rural residence. A negative association was observed for low income, indicating greater vulnerability among economically disadvantaged groups.

3.9. Model diagnostics

Model diagnostics were conducted to assess the assumptions of the regression model and identify any influential observations, as follows:

(i) Residual analysis:

- Durbin–Watson test: 2.08 (no autocorrelation)
- Breusch–Pagan test: χ^2 = 12.45, p=0.132 (homoscedasticity assumption met)
- Jarque–Bera test: χ^2 = 3.67, p=0.159 (normality of residuals)

(ii) Influential observations:

- No cases with Cook's distance >1.0
- Three cases (1.6%) with standardized residuals > |2.5|
- Five cases (2.6%) with leverage values >3(k+1)/n threshold
- No cases met the criteria for influential outliers requiring removal

Figure 5 shows the distribution of residuals around the fitted values. The random scatter around the zero line indicated that the assumptions of linearity and

Table 6. Collinearity statistics for final model variables

Variable	Tolerance	VIF	Condition index
Time since diagnosis	0.867	1.153	1.000
PHQ-9 total	0.892	1.121	4.235
Residence (rural vs. urban)	0.934	1.071	6.789
Education (high school vs. ≥college)	0.756	1.323	8.912
Income (<3000 vs. >5000 RMB)	0.723	1.383	11.456
Cancer type (stomach vs. others)	0.945	1.058	13.267

Abbreviations: PHQ-9: Patient Health Questionnaire-9; VIF: Variance inflation factor.

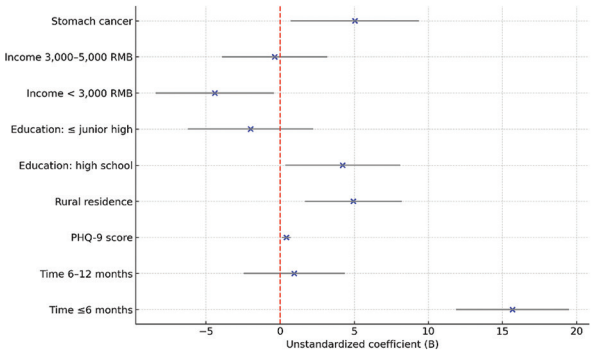

Figure 4. Regression coefficients (B) with 95% confidence intervals for predictors of spiritual needs

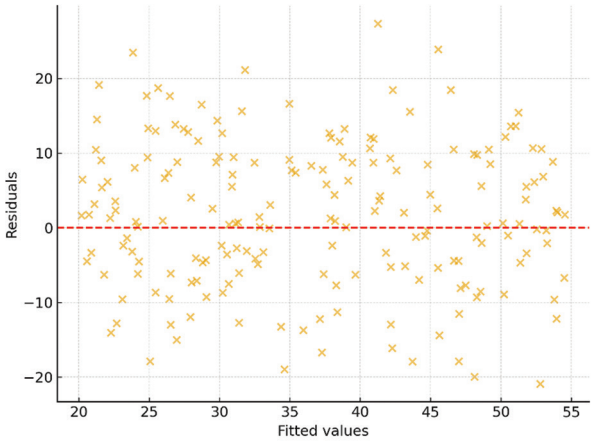

Figure 5. Comparison between residuals and fitted values

Table 7. Multiple linear regression predicting spiritual needs (Chinese version of the 27-item spiritual needs questionnaire, total score, n=189)

Predictor (reference group)	B (95% CI)	SE	β	t	p-value	VIF	Adjusted R^2/f^2
Constant	28.45 (24.12, 32.78)	2.21	–	12.87	<0.001	–	–
Time since diagnosis (>12 months)							
≤6 months	15.67 (11.90, 19.45)	1.93	0.52	8.12	<0.001	1.15	0.28 (large)
6–12 months	0.95 (−2.42, 4.33)	1.72	0.03	0.55	0.582	1.15	–
Depression (PHQ-9 score)	0.42 (0.16, 0.68)	0.13	0.21	3.23	0.002	1.12	0.04 (small–medium)
Residence (urban)							
Residence (rural)	4.94 (1.72, 8.16)	1.64	0.19	3.01	0.003	1.07	0.04 (small–medium)
Education (≥college)							
High school	4.22 (0.39, 8.06)	1.95	0.14	2.17	0.031	1.32	0.02 (small)
≤Junior high	−1.99 (−6.18, 2.20)	2.14	−0.06	−0.93	0.355	1.32	–
Income (>5,000 RMB)							
<3,000 RMB	−4.41 (8.35, −0.47)	2.01	−0.14	−2.20	0.029	1.38	0.02 (small)
3,000–5,000 RMB	−0.37 (−3.88, 3.15)	1.79	−0.01	−0.20	0.840	1.38	–
Cancer type (others)							
Stomach cancer	5.04 (0.75, 9.33)	2.19	0.14	2.30	0.022	1.06	0.02 (small)

Abbreviations: CI: Confidence interval; PHQ-9: Patient Health Questionnaire-9; SE: Standard error; VIF: Variance inflation factor.

homoscedasticity were met. No clear pattern or funnel shape suggested that the variance of residuals was constant across predictions.

Figure 6 compares the observed residuals against a theoretical normal distribution. Most points aligned closely with the diagonal reference line, indicating that residuals were approximately normally distributed. Minor deviations at the tails were acceptable and do not violate model assumptions.

Figure 7 evaluates both the leverage and the influence of observations. Most data points clustered within safe boundaries, and Cook's distance contours showed that no single observation exerts undue influence on the model. A few points with moderate leverage are within acceptable limits.

Figure 8 shows potential influential outliers identified using Cook's distance. In this dataset, all observations fell below the conventional cutoff of 1.0, suggesting no extreme outliers were driving the regression results. This confirms the model's stability and reliability.

Internal validation confirmed strong model stability, with a bootstrap-corrected R^2 of 0.781 and a ten-fold cross-validated R^2 of 0.773, indicating minimal overfitting. Time since diagnosis of ≤6 months showed the largest effect (β = 0.52), whereas depression, rural residence, intermediate education, low income, and stomach cancer contributed smaller but meaningful effects. Overall, the model explained 78.9% of the variance in spiritual needs, with recently diagnosed patients scoring 15.67 points higher and each one-point increase in PHQ-9 predicting a 0.42-point rise in spiritual need. These findings highlight that early diagnosis, psychological distress, and socioeconomic vulnerability are key indicators of heightened spiritual-care needs.

4. Discussion

This study explored the spiritual needs of Chinese cancer patients and identified the main sociodemographic, psychological, and clinical variables that affected the spiritual needs. The results showed that the general level of spiritual needs among participants was moderate, with a SpNQ-Ch-27 average total score of 37.23 (SD = 16.91). In the five domains, the needs were high in active giving and inner peace, with a mean score of 8.59 and 6.17, respectively. The lowest score was religious needs—resources (mean = 1.21), highlighting the overall non-religious nature of spiritual expression among Chinese patients. This aligns with previous cultural research, which points to relational and existential aspects of spirituality as being more relevant in collectivist East Asian settings.

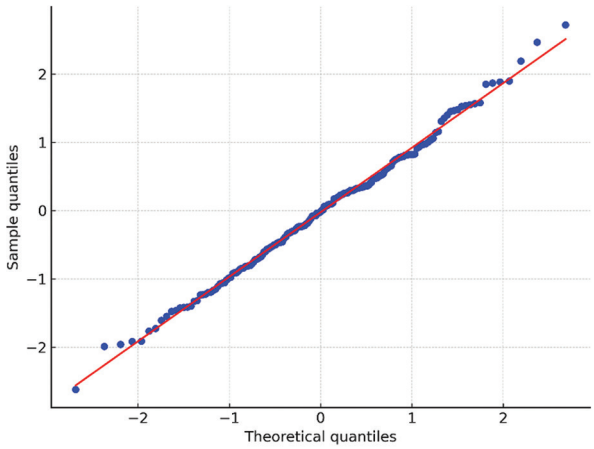

Figure 6. Normal Q-Q plot of residuals

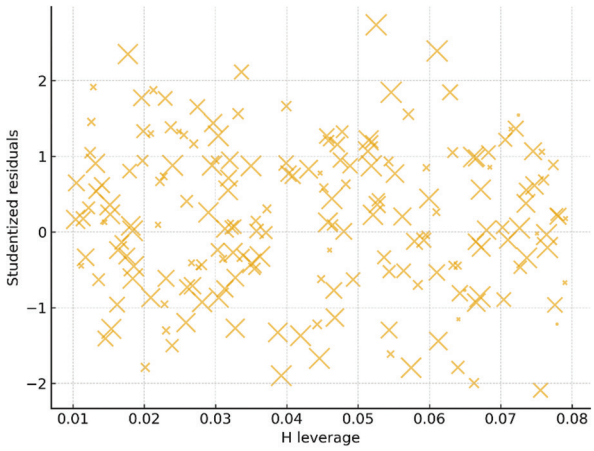

Figure 7. Comparison of H leverage and standardized residuals with Cook's distance

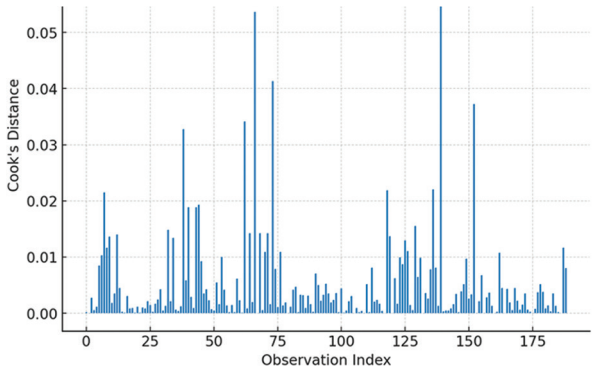

Figure 8. Cook's distance for influential observations

The time since diagnosis was among the strongest predictors (β = 0.52, p>0.001) with a large effect size (f^2 = 0.40). Patients diagnosed within 6 months reported

significantly higher spiritual needs than those diagnosed more than 12 months ago, with a difference of 26.67 (mean = 53.25 vs. 26.58, $\eta^2 = 0.57$). These results support the idea that the diagnostic and early treatment stage is a period of existential vulnerability, in line with previous studies.[28,29] This period is characterized by heightened emotional instability, extreme mental activity as a result of major decisions in life, and severe disruption in the self-conception. All these phenomena lead to a deep introspective experience about the existential meaning of people, the quality of their relationships with others, and the long-term legacy they would like to leave.

Intercorrelations between subdomains are strong, indicating conceptual overlap rather than statistical redundancy. The regression model also minimized concerns about multicollinearity, especially because only the MSPSS total score (and not its subscales) was included as a predictor. Multicollinearity was not a confounding factor in the estimation of coefficients, as the collinearity diagnostics (all tolerance values >0.70 and VIF values <2.0) indicated.

The results showed that depression severity, as measured by the PHQ-9, was associated with higher spiritual needs, thereby confirming Hypothesis 1. This correlation was moderate, with a correlation coefficient of 0.34 (p=0.001). The subsequent regression equation revealed that spiritual needs increased by 0.42 (95% CI: 0.21–0.002) for each one-point increase in the PHQ-9 score. This is consistent with findings that psychological distress generally prompts spiritual searching, serving as a coping strategy to reduce existential anxiety. This connection has been highlighted in previous works, which indicated that unmet spiritual needs can either contribute to depression or act as adaptive behavior.[30,31] It is important to note that PHQ-9 revealed that 37.5% of patients had moderate to severe depression, demonstrating the high burden of mental health problems within the cohort.

As anticipated, the spiritual needs of the rural patients were also found to be significantly higher than those of the urban patients (mean = 40.71 vs. 32.82, d = 0.42, p=0.004), and rural residence was also an independent predictor in the regression model (β = 0.19, p=0.003). The results confirm Hypothesis 2 and demonstrate inequality in accessing supportive care, information, and health literacy. Interestingly, although patients in rural regions may have less knowledge of psycho-oncological services, they reported higher existential need. This may be due to their greater emotional dependence on their family or community support networks in rural regions.

One of the less expected outcomes was the education level. It is expected that a lower educational level is associated with higher spiritual needs. However, only high school-educated patients (but not those with junior high or lower) had significantly higher spiritual needs than college-educated patients (β = 4.22, p=0.031). This implies that individuals with an intermediate level of education may have sufficient cognitive and emotional resources to recognize existential issues, but may lack the information or language needed to resolve them. Therefore, the non-linear relationship makes it more difficult to make assumptions in advance and suggests a subtle psychosocial gradient. Conversely, the effect of the lowest education group (≤junior high) was not significant in the adjusted model (p=0.355).

Consistent with Hypothesis 3, patients with a monthly income of <3000 RMB reported significantly higher spiritual needs (mean = 44.33) than those with a monthly income of more than 5000 RMB (mean = 28.95, p=0.001, $\eta^2 = 0.20$). The model also suggests that income is an important predictor (B = −4.41, p=0.029), indicating that economic insecurity is likely a contributing factor to vulnerability, reliance on psychosocial resources, and the demand for emotional meaning-making. Even though the direction of this relationship (i.e., low income predicting higher need) is as expected given the hypothesis, the negative beta value indicates that higher income is protective against spiritual distress, consistent with previous studies.[32,33]

For cancer type, stomach cancer is significantly associated with higher spiritual needs (B = 5.04, p=0.022), but it is insignificant for the unadjusted bivariate difference (p=0.059). This finding can be explained by the intrusiveness of treatment, nutritional restrictions, and poor prognostic expectations of gastrointestinal malignancies. It is also consistent with the previous studies that reported patients with gastric cancer had worsened emotional distress.[34,35] The current study suggests that cancer type is a significant predictor of spiritual needs, underscoring the necessity of diagnosis-related spiritual interventions.

The regression model explained 78.9% of the variance in spiritual needs (adjusted R^2 = 0.789), which is a relatively high proportion for psychosocial research. The model proved to be stable (bootstrap-corrected R^2 = 0.781; 10-fold cross-validation R^2 = 0.773), and all diagnostic tests (e.g., VIFs ≤ 2 and Cook's distance <1) were evidence of good statistical assumptions. This affirms the validity and potential of the model in the clinical setting to select cancer patients with the highest risks of having unmet spiritual needs.

Although such strengths exist, the study has certain methodological limitations. The cross-sectional design does not suggest causal inference, and it is unclear whether the spiritual needs exacerbate depression or not.

Furthermore, although convenience sampling facilitates feasible recruitment across the wards of the oncology department, it can create selection bias, especially because the research was confined to one tertiary hospital in Shanxi Province. The results might not be applicable to non-hospitalized patients, minority ethnic groups, and rural clinics. The relatively small number of patients with PHQ-9 scores of 15 or higher may underestimate the overall burden of spiritual distress in this population.

In terms of generalizability, the results can be used to generalize only to Han Chinese cancer patients admitted to hospitals in northern China. Nevertheless, predictive patterns, such as recent diagnosis, depression, rurality, and low income, are consistent, indicating greater applicability in cancer contexts where the vulnerabilities exist. The cultural pattern of low religious need but high altruistic and emotional needs for connection highlights the importance of non-theistic, culturally sensitive spiritual care models, especially among East Asia populations.[36-41]

Oncology nursing and interdisciplinary cancer treatment are two areas that stand to benefit greatly from the current study's findings. It is recommended to start psychosocial and spiritual screening at both the time of diagnosis and during the earliest stages of treatment planning, as the most significant predictor of high spiritual requirements was time since diagnosis (≤6 months). Nurses are also well-positioned to introduce standardized assessment, which would enable them to identify patients at risk of unmet existential or emotional needs in a timely manner.

The finding of a positive correlation between the level of depression and spiritual needs indicates the necessity of regular depression screening (e.g., PHQ-9) in oncology wards. Including spiritual support as well as psychological support can alleviate distress and increase treatment compliance.

The observation that individuals residing in rural areas and those with lower income and education levels report higher needs suggests that socioeconomic vulnerability should be considered a clinical factor. The nursing interventions for these groups should include equitable access to supportive services and community-based follow-up and referral pathways to psychosocial resources.

Finally, the high non-religious spiritual needs for active giving and inner peace indicate that culturally friendly interventions, such as family-based support, peer discussion groups, and opportunities for altruistic contribution, are more likely to be effective than religiously oriented interventions in the Chinese setting. Incorporating these practices in oncology nursing practices can enhance holistic care and quality of life.[30-32]

The current study offers valuable insights into oncology healthcare professionals, especially nurses, regarding the management of the spiritual needs of cancer patients that are commonly ignored. The initial psychosocial and spiritual screening needs to be included in the standard care pathway, as it was based on the observation that patients with 6 months of diagnosis had the greatest spiritual needs. Instruments, such as the SpNQ-Ch-27 and PHQ-9, can be used during initial hospital admission to identify patients at risk of emotional or existential distress.

Future studies should use longitudinal designs to examine spiritual needs and their dynamic association with depressive symptomatology over time. Studies on family-based interventions that embrace family-centered spiritual care should be promoted to establish causality and to ascertain cultural flexibility. Potential mediating and moderating mechanisms to such relationships should be investigated in future studies. Perceived social support can mediate the relationship between socioeconomic vulnerability (e.g., low income, living in rural areas) and spiritual needs, and depressive symptoms may moderate these relationships by enhancing existential distress. Such pathways were not tested in this study because of the cross-sectional design, but they can be consistent with stress-coping and meaningful models and should be investigated in longitudinal or structural equation models.

5. Conclusion

This study determined key predictors of spiritual needs in hospitalized cancer patients in China and reported a complicated relationship between psychological distress, socioeconomic status, clinical diagnosis, and time since cancer diagnosis. The spiritual needs of patients were rated as moderate, although the religious dimension was not prioritized, and the non-religious aspects of spiritual needs (altruism and emotional balance) were the most significant. The time since diagnosis, depression severity, rural residency, educational level, income, and cancer type have shown significant results as indicated by the model, which has a high statistical validity (adjusted $R^2 = 0.789$). The results provide an empirical rationale, including spiritual evaluation in oncology care at early stages. The acute demands of patients with a newly diagnosed cancer highlight the significance of the timely screening and psycho-spiritual assistance at the time of diagnosis. The predictive value of depression as an independent variable further justifies the clinical value of instruments, such as the PHQ-9, as not only a psychological triage tool, but also as a possible indicator of spiritual distress. Socioeconomic vulnerability has become a recurrent issue, underscoring the need for spiritual care models to go beyond patients'

symptomatology and incorporate the structural and contextual aspects of their lives. Interventions should focus on relational, culturally consonant support strategies rather than on religiously prescriptive models, particularly in societies where spiritual identity is more communal and existential than theological.

From a policy and practice perspective, the oncology unit should focus on establishing scalable, culturally appropriate spiritual care pathways. These may include organized peer support, family-focused communication, and trained-nurse-led spiritual counseling, particularly in rural areas. Spiritual sensitivity and needs identification should be integrated into the continuing education of oncology nurses and psychosocial staff. Future studies should apply longitudinal designs to investigate changes in spiritual needs over the course of treatment and survivorship follow-up. The sample frame could also be expanded to cover outpatient facilities and minority groups so that the external validity of the findings can be increased. The integration of the evaluation and management of spiritual needs into a comprehensive approach to treating cancer can help healthcare teams build stronger relationships between patients and caregivers, enhance their psychological well-being, and develop a sense of purpose and self-esteem throughout the oncologic process.

Our study shows the significance of early screening of depression and taking into account socioeconomic and cultural factors when attending to the spiritual needs of newly diagnosed cancer patients.

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Conflict of interest

The authors declare no conflict of interest.

Author contributions

Conceptualization: Wang Ting, Salwismawati Badrin
Formal analysis: Wang Ting, Salziyan Badrin
Investigation: Wang Ting
Methodology: Wang Ting, Salwismawati Badrin
Writing–original draft: Wang Ting
Writing–review & editing: Salwismawati Badrin, Salziyan Badrin

Ethics approval and consent to participate

This study was approved by both the Institutional Review Board of Shanxi Bethune Hospital, China (Approval No: SBH/IRB/2025/021) and the Human Research Ethics Committee of Universiti Sains, Malaysia (USM/JEPeM/KK/24080744). All participants provided written informed consent in Mandarin, their native language, after being informed of the study's purpose, voluntary nature, confidentiality safeguards, and the right to withdraw at any stage. All responses were anonymized and stored in password-protected databases to ensure participant privacy.

Consent for publication

All participants provided informed consent for the publication of the findings derived from this study. No identifiable personal data were collected or reported. All consent documentation is securely stored by the research team and is available upon reasonable request.

Availability of data

The datasets generated and analyzed during the current study are not publicly available due to ethical restrictions and the need to protect participant confidentiality. However, anonymized data may be made available from the corresponding author upon reasonable request.

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Appendix

Strengthening the reporting of observational studies in epidemiology (STROBE) checklist

Title of study: Spiritual needs, psychological distress, and social support among cancer patients in China: A cross-sectional study
date of submission: August 29, 2025
STROBE checklist for cross-sectional studies

Section/item	Item no.	Recommendation
Title and abstract	1	Indicate the study's design with a commonly used term in the title or the abstract.
Introduction	2	Explain the scientific background and rationale for the investigation.
Objectives	3	State specific objectives, including any prespecified hypotheses.
Study design	4	Present key elements of the study design early in the paper.
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment and data collection.
Participants	6	Provide the eligibility criteria and the sources and methods of selection of participants.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers.
Data sources/measurement	8	Provide sources of data and the details of the methods of assessment.
Bias	9	Describe any efforts to address potential sources of bias.
Study size	10	Explain how the study size was derived.
Quantitative variables	11	Explain how quantitative variables were handled in the analyses.
Statistical methods	12	Describe all statistical methods used.
Participants	13	Report the number of individuals at each stage of study.
Descriptive data	14	Provide characteristics of study participants.
Outcome data	15	Report numbers of outcome events or summary measures.
Main results	16	Provide unadjusted estimates and, if applicable, confounder-adjusted estimates and precision.
Other analyses	17	Report other analyses done—e.g., subgroup and sensitivity analyses.
Key results	18	Summarize key results with reference to study objectives.
Limitations	19	Discuss limitations of the study.
Interpretation	20	Provide a cautious overall interpretation of results considering objectives, limitations, and other evidence.
Generalisability	21	Discuss the generalizability (external validity) of the study results.
Funding	22	Provide the source of funding and the role of the funders.