

Parenting concerns among young and middle-aged lymphoma patients with minor children: Application of latent profile analysis and network analysis

Huiping zhang

Shandong Medical and Pharmaceutical University

guang yang

Shandong Tumor Hospital

zhenying wang

Shandong Chest Hospital

xiaoting hu

Shandong First Medical University, Shandong Academy of Medical Sciences, Nursing College

juan xu

xu.juan@sd-cancer.com

Shandong Tumor Hospital

xiaomin zhao

Shandong Medical and Pharmaceutical University

Research Article

Keywords: Parenting concerns, lymphoma patients, latent profile analysis, network analysis

Posted Date: August 10th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10484254/v1>

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

Additional Declarations: No competing interests reported.

Abstract

Background

Parenting concerns are common but underrecognized psychosocial challenges among lymphoma patients with dependent children. This study aimed to identify latent profiles of parenting concerns and explore associated psychosocial factors and profile-specific network structures among lymphoma patients.

Methods

A cross-sectional study was conducted among lymphoma patients with dependent children. Latent profile analysis was performed to identify distinct patterns of parenting concerns. Multinomial logistic regression analysis was used to examine psychosocial factors associated with profile membership. Subgroup-specific network analysis was conducted to identify central nodes and characterize the relationships among psychosocial variables within each profile. Network stability and accuracy were evaluated using bootstrap procedures.

Results

Two latent profiles of parenting concerns were identified: a low parenting concerns profile (60.7%) and a high parenting concerns profile (39.3%). Multinomial logistic regression analysis showed that illness perception, perceived social support, mindfulness, negative affect, and child–parent relationship were significantly associated with profile membership. Compared with patients in the low parenting concerns profile, those in the high parenting concerns profile exhibited more negative illness perceptions, higher negative affect, lower perceived social support and mindfulness, and greater involvement in child–parent relationships. Network analysis revealed that mindfulness and social support were central protective factors in both profiles, although the core nodes differed between profiles.

Conclusions

Lymphoma patients with dependent children exhibit substantial heterogeneity in parenting concerns, with distinct psychosocial characteristics and network structures across profiles. Identifying profile-specific risk factors and network core nodes may facilitate targeted psychosocial interventions.

1 Introduction

Lymphoma is a group of malignancies characterised by the clonal proliferation of lymphocytes. Its development may be associated with multiple factors, including immune deficiency, infection, genetic susceptibility, dietary factors, and exposure to chemical substances[1]. Based on pathological characteristics, lymphoma is mainly classified into two major types: Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL)[2]. According to global cancer statistics[3], approximately 553,000 new cases of NHL were reported

worldwide in 2022. NHL ranked as the eighth most common malignancy in males and the tenth most common malignancy in females, with its overall incidence ranking among the top 10 cancers globally.

In recent years, advances in diagnostic and therapeutic techniques have markedly improved the survival outcomes of patients with lymphoma. However, the risk of relapse, prolonged and repeated treatments, and treatment-related toxicities may continue to negatively affect their psychological well-being and quality of life[4]. Following diagnosis, they must not only cope with the challenges of disease treatment and uncertainty regarding prognosis but also continue to fulfil caregiving and educational responsibilities for their minor children. The coexistence of disease-related stress and family responsibilities may further increase their psychological burden. In this context, parenting concerns among parents with cancer have received increasing attention[5]. Previous studies have shown that higher levels of parenting concerns are associated with greater psychological distress, anxiety, depression, and poorer quality of life. Therefore, parenting concerns have become an important indicator for assessing psychological adjustment among parents with cancer[6].

However, current research on parenting concerns has largely focused on female patients with breast cancers, whereas studies among lymphoma patients remain relatively scarce[7]. According to the multifactorial theory of stress, individuals' psychological responses to stressful events are shaped by the interaction of cognitive appraisal, emotional states, psychological resources, social support, and family relationships[8]. However, previous findings have not been entirely consistent. For example, positive parent-child relationships may reduce family conflict and psychological strain but may also intensify concerns about disease-related consequences because stronger emotional attachment to children may increase parents' worries about the impact of illness on their children. These inconsistent findings suggest that lymphoma patients may not share a uniform psychological response pattern[9,10].

Variable-centred analyses based on overall mean scores or total scale scores may obscure heterogeneity in the manifestations of parenting concerns among patients. Some patients may report low levels of concern across all dimensions, whereas others may simultaneously exhibit high levels of practical concerns, emotional concerns, and parental concerns. Latent profile analysis (LPA) is a person-centred statistical approach that identifies latent subgroups based on individuals' response patterns across multiple observed indicators, thereby revealing whether clinically meaningful profiles of parenting concerns exist among patients. LPA can precisely capture within-group heterogeneity and provide a basis for stratified screening and targeted interventions.

However, identifying latent subgroups alone is insufficient to elucidate the organization of psychosocial factors within each subgroup. Network analysis treats each variable as a node and conditional associations after controlling for other variables as edges. This approach enables the examination of interconnections among multiple factors within the same system and facilitates the identification of highly connected core nodes and bridging nodes that link different psychological dimensions[11]. In recent years, network analysis has been applied in studies of depression, insomnia, self-injurious behaviour, and cancer-related psychological distress to identify key symptoms and potential intervention targets[12].

LPA and network analysis offer complementary insights: LPA identifies patient subgroups based on distinct patterns of parenting concerns, whereas network analysis examines how psychosocial factors are interconnected within each subgroup and identifies centrally positioned factors. Integrating these two

approaches not only reveals the heterogeneity of parenting concerns among lymphoma patients but also compares differences in the structural relationships among illness perception, social support, mindfulness, affect, and parent-child relationships across subgroups. Thus, grounded in the multifactorial theory of stress, the present study incorporates these psychosocial factors into its analytical framework. First, LPA was conducted to identify latent profiles of parenting concerns. Second, demographic, disease-related, and psychosocial characteristics were compared across profiles, and multinomial logistic regression identified factors associated with profile membership. Finally, separate network models were constructed for each profile to identify core and bridge nodes and to compare differences in network structure and global strength.

2 Methods

2.1 Participants

Using convenience sampling, we recruited lymphoma patients from a tertiary grade-A oncology hospital in Shandong Province, China, between February 2024 and April 2025. All participants completed a paper-based questionnaire.

The inclusion criteria were as follows: (1) patients with a pathologically confirmed diagnosis of lymphoma who were undergoing outpatient follow-up or inpatient treatment; (2) patients who were currently raising at least one minor child (< 18 years of age); (3) patients who were conscious, had adequate communication and comprehension abilities, and were fully aware of their diagnosis and disease status; and (4) patients who voluntarily participated and provided written informed consent.

The exclusion criteria were as follows: (1) patients with a documented history of psychiatric disorders; (2) patients with concurrent primary malignant tumours at other sites; and (3) patients with severe complications or comorbidities.

According to the sample size requirements for influencing factor analysis, the required sample size should be at least 5–10 times the number of independent variables. This study included 16 independent variables, resulting in a required sample size of 80–160 participants. In addition, based on the requirements of network analysis, the minimum sample size should meet the criterion of $P(P - 1)/2$ to ensure sufficient statistical power for estimating a partial correlation network with P nodes. In this study, P represented the number of 18 nodes; therefore, the minimum required sample size was 180 patients. During the actual survey process, 490 questionnaires were distributed, and 482 questionnaires were retrieved. After excluding 27 invalid questionnaires due to duplicate responses, logical inconsistencies, and abnormal response patterns, 455 valid questionnaires were included in the final analysis, yielding a valid response rate of 92.85%.

2.2 Data Collection

The formal survey was conducted in the lymphoma ward and outpatient clinic of the hospital between February 2024 and April 2025. After obtaining informed consent, patients were asked to complete the questionnaires based on their actual circumstances. Upon completion, each questionnaire was collected immediately onsite and checked for completeness. If missing or incomplete responses were identified, patients were asked to provide the missing information onsite.

2.3 Instruments

2.3.1 General Information Questionnaire

The General Information Questionnaire was designed by the researchers based on a review of relevant literature. It comprises 10 items covering two domains: demographic information (age, gender, educational level, employment status, family financial situation, primary caregiver, and number of children) and disease-related information (cancer stage, chemotherapy, and duration of illness).

2.3.1 Parental Cancer Questionnaire, PCQ

The PCQ was originally developed by Muriel et al. in 2012 and was subsequently translated and culturally adapted into Chinese by Kang Tingting et al [13, 14]. The PCQ was designed to assess the level of parenting concerns related to child-rearing among patients with cancer. The scale consists of 15 items across three dimensions: Practical Concerns, Emotional Concerns, and Parental Concerns. Each item is rated on a 5-point Likert scale ranging from 1 ("not concerned at all") to 5 ("extremely concerned"). Scores for each dimension and the total scale are calculated based on the mean item score, with higher scores indicating higher levels of parenting concerns. The Cronbach's α coefficient for the total scale was 0.935, and the coefficients for the three dimensions were 0.877, 0.868, and 0.837.

2.3.2 Child-Parent Relationship Scale Short-Form, CPRS-SF

The CPRS-SF was originally developed by Pianta and was later translated and culturally adapted into Chinese by Shen Qinghui et al [15, 16]. Because the Dependency dimension demonstrated poor reliability, most subsequent studies have adopted a shortened version comprising only the Closeness and Conflict dimensions to assess parent-child relationships. This shortened version consists of 15 items across two dimensions: Cohesion (7 items) and Conflict (8 items) [17]. In the present study, the Cronbach's α coefficients for the Cohesion and Conflict dimensions were 0.875 and 0.860.

2.3.3 The Brief Illness Perception Questionnaire, BIPQ

The BIPQ was developed by Broadbent et al. in 2006 and was later translated and culturally adapted into Chinese by Mei Yaqi et al [18, 19]. The scale consists of nine items spanning three dimensions: Illness Cognition, Illness-related Emotion, and Illness Understanding. Item 9 is an open-ended question and is excluded from scoring. The remaining eight items are rated on a 0–10 scale and are used to assess patients' illness perceptions and emotional responses. In the present study, the Cronbach's α coefficient for the total scale was 0.664.

2.3.4 Perceived Social Support Scale, PSSS

The PSSS was developed by Dahlem et al. in 1987 and was subsequently translated into Chinese by Jiang Qianjin et al [20, 21]. The scale consists of 12 items across three dimensions based on the source of support: Family Support, Friend Support, and Other Support. Items are rated on a 7-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Higher total scores indicate higher levels of perceived social support. The Cronbach's α coefficient for the total scale was 0.939. The Cronbach's α coefficients for the three subscales were 0.906 for Family Support, 0.913 for Friend Support, and 0.870 for Other Support.

2.3.5 Mindful Attention Awareness Scale-5, MAAS-5

The MAAS-5 was developed by Deng et al[22].It consists of five items (items 7,8,9,10,and 14) selected from the original scale.The scale uses a 6-point Likert scale ranging from 1 ("never") to 6 ("always").Responses to all five items are reverse-scored,with total scores ranging from 5 to 30.Higher scores indicate higher levels of mindfulness.In the present study,the Cronbach's α coefficient for the MAAS-5 was 0.815.

2.3.6 Positive Affect and Negative Affect Scale, PANAS

The PANAS was developed by Watson et al[23, 24].The PANAS was translated and culturally adapted into Chinese by Huang et al.The scale was designed to assess participants' affective experiences over the previous two weeks.It consists of 20 items across two dimensions:Positive Affect and Negative Affect.Each item is rated on a 5-point Likert scale.Higher total scores indicate higher levels of affect in the corresponding dimension;specifically,higher scores on the Positive Affect dimension indicate stronger positive affect,whereas higher scores on the Negative Affect dimension indicate more severe negative affect.In the present study,the Cronbach's α coefficient for the total PANAS was 0.828.The Cronbach's α coefficients for the Positive Affect and Negative Affect subscales were 0.897 and 0.890.

2.4 Data analysis

Data analysis was conducted using Mplus 8.3,SPSS 25.0, and R statistical software (version 4.5.2).Descriptive statistics were computed for all variables: continuous variables were presented as mean $\pm$ standard deviation, and categorical variables as frequencies and percentages. Latent profile analysis identified subgroups of parenting concerns based on responses to each item of the Parenting Concerns Questionnaire. Model fit was assessed using Akaike Information Criterion (AIC),Bayesian Information Criterion (BIC),and adjusted Bayesian Information Criterion (aBIC),with lower values indicating better fit, and entropy (values closer to 1 reflect better classification accuracy).Bootstrap Likelihood Ratio Test(BLRT) and Lo-Mendell-Rubin Likelihood Ratio Test(LMR-LRT) were used to compare a k-profile model with a k-1-profile model, where a significant p-value indicated better fit for the k-profile model. After identifying the optimal profile solution, univariate analyses compared variables across profiles, and significant variables were included in a multinomial logistic regression model to identify predictors of profile membership among young and middle-aged lymphoma patients raising minor children. All tests used a significance level of $p < 0.05$. Although BIC and LMR-LRT favored the three-profile model, model selection also considered theoretical meaning and practical utility[25]. The three-profile model showed high classification accuracy but poor structural stability in subsequent network analyses and included profiles that were difficult to interpret. The two-profile model, despite slightly lower classification accuracy, provided more theoretically meaningful partitions and yielded more stable and interpretable network structures. Thus, the two-profile model was selected as optimal.

To examine the conditional dependence structure among parenting concern variables, network models were constructed within each profile using R 4.2.2 with qgraph, bootnet, and networktools. Networks consisted of nodes (observed variables) and edges (regularized partial correlations), with edge weights reflecting association strength; positive and negative associations were indicated by different colors, and edge width represented strength. As variables were primarily ordinal or continuous, networks were constructed using cor_auto and estimated with EBIC-glasso ($\gamma = 0.50$) to obtain a sparse and interpretable structure. Core node identification was based on Strength (sum of absolute edge weights) and Expected Influence (algebraic sum

of edge weights). Network stability was assessed via bootnet: non-parametric bootstrapping (1,000 resamples) estimated 95% confidence intervals for edge weights, and case-dropping bootstrapping calculated Correlation Stability (CS) coefficient for centrality indices ($CS \geq 0.50$ indicates good stability; CS should not be less than 0.25). Bootstrap difference tests compared edge weights and centrality indices. To compare networks across profiles, the Network Comparison Test (NCT) with 1,000 permutation tests examined differences in overall structure, edge weights, and centrality.

3 Results

3.1 Sample characteristics

This study included 455 lymphoma patients, with a mean age of 38.72 ± 5.53 years. The majority of participants were female (56.7%), and 30.3% had one child. Regarding family financial situation, approximately half of the participants reported breaking even (51.9%), whereas only 14.3% reported living within their means. In terms of disease characteristics, most patients had stage IV lymphoma (58.5%), and the mean disease duration was 0.89 ± 1.28 years. Detailed information is presented in Table 1.

Table 1
Demographic and Clinical Characteristics of Lymphoma Patients (N = 455)

Variables	n(%)	Class 1 n(%)	Class 2 n(%)	χ^2/t	P
Age (years)				0.839	0.360
<45	397(87.3)	244(61.5)	153(38.5)		
≥ 45	58(12.7)	32(55.2)	26(44.8)		
Gender				0.084	0.772
Male	197(43.3)	118(59.9)	79(40.1)		
Female	258(56.7)	158(61.2)	100(38.8)		
Educational Level					
Junior high school or below	142(31.2)	86(60.6)	56(39.4)	5.212	0.074
High school or vocational	128(28.1)	68(53.1)	60(46.9)		
College or higher	185(40.7)	122(65.9)	63(34.1)		
Employment					
Farmer	108(23.7)	57(52.8)	51(47.2)	5.747	0.057
Employed	223(49.0)	147(65.9)	76(34.1)		
Unemployed	124(27.3)	72(58.1)	52(41.9)		
Family Financial Situation				13.125	0.001
Living beyond one's means	154(33.8)	76(49.4)	78(50.6)		
Breaking even	236(51.9)	154(65.3)	82(34.7)		
Living within one's means	65(14.3)	46(70.8)	19(29.2)		
Primary Caregiver				3.938	0.14
Self	94(20.7)	62(66.0)	32(34.0)		
Spouse	138(30.3)	89(64.5)	49(35.5)		
Other	223(49.0)	125(56.1)	98(43.9)		
Number of Children				0.229	0.633
< 1	138(30.3)	86(62.3)	52(37.7)		
≥ 1	317(69.7)	190(59.9)	127(40.1)		
Cancer Stage				5.377	0.068
I/II	104(22.8)	67(64.4)	37(35.6)		
III	85(18.7)	59(69.4)	26(30.6)		

Variables	n(%)	Class 1 n(%)	Class 2 n(%)	χ^2/t	P
IV	266(58.5)	150(56.4)	116(43.6)		
Chemotherapy				0.002	0.963
No	92(20.2)	56(60.9)	36(39.1)		
Yes	363(79.8)	220(60.6)	143(39.4)		
Duration of Illness (years)				0.006	0.939
< 1	327(71.9)	198(60.6)	129(39.4)		
≥ 1	128(28.1)	78(60.9)	50(39.1)		
Illness Perception(M ± SD)		37.91 ± 11.54	45.66 ± 9.10	-7.972	< 0.001
Perceived Social Support(M ± SD)		65.97 ± 13.06	59.61 ± 12.53	5.155	< 0.001
Positive Affect(M ± SD)		30.87 ± 7.27	28.56 ± 7.33	3.300	< 0.001
Negative Affect(M ± SD)		22.13 ± 6.31	26.65 ± 7.12	-7.086	< 0.001
Mindful Attention Awareness(M ± SD)		21.64 ± 4.46	18.97 ± 4.51	6.222	< 0.001
Child-Parent Relationship(M ± SD)		44.59 ± 7.50	47.80 ± 7.98	-4.296	< 0.001

3.2 Latent Profiles of Parenting Concerns

Latent profile analysis identified two distinct profiles of parenting concerns based on participants' responses to the Parenting Concerns Questionnaire. The model fit indices are presented in Table 2. As the number of profiles increased, the AIC, BIC, aBIC values decreased progressively. The two-profile solution was supported by both the BLRT and the LMR-LRT ($p < 0.001$). Although the three-profile solution further improved statistical fit, the two-profile solution was ultimately selected because it provided better interpretability and greater structural stability for the subsequent network analysis. Figure 1 illustrates the distribution of parenting concern scores across the two profiles. The first profile, characterized by relatively low scores across all items, was labeled the low parenting concerns profile ($n = 276, 60.7\%$). The second profile, characterized by consistently higher scores across all items, was labeled the high parenting concerns profile ($n = 179, 39.3\%$).

Table 2
Model fit indices for latent profile analysis (N = 455).

Model	AIC	BIC	aBIC	LMR	BLRT	Entropy	Class Proportions
1	22045.642	22169.251	22074.041				
2	19431.770	19621.304	19475.315	< 0.001	< 0.001	0.934	0.607/0.393
3	18612.398	18867.857	18671.089	0.014	< 0.001	0.952	0.534/0.323/0.142
4	18130.677	18452.060	18204.514	0.080	< 0.001	0.935	0.434/0.330/0.109/0.127

Table 1 presents the comparisons of demographic,disease-related,and psychosocial characteristics between the two latent profiles.A significant difference in family financial situation was observed between the two profiles ($\chi^2 = 13.125,p = 0.001$).Significant differences were also found in illness perception,perceived social support,positive affect,negative affect,mindful attention awareness,and child–parent relationship (all $p < 0.05$).The results of the multinomial logistic regression analysis are presented in Table 3.Psychosocial variables were significantly associated with latent profile membership.Specifically,higher illness perception scores were associated with a greater likelihood of belonging to the high parenting concerns profile (OR = 1.041, $p = 0.003$).Similarly,higher negative affect scores (OR = 1.049, $p = 0.012$) and higher child–parent relationship scores (OR = 1.031, $p = 0.041$) were associated with an increased likelihood of membership in the high parenting concerns profile.In contrast,higher perceived social support (OR = 0.976, $p = 0.007$) and higher mindfulness (OR = 0.925, $p = 0.003$) were associated with a lower likelihood of belonging to the high parenting concerns profile.Family financial situation and positive affect were not significantly associated with latent profile membership ($p > 0.05$).

Table 3
Multivariate Logistic Regression Analysis of Factors Influencing Parenting Concerns (N = 455)

Variables	B	SE	Wald χ^2	P	Exp(B)
Constants	-1.012	1.28	0.624	0.429	0.364
Family Financial Situation			2.807	0.246	
Living beyond one’s means	-0.256	0.242	1.119	0.290	0.774
Breaking even	-0.583	0.359	2.636	0.104	0.558
Illness Perception	0.04	0.013	9.101	0.003	1.041
Perceived Social Support	-0.024	0.009	7.253	0.007	0.976
Positive Affect	-0.013	0.018	0.51	0.475	0.987
Negative Affect	0.047	0.019	6.295	0.012	1.049
Mindful Attention Awareness	-0.078	0.026	8.863	0.003	0.925
Child-Parent Relationship	0.031	0.015	4.162	0.041	1.031

3.3 Network Analysis

3.3.1 Network Structure

To examine the subgroup-specific network structures of psychosocial variables across different latent profiles of parenting concerns, separate network models were estimated for Profile 1 and Profile 2. The initial networks consisted of 18 nodes covering six domains: parenting concerns, child–parent relationship, illness perception, perceived social support, mindfulness, and affect. Overall, Profile 1 showed stronger network connectivity than Profile 2. The Network Comparison Test revealed a significant difference in overall network structure between the two profiles ($M = 0.275,p = 0.044$). A significant difference was also observed in global strength ($S =$

2.230, $p = 0.009$). Specifically, global strength was higher in Profile 1 (5.583) than in Profile 2 (3.354), indicating stronger overall connectivity among nodes in Profile 1. Detailed results are presented in Fig. 2.

3.3.2 Centrality Analysis

In Profile 1, M5 showed the highest centrality, followed by Family Support, Other Support, and Practical Concerns. Specifically, the fifth mindfulness item (M5) demonstrated a high Expected Influence and played an important role in the network structure. These findings suggest that mindfulness, particularly the component represented by M5, may serve as a core node within the Profile 1 network. In Profile 2, Other Support showed the highest Expected Influence, followed by Practical Concerns, Friend Support, and mindfulness-related indicators. Regarding Expected Influence, Other Support remained the most central node, followed by M2 and Friend Support. Compared with Profile 1, the Illness Cognition node in Profile 2 exhibited relatively lower centrality. Overall, the centrality analysis indicated that although both networks were characterized by prominent roles of mindfulness and social support, the relative importance of Illness Cognition and parenting concerns nodes differed between the two profiles. Detailed results are presented in Fig. 3.

3.3.3 Network Stability

Network stability was assessed using the case-dropping bootstrap procedure. In Profile 1, the CS coefficients for Strength and Expected Influence were 0.518 and 0.594, respectively, both indicating good stability. In Profile 2, the CS coefficient for Expected Influence was 0.514, indicating good stability, whereas the CS coefficient for Strength was 0.441, indicating acceptable stability. The accuracy of edge weights was evaluated using the non-parametric bootstrap procedure. The 95% confidence intervals of the edge weights were relatively narrow (Figure S1), suggesting acceptable precision of the estimates.

4 Discussion

This study identified two latent profiles of parenting concerns among lymphoma patients: the low parenting concerns profile (60.7%) and the high parenting concerns profile (39.3%). These findings indicate substantial heterogeneity in both the level and pattern of parenting concerns within this population. The results support the multifactorial stress theory, which posits that patients' psychological adaptation is jointly influenced by multiple factors, including illness appraisal, emotional states, psychological resources, and family support. Patients who perceive their illness as more threatening or unpredictable may experience greater uncertainty about their ability to continue fulfilling their parental responsibilities, thereby reporting higher levels of parenting concerns. Thus, differences in parenting concerns may reflect the combined influence of illness perception, psychological resilience, and family resources, rather than being determined solely by disease-related characteristics[26]. Identifying such heterogeneity may facilitate stratified screening and the development of individualized psychosocial support for lymphoma patients with dependent children.

Multinomial logistic regression analysis further revealed that illness perception, social support, mindfulness, negative affect, and child–parent relationship were all significantly associated with latent profile membership. Higher levels of illness perception increased the likelihood of belonging to the high parenting concerns profile[27], suggesting that when patients perceive their illness as having long-term consequences or being difficult to control, they may become more concerned about its impact on child care, family functioning, and

their children's future development. Conversely, higher levels of social support and mindfulness were associated with lower parenting concerns, possibly exerting protective effects by enhancing emotional regulation, reducing illness-related stress, and promoting family adaptation[28]. Negative affect was associated with an increased likelihood of belonging to the high parenting concerns profile, which may be explained by its tendency to amplify perceptions of illness threat and concerns regarding the potential impact of the disease on children and family life[26]. In addition, stronger child–parent relationships were associated with greater parenting concerns. This finding may reflect that parents with closer emotional bonds with their children invest more heavily in their parental roles and therefore experience greater concern about the potential disruption of their parenting responsibilities caused by illness.

Network analysis further revealed differences in the organization of psychosocial factors across the two parenting concerns profiles. Both networks demonstrated high centrality of mindfulness and social support, suggesting that these factors may serve as important protective resources. However, the core nodes differed between the two profiles. In the low parenting concerns profile (Profile 1), M5 ("I find that I can't concentrate on what I'm doing") showed the highest centrality, while Family Support and Other Support also demonstrated strong connectivity, suggesting that mindfulness capacity and social support may contribute to maintaining the stability of the psychosocial network in this profile. In the high parenting concerns profile, M3 ("I focus too much on the goal itself, without considering how to achieve it") exhibited relatively high centrality, whereas Other Support showed the highest Expected Influence, indicating that psychosocial adaptation in this profile may rely more heavily on mindfulness and broader social support resources. Overall, the two profiles displayed distinct patterns of psychosocial interactions, suggesting that different intervention priorities may be required. For patients in the low parenting concerns, interventions may focus on strengthening mindfulness skills and family support, whereas patients in the high parenting concerns profile may benefit from cognitive-based interventions together with strategies to expand social support resources.

4.1 Strengths, Limitations, and Future Research

This study has several limitations. First, the cross-sectional design precludes conclusions regarding the temporal sequence or causal relationships among illness perception, negative affect, mindfulness, social support, child–parent relationship, and parenting concerns. Although central nodes identified through network analysis represent variables with strong conditional associations, they should not be interpreted as causal determinants. Future studies should employ longitudinal network analysis or cross-lagged panel models to examine the dynamic relationships among these psychosocial factors over time.

Second, the study was conducted in a single center, which may limit the generalizability of the findings. Different lymphoma subtypes, treatment stages, and disease characteristics may influence patients' perceptions of their parental role and family future. Future multicenter studies with larger and more diverse samples should compare psychosocial network structures across lymphoma subtypes, treatment stages, and children's developmental stages.

Third, all variables were assessed using self-report questionnaires, making the findings susceptible to recall bias, social desirability bias, and common method bias. Because parenting concerns inherently involve family interactions, relying solely on patients' self-reports may not fully capture family functioning or child–parent relationships. Future research should incorporate reports from spouses, children, or caregivers, together with

qualitative interviews, behavioral observations, and clinical indicators, to establish a more comprehensive patient–family–disease framework.

Despite these limitations, this study integrated latent profile analysis, multinomial logistic regression, and subgroup-specific network analysis to identify heterogeneity in parenting concerns among lymphoma patients and to characterize the psychosocial interaction patterns within different profiles. Compared with traditional variable-centered approaches, this integrated analytical framework provides a more nuanced understanding of subgroup differences and offers valuable evidence for stratified screening, risk identification, and individualized psychosocial nursing interventions.

5 Implications for Clinical Practice

The findings of this study highlight the importance of incorporating routine screening for parenting concerns into the clinical management of lymphoma patients with dependent children, rather than assuming that all parents have similar psychosocial needs. Illness perception, social support, mindfulness, negative affect, and child–parent relationship were identified as important factors associated with parenting concerns. Accordingly, healthcare professionals should provide psychoeducation to improve maladaptive illness perceptions, implement mindfulness-based interventions to enhance emotional regulation, strengthen family-centered care to increase perceived social support, and routinely monitor patients' negative affect throughout the disease trajectory. Furthermore, network analysis identified mindfulness and social support as highly influential protective factors across both parenting concerns profiles. Targeting these core nodes may improve multiple psychosocial factors through their interconnected relationships within the network, thereby promoting overall psychological adaptation. Future intervention programs should integrate network-based approaches to develop individualized psychosocial support strategies that address the specific needs of different parenting concerns profiles.

6 Conclusions

In conclusion, this study identified two distinct latent profiles of parenting concerns among lymphoma patients, further confirming the substantial heterogeneity in parenting concerns within this population and highlighting the need for stratified and targeted interventions. Patients in the high parenting concerns profile were characterized by more negative illness perceptions, higher levels of negative affect, lower levels of perceived social support and mindfulness, and stronger involvement in child–parent relationships. In addition, the two profiles differed in their psychosocial network structures and core nodes. These findings suggest that patients with different levels of parenting concerns differ not only in the levels of relevant psychosocial factors but also in the way these factors are organized and interact with one another. Therefore, healthcare professionals should develop individualized psychosocial support and family-centered nursing interventions based on the risk characteristics and network-based core factors of each parenting concerns profile.

Declarations

Ethics approval and consent to participate

The study was approved by Ethics Committee of the Cancer Hospital Affiliated to Shandong First Medical University (Ethical approval number: SDTHEC 2024002062).Written informed consent was obtained from all participants. In studies involving human participants, all procedures were carried out in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Helsinki Declaration, along with its subsequent amendments or equivalent ethical standards.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Funding

None.

Author Contribution

Authors' contributionsAuthors' contributions Huiping Zhang and Guang Yang designed, wrote, and edited the manuscript, interpreted the data, and contributed to the discussion. Xiaomin Zhao and Juan Xu designed/edited/wrote several parts of the manuscript, interpreted the data, contributed to the discussion and content, and reviewed the manuscript.Xiaoting Hu and Zhenying Wang collected the data and completed the calculation.

Acknowledgments

None.

Clinical trial number

Not applicable.

Authors' contributions

Authors' contributions Huiping Zhang and Guang Yang designed, wrote, and edited the manuscript, interpreted the data, and contributed to the discussion. Xiaomin Zhao and Juan Xu designed/edited/wrote several parts of the manuscript, interpreted the data, contributed to the discussion and content, and reviewed the manuscript.Xiaoting Hu and Zhenying Wang collected the data and completed the calculation.

Data Availability

Data availability The datasets used and /or analyzed during this study are not publicly available due to confidentiality of patient information and ethical restrictions but are available in summary form from the corresponding author upon reasonable request.

References

1. Thandra KC, Barsouk A, Saginala K, Padala SA, Barsouk A, Rawla P. Epidemiology of non-Hodgkin's lymphoma. *Med Sci*. 2021;9(1):5. 10.3390/medsci9010005.
2. Jabareen M, Al-Sweity M, Alhroub W, Altel K, Aljaradat A. Advances in the pathophysiology, diagnosis, and treatment of lymphomas: a comprehensive overview. *Advances in Lymphatic Medicine*. London: IntechOpen; 2025. 10.5772/intechopen.1009129.
3. Bray F, Laversanne M, Sung H, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2024;74(3):229–63. 10.3322/caac.21834.
4. Neppelenbroek SIM, Ekels A, Kersten MJ, et al. Fatigue, neuropathy and psychological distress and their association with health-related quality of life in survivors of diffuse large B-cell lymphoma: a prospective cohort study and comparison with a normative population. *Hematol Oncol*. 2025;43(6):e70151. 10.1002/hon.70151.
5. Li Y, Chong M, Chui P, et al. Psychosocial interventions to support parenting among parents with cancer: a scoping review. *Asia Pac J Oncol Nurs*. 2026;13:100921. 10.1016/j.apjon.2026.100921.
6. Leo K, Langer SL, McDaniel H, et al. Parenting concerns, psychological distress, and relationship adjustment among patients with cancer and their partners: a longitudinal study. *Psychooncology*. 2025;34(1):e70057. 10.1002/pon.70057.
7. Zhang Q, Gao W, Li X, et al. Motherhood role concerns in young women with breast cancer: a mixed-methods study. *BMC Womens Health*. 2025;25(1):313. 10.1186/s12905-025-03870-5.
8. Jiang QJ. A multifactorial system of psychological stress: twenty years of exploration on psychological stress theory and its application. In: *Proceedings of the 12th Annual Meeting of the Chinese Society of Psychosomatic Medicine*. Beijing: Chinese Medical Association; 2006.
9. Milbury K, Ann-Yi S, Jones M, et al. Patients with advanced cancer and their spouses parenting minor children: the role of the relationship context in parenting concerns. *Psychooncology*. 2024;33(3):e6310. 10.1002/pon.6310.
10. Babore A, Trumello C, Bramanti SM, Brandão T. Exploring the psychological outcomes of cancer diagnosis on parental role and parent-child relationships: validation of the Italian Parenting Concerns Questionnaire (PCQ). *Curr Psychol*. 2025;44(3):1832–9. 10.1007/s12144-024-07258-w.
11. Ma Z, Zhao F, Wang Y, Liu T, Chao N. Network analysis of time use and depressive symptoms among emerging adults: findings from the Guizhou Population Health Cohort Study. *Front Psychiatry*. 2022;13:809745. 10.3389/fpsy.2022.809745.
12. Zhang Y, Ma Z, Chen W, Wang D, Fan F. Network analysis of health-related behaviors, insomnia, and depression among urban left-behind adolescents in China. *Child Psychiatry Hum Dev*. 2025;56(3):844–55. 10.1007/s10578-023-01607-9.

13. Muriel AC, Moore CW, Baer L, et al. Measuring psychosocial distress and parenting concerns among adults with cancer: the Parenting Concerns Questionnaire. *Cancer*. 2012;118(22):5671–8. 10.1002/cncr.27572.
14. Kang TT. Chinese translation and preliminary application of the Parenting Concerns Questionnaire in patients with cancer [master's thesis]. Zhengzhou: Zhengzhou University; 2022. 10.27466/d.cnki.gzzdu.2021.003753
15. Pianta RC. Child-Parent Relationship Scale. Charlottesville (VA): University of Virginia; 1992.
16. Shen QH. The relationship between parent-child relationship and frustration tolerance in preschool children [master's thesis]. Chongqing: Southwest University; 2015.
17. Deng XP. The relationship among teacher behavior, parent-child interaction and creativity in preschool children [doctoral dissertation]. Changchun: Northeast Normal University; 2013.
18. Broadbent E, Petrie KJ, Main J, Weinman J. The Brief Illness Perception Questionnaire. *J Psychosom Res*. 2006;60(6):631–7. 10.1016/j.jpsychores.2005.10.020.
19. Mei YQ, Li HP, Yang YJ, et al. Reliability and validity of the Chinese version of the Brief Illness Perception Questionnaire in women with breast cancer. *J Nurs (China)*. 2015;22(24):11–4. 10.16460/j.issn1008-9969.2015.24.011.
20. Wang WN, Wu DN, Xie YL, Wang JX, Fan XY, Li SY. Mindfulness-based cognitive therapy reduces parenting anxiety and enhances quality of life in patients with breast cancer. *World J Psychiatry*. 2025;15(12):111320. 10.5498/wjp.v15.i12.111320.
21. Jiang QJ. Perceived Social Support Scale. *Chin J Behav Med Sci*. 2001;10(1):41–3.
22. Deng YQ, Li S, Tang YY, Zhu LH, Ryan R, Brown K. Psychometric properties of the Chinese translation of the Mindful Attention Awareness Scale (MAAS). *Mindfulness*. 2012;3(1):10–4. 10.1007/s12671-011-0074-1.
23. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers Soc Psychol*. 1988;54(6):1063–70.
24. Huang L, Yang TZ, Ji ZM. Applicability of the Positive and Negative Affect Schedule in Chinese populations. *Chin Ment Health J*. 2003;(1):54–6.
25. Bray BC, Dziak JJ. Commentary on latent class, latent profile, and latent transition analysis for characterizing individual differences in learning. *Learn Individ Differ*. 2018;66:105–10. 10.1016/j.lindif.2018.06.001.
26. Li N, Li C, Chen L, Wang X, Liang S, Shao L. Factors influencing parenting concerns in Chinese breast cancer mothers with minor children: a path analysis using a multi-mediation model. *J Cancer Surviv*. 2025. 10.1007/s11764-025-01813-5.
27. Liang W, Pang Y, Lin J, Liu J, Liang W. The impact of illness perception on parenting concerns of breast cancer patients with minor children: mediating effects of fear of progression. *Front Psychol*. 2025;16:1676894. 10.3389/fpsyg.2025.1676894.
28. Salafia C, Bellizzi KM, Ligus K, Fritzson E, Park CL. Perceived negative consequences of cancer and psychological distress in survivors: the moderating role of social support. *J Cancer Surviv*. 2025;19(1):12–20. 10.1007/s11764-023-01444-8.

Figures

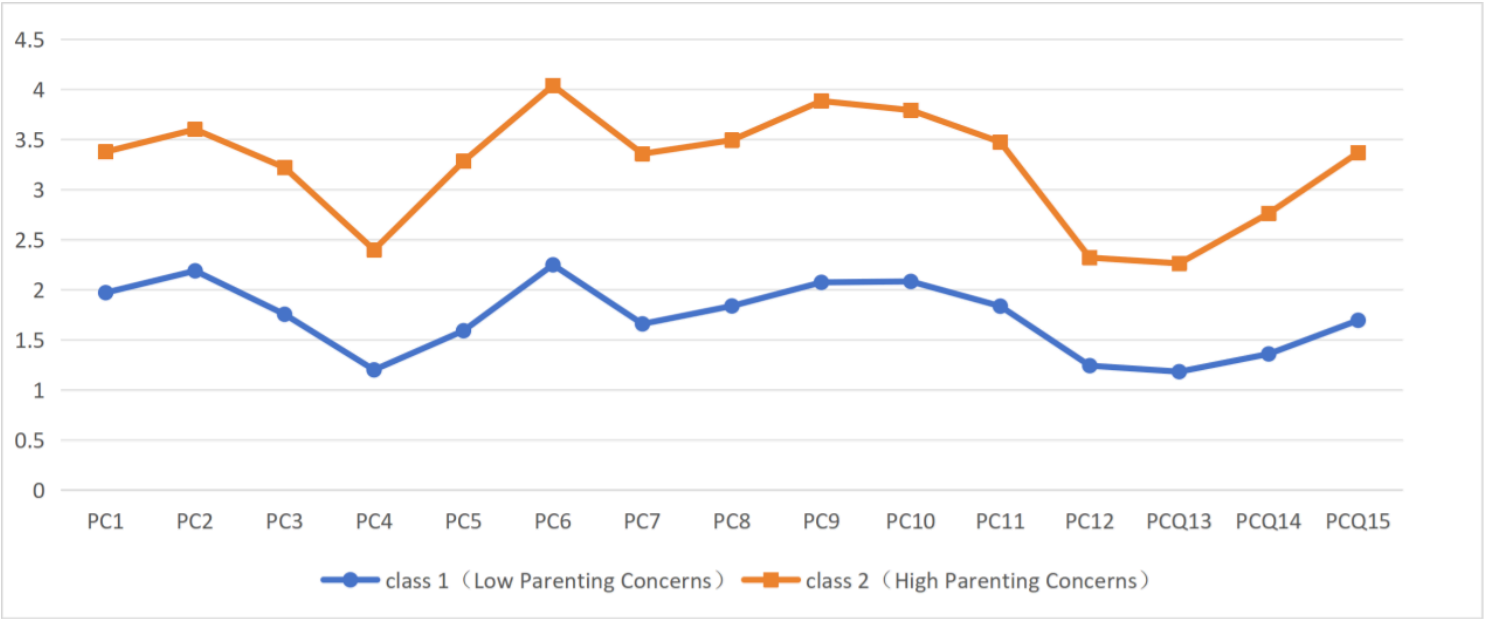


Figure 1

Of the three profile types identified through latent profile analysis, each type includes 15 estimated mean values for parenting concerns.

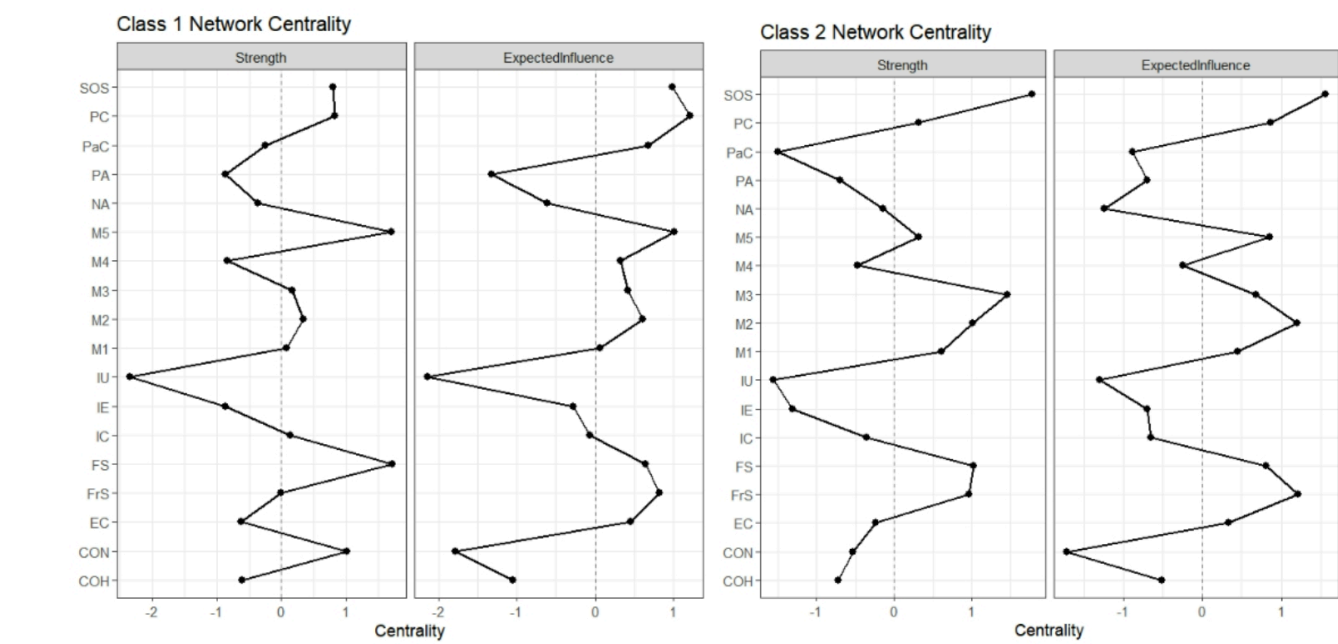


Figure 2

Centrality indices of the subgroup networks across the two latent profiles.

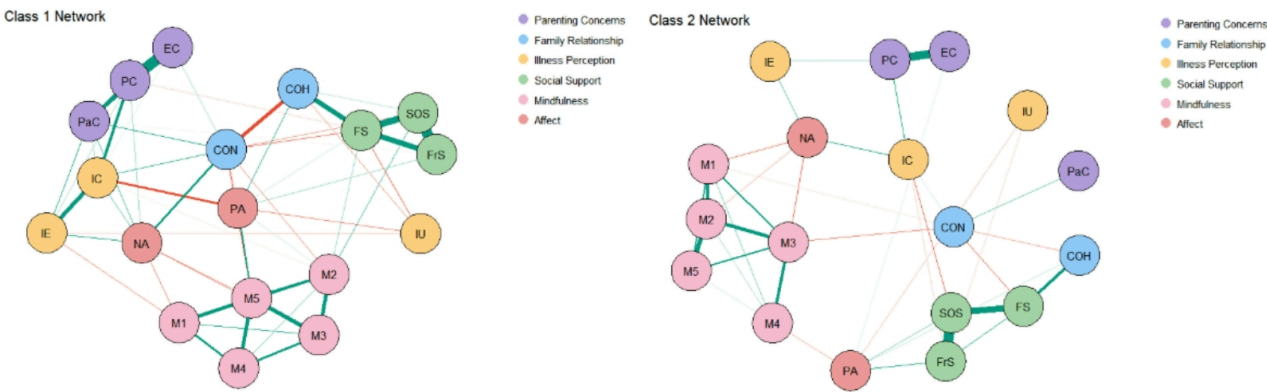


Figure 3

Network analysis of profiles

Note:Parenting Concerns:PC=Practical Concerns,EC=Emotional Concerns,PaC=Parental Concerns.Family Relationship:COH=Cohesion ,CON=Conflict. Illness Perception:Illness cognition=IC,Illness-related Emotion=IE,Illness Understanding=IU.Social Support:Family Support=FS,Friend Support=FrS,Significant Other Support=SOS.Mindfulness:Mindfulness1=It seems like I do certain things out of habit without realizing what I'm doing,Mindfulness2=When I attend events or gatherings, I'm always in a rush and don't really give them my full attention,Mindfulness3=I focus too much on the goal itself, without considering how to achieve it,Mindfulness4=I will automatically complete certain tasks or assignments without even realizing it,Mindfulness5=I find that I can't concentrate on what I'm doing.Affect:Positive Affect=PA,Negative Affect=NA

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryMaterials.docx](#)