



Original Article

Exploring the relationship between illness perception, self-transcendence, and demoralization in patients with lung cancer: A latent profile and mediation analysis

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ABSTRACT

Objective: This study examined the heterogeneity of illness perceptions in patients with lung cancer and evaluated the mediating role of self-transcendence in the relation between illness perception and demoralization.

Methods: A convenience sample of 477 patients with lung cancer was selected from three tertiary hospitals in Wuhan, China, between January and June 2024. Participants completed the Brief Illness Perception Questionnaire, Self-Transcendence Scale, and Demoralization Scale. Data were analyzed using Mplus 8.3 and SPSS 25.0. **Results:** Three latent illness perception profiles were identified among patients with lung cancer: low (27.25%), moderate (40.04%), and high (32.71%). Mediation analyses revealed a partial mediation effect in the relation between illness perception and demoralization in the low versus moderate (SE = 1.56, 95% CI = 14.71, 20.86) and high versus low illness perception groups (SE = 1.71, 95% CI = 35.44, 42.71).

Conclusions: Patients with lung cancer exhibited heterogeneous illness perceptions, and self-transcendence partially mediated the relation between illness perception and demoralization. Promoting self-transcendence may help mitigate the negative impact of illness perceptions on demoralization. Clinical interventions aimed at reducing negative illness perceptions and enhancing self-transcendence should be prioritized in the care of patients with lung cancer.

Introduction

According to the latest global data, lung cancer continues to be the malignant tumor with the highest incidence and mortality rates worldwide. The five-year survival rate is estimated to be between 15% and 30%; however, for patients with distant metastases, the survival rate is as low as 4%.^{1,2} Considering the low early diagnosis rate, high mortality rate, lengthy treatment period, frequent complications, and heavy economic burden associated with lung cancer, patients with this disease often face severe psychological pressures and a higher risk of suicide than that of those with other types of malignant tumors.^{3,4} Demoralization syndrome, characterized by dysphoria, a strong sense of failure, and loss of value or meaning in life, is particularly prominent in patients with lung cancer.⁵ The prevalence of demoralization in patients with cancer ranges from 24% to 36%,⁶ whereas the prevalence of moderate and high levels

of demoralization in patients with lung cancer ranges from 33% to 87.5%,^{7–9} making them a high-risk group for demoralization.

Demoralization syndrome, which excludes major depression or other persistent psychiatric disorders, is a cluster of psychological symptoms lasting more than 2 weeks involving an individual's subjective perceptions of an inability to cope with or a loss of control in the face of prolonged stress or illness. This condition is followed by feelings of despair, hopelessness, and even a loss of will to live.¹⁰ In patients with cancer, demoralization syndrome has transitioned from merely being a variable in physiological and psychological research to becoming a clinically recognized psychological condition with clear diagnostic criteria, representing a common and serious psychological problem.¹¹ Intensive clinical and psychological studies have shown that patients with demoralization often suffer from severe psychological distress, manifesting in anxiety, depression, regret, frustration, despair, a strong sense

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of personal failure, and a loss of purpose and meaning in life.^{12,13} These negative emotions are strongly associated with various adverse outcomes in patients with cancer, including poor treatment responses, reduced overall survival, and even suicidal tendencies.^{14–16} For example, major depression is considered a high-risk factor for suicide, but the risk of suicidal ideation in demoralized patients is twice as high as the risk associated with depressive symptoms.^{17–19} Meanwhile, problems triggered by demoralization, such as insufficient adherence to rehabilitation treatment and poor self-management,²⁰ not only impede recovery from the disease but also prevent patients from readjusting to their interpersonal relationships, families, and occupations. This consequently exacerbates the disease-related burden on both the family unit and society.²¹ Therefore, in view of its considerable clinical and social impact, the problem of demoralization in patients with lung cancer urgently requires the attention of researchers and medical practitioners.

Illness perception, a subjective psychological representation, encompasses an individual's cognitive appraisal, emotional response, and comprehension of a disease and its potential consequences.^{22,23} It reflects the perceived degree of threat posed by the disease, influences both the onset and progression of illness, and is closely related to a patient's psychological condition and quality of life.²⁴ When individuals hold excessively negative views of illness, such irrational perceptions may not only distort their understanding of the illness's nature, triggering cognitive biases, but may also disrupt emotional regulation mechanisms, leading to emotional imbalance.^{25–27} This negative perception of the disease may not only exacerbate the patient's demoralization syndrome,²⁸ but may also cause the patient to lose hope for survival and adopt suicidal behaviors.²⁹ Therefore, actively guiding and improving patients' disease cognition is vital for alleviating the symptoms of demoralization and helping patients regain hope for life. However, studies have mainly used a variable-centered approach, and few studies have explored the internal heterogeneity of illness perception, ignoring the heterogeneity between groups of patients at different levels.^{30,31} Latent Profile Analysis (LPA) is an individual-centered statistical method that infers and classifies latent individual characteristics from the response patterns of auxiliary variables.³² The most appropriate model can be determined by comparing the fit indices across various model categories.³² Therefore, we used LPA to identify potential differences between groups and determine potential classifications of illness perceptions in patients with lung cancer. This approach enhances our understanding of the manifestations and mechanisms of demoralization among patients with varying perceptions of illness, thereby providing a scientific foundation for the development of personalized interventions.

Self-transcendence is an individual's ability to extend the boundaries of the self in various ways, including intrinsic, interpersonal, temporal, and transpersonal dimensions.³³ It serves as a powerful resource for coping with difficulties,^{34,35} not only supporting an individual's discovery of meaning and purpose in life and promoting psychological health but also potentially restoring somatic health.³⁶ Self-transcendence is derived from Reed's theory, a framework that focuses on three core concepts: vulnerability, self-transcendence, and wellbeing. This theory provides insights into their complex interconnections.³⁷ In this model, vulnerability involves an individual's awareness of death or their experience and perception of difficult life events (including serious or chronic diseases and other life crises). Wellbeing is a subjective assessment of the state of physical or mental health, measured by indicators, such as life satisfaction, subjective wellbeing, sense of meaning and purpose in life, and the absence of mental health problems, including depression, anxiety, and loneliness.³⁸ This theory suggests that individuals facing difficult life events, such as serious or chronic illnesses, are prone to vulnerability. Awakening to this vulnerability may stimulate self-transcendence. Self-transcendence mediates the relation between vulnerability and wellbeing by modifying cognitive frameworks, goal orientations, and behavioral patterns; surpassing internal and interpersonal boundaries; and becoming a key resource for individual wellbeing.³⁹ Self-transcendence is strongly associated with low demoralization, and low levels of self-transcendence

are significant predictors of severe demoralization.⁴⁰ In addition, patients with high levels of self-transcendence can not only reduce the negative psychological impact of illness perceptions,⁴¹ but also adopt positive coping strategies to reconstruct their perceptions of the illness, thereby reducing the formation of negative emotions.⁴² Nevertheless, studies exploring the interplay among illness perception, self-transcendence, and demoralization scarce. This study is grounded in Reed's self-transcendence theory, where illness perception, as an individual's subjective cognitive appraisal of illness, corresponds to the concept of vulnerability in the model. Demoralization, a serious psychological state, serves as a negative appraisal indicator of wellbeing. It is hypothesized that self-transcendence mediates the relation between illness perception and demoralization. Based on this theoretical framework, our study aimed to elucidate the interaction mechanisms among the three constructs and to provide a solid theoretical and empirical foundation for the development of self-transcendence interventions to alleviate demoralization and maintain patients' physical and psychological wellbeing.

Drawing from prior research, we postulate the following hypothesis.

- (i) Hypothesis 1: LPA will recognize several different illness perception patterns among patients with lung cancer.
- (ii) Hypothesis 2: Self-transcendence may serve as a mediating variable in the relationship between illness perception and demoralization.

Methods

Participants and recruitments

Between January 2024 and June 2024, patients with lung cancer treated in the Department of Thoracic Oncology or the Department of Oncology of three tertiary-level hospitals in Wuhan, China, were considered for participation. Patients were enrolled in the study using convenience sampling and had to fulfill the following inclusion criteria: (1) a histopathologically confirmed diagnosis of lung cancer; (2) age 18 years or older; (3) being conscious and capable of communication and comprehension; and (4) providing informed consent and voluntarily agreeing to participate in the study. The exclusion criteria were as follows: (1) unawareness of their diagnosis; (2) conditions too severe to participate in the survey; and (3) a personal or familial history of severe mental illness.

Prior to initiating the survey, we fully communicated the purpose and methodology of the survey to the head of the department. After obtaining their support, we screened suitable patients for interviews based on strict inclusion and exclusion criteria. During this process, we informed patients about the purpose and methods of the study and their rights, including the protection of privacy and right to withdraw from the study at any time. After obtaining informed consent, we distributed the questionnaires. While completing the questionnaire, the investigator accompanied the patient throughout the process to address any issues raised by the patient in a timely manner. After collecting the questionnaires, a strict secondary review was conducted. Incomplete questionnaires or those showing uniformity (including non-differentiated responses) across all options were excluded to ensure data quality, accuracy, and completeness.

Sample size

Latent profile analysis (LPA) requires a minimum sample size of 300 to ensure the dependability and precision of the subgroup findings.⁴³ Taking into account a dropout rate of 10%, the calculated minimum sample size for the study was 334 participants. Of the 495 eligible participants who agreed to participate in this study, 477 completed the questionnaires, representing an 96.36% response rate. 18 samples were excluded because of incomplete questionnaires. There was no significant difference in general information between the 18 excluded samples and the 477 samples.

Instruments

Demographic characteristics

A two-part questionnaire was administered. The questionnaire comprised items on sociodemographic variables (age, sex, marital status, educational level, family monthly income per capita, occupation, place of residence, medical insurance type, smoking status, and alcohol consumption) and clinical characteristics (cancer stage, lung cancer type, time since diagnosis, surgery history, chemotherapy history, radiotherapy history, targeted therapy history, and immunotherapy history).

Brief Illness Perception Questionnaire (B-IPQ)

The original B-IPQ, developed by Broadbent et al.²³ and translated into Chinese by Chen et al.⁴⁴ was primarily used to measure the patients' negative perceptions of the disease. The questionnaire consists of nine items, including three dimensions: cognition (items 1–5), emotion (items six and eight), and comprehension (item seven). Item nine is an open-ended question. The participants rated each item on a 10-point Likert scale. The possible total score ranges from zero to 80, with high scores reflecting more negative perceptions of the disease. In this study, Cronbach's α for the B-IPQ was 0.840.

The Self-Transcendence Scale (STS)

The STS, was compiled developed by Reed⁴⁵ and translated into Chinese by Zhang et al.⁴⁶ includes 15 items divided into two dimensions: interpersonal and intrapersonal self-transcendence. Participants rated each item using a four-point Likert scale, yielding a total score ranging from 15 to 60. Higher scores indicated a greater degree of self-transcendence. In the current study, Cronbach's α for the STS was 0.919.

The Demoralization Scale (DS)

The demoralization scale was developed by Kissane et al.⁴⁷ and translated into Chinese by Hung et al.⁴⁸ It includes 24 items with five dimensions: sense of failure, loss of meaning, helplessness, dysphoria, and disheartenment. Each item is rated on a four-point Likert scale, with a total score ranging from 0 to 96 points. A higher score indicates a higher level of demoralization. The Cronbach's α coefficient for this scale in this study was 0.966.

Data analysis

Data analysis was conducted using SPSS 25.0 and Mplus 8.3 software. First, descriptive statistics (expressed as means, standard deviations, and percentages) were analyzed using SPSS 25.0. Second, Pearson's correlation analyses were conducted to evaluate the extent of the linear associations among illness perception, self-transcendence, and demoralization. Third, we used LPA to identify potential subgroups characterized by distinct patterns of illness perception. The fit metrics were the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), adjusted BIC (aBIC), Entropy, Lo-Mendell-Rubin Likelihood Ratio Test, Bootstrapped Likelihood Ratio Test, and category probability. Lower AIC, BIC, and aBIC values, along with higher entropy values (greater than 0.8), suggest a better model fit.⁴⁹ In addition, univariate and multivariate regression analyses were conducted to ascertain the factors correlated with the profiles derived from the LPA, and the study outcomes were graphically depicted in a forest plot. Fourth, ANOVA was used to compare differences in self-transcendence and demoralization among patients with different illness perception categories. Finally, mediation analysis was employed to evaluate the mediating effect of self-transcendence on the relation between illness perception and demoralization. To fully consider the potential impact of demographic variables on the mediation model, demographic characteristics significantly correlated ($P < 0.05$) with illness perception categories, and demoralization scores were included as covariates in the final analyses. These analyses were conducted using SPSS 25.0 with the PROCESS-Model 4 procedure.

Ethical considerations

This research adhered to the guidelines of the Declaration of Helsinki and received approval from the Ethics Committee of Huazhong University of Science and Technology, Tongji Medical College (IRB No. 2024-S073). All participants provided written informed consent.

Results

Demographic variables

Patients' ages ranged from 18 to 77 years, with an average age of 58.95 years. Most participants were male (63.94%). A significant proportion of the participants (63.94%) had a junior secondary education or lower, and the majority (57.23%) lived in urban areas. When considering monthly family income per capita, more than one-third of the participants (37.53%) reported a monthly income of less than 3000 RMB. Additionally, over half of the patients with lung cancer were diagnosed at stage IV (72.96%), and 84.07% received chemotherapy. Demoralization was high among female, those with a junior secondary education or lower, those with lower per capita monthly household income (< 3000 RMB), unemployed individuals, rural residents, those with basic medical insurance for rural residents, those who smoked or drank alcohol, patients in stage IV, and patients who had received chemotherapy. Additional information is presented in Table 1.

Correlation analysis of illness perception, self-transcendence, and demoralization

Based on the results of the normality test, the scores for illness perception, self-transcendence, and demoralization were normally distributed ($P > 0.05$), allowing the application of Pearson correlation analysis. The findings indicated that: (1) illness perception had a significant negative correlation with self-transcendence ($r = -0.736$, $P < 0.001$); (2) illness perception had a significant positive correlation with demoralization ($r = 0.804$, $P < 0.001$); and (3) self-transcendence was negatively correlated with demoralization ($r = -0.785$, $P < 0.001$). The results of the Pearson correlation analysis are depicted in a heat map (Fig. 1)

Latent profile analysis of illness perception

Fig. 2A shows the outcomes of the model fit indices. The AIC, BIC, and aBIC values exhibited a downward trend as the number of latent profile categories increased. However, the Lo-Mendell-Rubin likelihood ratio test did not yield a statistically significant difference when the fourth profile was included. To ensure model stability, we selected a three-profile model, which exhibited relatively low AIC, BIC, and aBIC values and had an entropy value greater than 0.8, indicating good classification accuracy. The three profiles of illness perception based on the LPA are shown in Fig. 2B. Based on the scores for each item in each category, Class 1 was named the "low illness perception group" ($n = 130$, 27.25%), Class 2 was named the "moderate illness perception group" ($n = 156$, 40.04%), and Class 3 was named the "high illness perception group" ($n = 191$, 32.71%). Fig. 2C depicts the factors influencing different illness perception classes. The results of the univariate and multivariate analyses showed that gender and family monthly income per capita were influential factors distinguishing between Classes 1 and 2. Gender, family monthly income per capita, cancer stage, diagnostic time, and surgery were influential factors distinguishing between Classes 1 and 3.

LPA-based difference in self-transcendence and demoralization scores

ANOVA revealed statistically significant differences in self-transcendence and demoralization scores among the three classes ($P < 0.001$). Further pairwise comparisons indicated that self-transcendence

Table 1
Demographic and disease-related data and demoralization (N = 477).

Variables	n (%)	Demoralization (M ± SD)	P
Gender			
Male	305 (63.94)	39.80 ± 20.77	< 0.001
Female	172 (36.06)	50.80 ± 21.35	
Marital status			
Married	453 (94.97)	43.45 ± 21.44	0.164
Unmarried/divorced/widowed	24 (5.03)	49.75 ± 24.38	
Educational level			
Junior secondary and less	305 (63.94)	48.14 ± 21.75	< 0.001
High school/junior college	87 (18.24)	38.89 ± 18.53	
Bachelor and more	85 (17.82)	33.05 ± 19.33	
Family monthly income per capita (RMB)			
< 3000	179 (37.53)	53.19 ± 19.67	< 0.001
3000–5000	156 (32.70)	42.04 ± 20.25	
> 5000	142 (29.77)	33.77 ± 20.54	
Occupation			
Employed	35 (7.34)	33.20 ± 18.60	< 0.001
Unemployed	113 (23.69)	50.00 ± 20.75	
Laborer	111 (23.27)	49.62 ± 20.95	
Retired	171 (35.85)	38.13 ± 20.67	
Others	47 (9.85)	43.30 ± 22.83	
Place of residence			
Rural area	204 (42.77)	49.85 ± 20.51	< 0.001
Urban area	273 (57.23)	39.22 ± 21.33	
Medical insurance type			
Basic medical insurance for urban residents	49 (10.27)	42.31 ± 22.06	< 0.001
Basic medical insurance for urban employee	180 (37.74)	37.52 ± 20.57	
Basic medical insurance for rural residents	215 (45.07)	50.12 ± 21.09	
Others	33 (6.92)	39.24 ± 19.31	
Ever smoked cigarettes			
Yes	270 (56.60)	39.57 ± 21.38	< 0.001
No	207 (43.40)	49.24 ± 20.72	
Ever drank alcohol			
Yes	215 (45.07)	39.83 ± 20.78	< 0.001
No	262 (54.93)	47.00 ± 21.79	
Cancer stage			
Stage I	11 (2.31)	38.18 ± 21.38	< 0.001
Stage II	43 (9.01)	36.33 ± 22.24	
Stage III	75 (15.72)	36.81 ± 19.41	
Stage IV	348 (72.96)	46.36 ± 21.51	
Lung cancer type			
Small cell lung cancer	52 (10.90)	47.96 ± 18.42	0.560
Adenocarcinoma	319 (66.88)	43.70 ± 21.97	
Squamous cell carcinoma	78 (16.35)	42.28 ± 20.93	
Adenosquamous carcinoma	13 (2.73)	42.62 ± 27.86	
Others	15 (3.14)	39.33 ± 22.60	
Diagnostic time			
< 3 months	146 (30.61)	46.04 ± 21.02	0.098
3–6 months	73 (15.30)	40.68 ± 19.19	
6–12 months	69 (14.47)	42.84 ± 23.00	
1–3 years	117 (24.53)	46.17 ± 23.05	
> 3 years	72 (15.09)	39.25 ± 20.76	
Surgery			
Yes	105 (22.01)	41.08 ± 21.87	0.149
No	372 (77.99)	44.52 ± 21.51	
Chemotherapy			
Yes	401 (84.07)	42.86 ± 21.81	0.036
No	76 (15.93)	48.53 ± 20.02	
Radiotherapy			
Yes	196 (41.09)	44.66 ± 22.00	0.452
No	281 (58.91)	43.14 ± 21.36	
Targeted therapy			
Yes	150 (31.45)	46.83 ± 21.69	0.084
No	327 (68.55)	42.36 ± 21.47	
Immunotherapy			
Yes	164 (34.38)	42.32 ± 23.11	0.292
No	313 (65.62)	44.52 ± 20.79	

M, mean; SD, standard deviation.

and its two-dimensional scores increased sequentially from the low to moderate to high illness perception classes ($P < 0.001$), and demoralization and its five-dimensional scores decreased sequentially from the high to moderate to low illness perception classes ($P < 0.001$). Additional details are presented in [Table 2](#).

Mediation analysis of self-transcendence based on LPA

Considering variations in sociodemographic and clinical features associated with demoralization scores, as well as the determinants of distinct illness perception classes, we conducted analyses with gender, educational level, family monthly income per capita, occupation, place of residence, medical insurance type, smoking, alcohol consumption, cancer stage, diagnostic time, surgery, and chemotherapy as covariates. We dummy-coded the categories of illness perception, using the “low illness perception” group as the reference category. Self-transcendence was used as the mediating variable, and demoralization was used as the dependent variable to construct the mediation model. The analysis yielded the following findings (95% bootstrap confidence intervals): moderate illness perception group: direct (4.68, 10.51), indirect (8.00, 12.60), and total effects (14.71, 20.86); (2) high illness perception group: direct (16.20, 23.82), indirect (15.71, 21.98), and total effects (35.44, 42.17). The results suggest that self-transcendence significantly mediates the relation between illness perception and demoralization. Additional details are presented in [Table 3](#), and the mediating effect is shown in [Fig. 3](#).

Discussion

This study highlights the heterogeneity of illness perceptions and identifies the mediating role of self-transcendence in the relation between illness perceptions and demoralization.

Three classes of illness perception were identified: Class 1 (low illness perception), Class 2 (moderate illness perception), and Class 3 (high illness perception), accounting for 27.25%, 40.04%, and 32.71% of the total sample, respectively. This indicates that approximately one-third of patients with lung cancer in this study sample had higher-than-average levels of illness perception. Illness perception refers to an individual's subjective feelings about the disease.⁵⁰ Patients with lung cancer often face severe treatment challenges and unfavorable prognoses owing to the high mortality rate of the disease and the prevalence of late diagnoses, which may lead to impaired confidence in treatment and exaggerated perceptions of the severity of disease symptoms, thus exacerbating worries and fears about the outcome of the disease.⁵¹ In addition, the burden of symptoms associated with the disease and treatment, as well as the resulting financial stress, severely disrupts patients' daily lives, further fueling their negative emotions and fear of the future.⁵² Simultaneously, because of a lack of knowledge about the disease, patients may have cognitive biases regarding the diagnosis, treatment, and prognosis of the disease, which not only undermines their belief in disease control but may also lead them to exaggerate the physical, social, and economic consequences of the disease.⁵³ The current study discovered a positive correlation between illness perception and demoralization, which aligns with the findings of previous research.⁵⁴ When faced with the threat of death and physical pain, patients are prone to form negative illness perceptions, and such persistent negative perceptions may impose significant psychological burdens on patients, rendering them susceptible to high levels of demoralization, such as helplessness, fear, pessimism, and despair.⁵⁵ In addition, severe negative illness perceptions may weaken patients' adherence to treatment and influence their treatment decisions. Furthermore, these perceptions can negatively affect treatment outcomes and prognosis.^{26,56,57} Therefore, helping patients develop accurate illness perceptions plays a crucial role in alleviating negative emotions, improving their prognosis, and enhancing their quality of life.

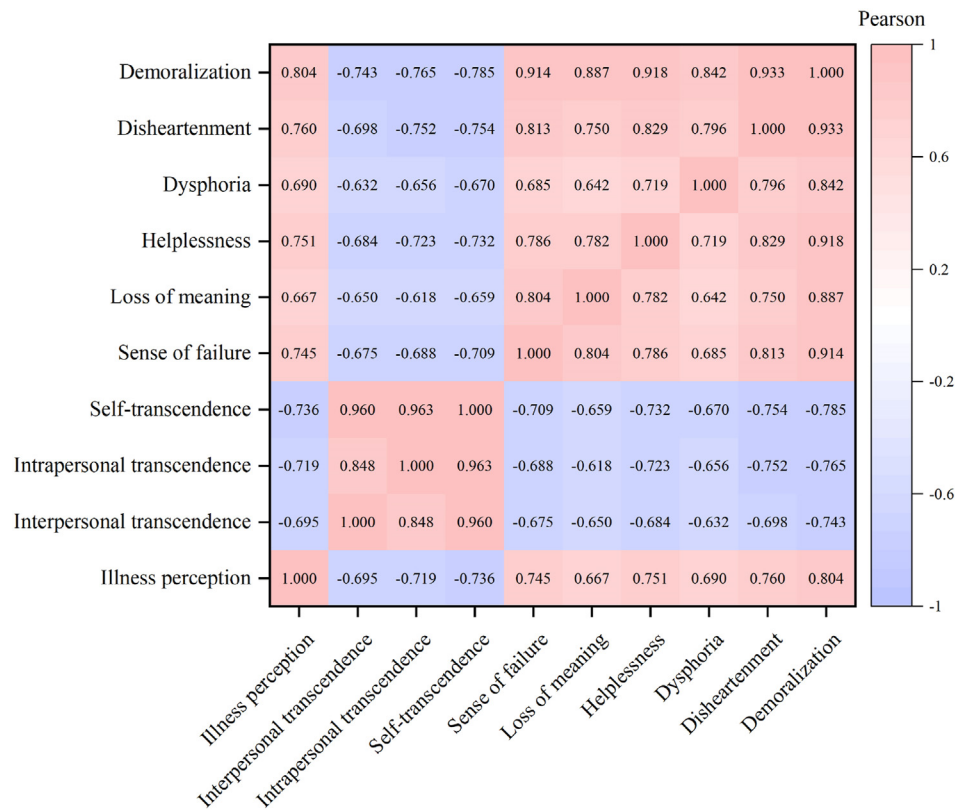


Fig. 1. Pearson correlation heatmap among illness perception, self-transcendence, and demoralization.

The heterogeneity analysis highlighted the substantial impact of demographic and disease-related variables on illness perception among patients with lung cancer. Notably, women exhibited more negative perceptions of their illness, potentially attributable to their greater ability to articulate and detail their emotional responses to illness.⁵³ Patients with low per-capita monthly household incomes may face greater financial pressure because of disease treatment, which may lead to increased anxiety about the future.⁵⁸ In the early stages of disease diagnosis, patients may experience emotional reactions, such as shock and denial. This emotional state may be accompanied by a lack of knowledge about the disease, which in turn can lead to negative illness perceptions.²⁶ Notably, patients diagnosed more than 6 months ago also exhibited high levels of negative illness perception. This may be attributed to the financial burden and the disruption of normal life that long-term treatment entails.⁵⁹ For patients who undergo surgical treatment, despite being diagnosed at an earlier stage and having a better prognosis, postoperative impaired respiratory function can interfere with daily life and potentially increase negative illness perceptions.⁶⁰ Patients with stage IV lung cancer may face more severe emotional problems owing to their high symptom burden and poorer prognosis, which may significantly exacerbate their negative illness perceptions.²⁹ Therefore, clinicians should consider demographic and disease-related factors when developing interventions. Tailoring interventions in this way can lead to more precise and personalized care, effectively reducing patients' perceptions of negative aspects of their illness, alleviating demoralization, and ultimately enhancing their overall quality of life. Cognitive behavioral therapy (CBT) can correct patients' distorted perceptions of their illnesses and enhance their sense of self-efficacy. Zheng et al.⁶¹ showed that CBT administered to patients with atrial fibrillation could establish correct illness perceptions and alleviate anxiety and depression. Similarly, van den Akker et al.⁶² found that CBT positively affected patients' physical and mental health by improving fatigue perception, promoting physical activity, and reducing drowsiness and helplessness.

The present study revealed that self-transcendence mediates the relation between illness perception and demoralization in patients with lung cancer, thereby validating Hypothesis 2. This hypothesis posits that there is a negative correlation between illness perception and self-transcendence, as well as between self-transcendence and demoralization, while illness perception and demoralization are positively correlated. Specifically, high levels of self-transcendence buffered the negative effects of negative illness perceptions on demoralization. Patients with lung cancer often develop serious negative perceptions because of the rapid progression and high malignancy of the disease, which intensify their feelings of demoralization.⁹ Individuals with a high level of self-transcendence can reconstruct their own thinking and positively adjust their lives, thereby enhancing their ability to combat the disease and improve their quality of life.^{41,63} In addition, self-transcendence was found to be negatively correlated with demoralization, which may be attributed to the fact that the self-transcendence theory emphasizes transcendence and the discovery of the meaning of life.³⁶ High levels of self-transcendence can motivate individuals to search for a deeper value and purpose in life when they are facing adversity, such as illness, thus reducing their focus on the negative effects of illness.⁶⁴ Second, self-transcendent individuals tend to have a strong sense of self-efficacy, believing that they can control and influence their own health and lives, a belief that helps them maintain a positive attitude in the face of illness and enhances hope for treatment and other outcomes.⁶⁴ Finally, it has been posited that individuals with elevated levels of self-transcendence are more inclined to garner social support and a sense of belonging by forging connections with others and engaging in social activities, which may play a pivotal role in alleviating demoralization.⁶⁵ Therefore, self-transcendence, as a psychological resource, can play a protective role when individuals face the challenges of illness. Enhancing patients' self-transcendence is of great practical importance in reducing their levels of demoralization. According to Reed,³⁶ the author of the self-transcendence theory, there are three kinds of strategies to improve

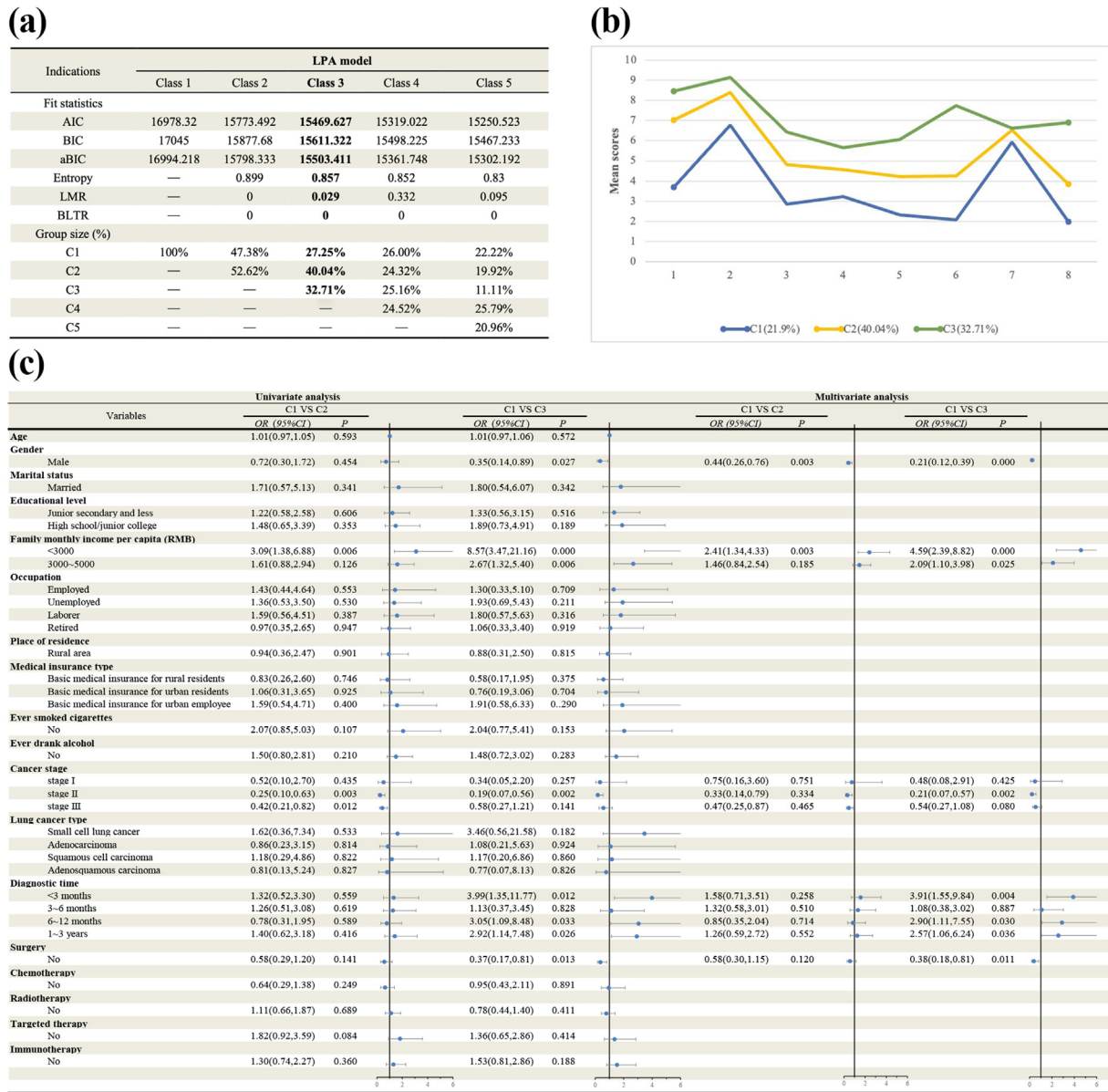


Fig. 2. A. Fit indices and participant distribution of the latent profile analysis. B. Patterns of three distinct latent classes. C. Analyses of univariate and multivariate data stratified by three distinct classes.

Table 2
Differences in self-transcendence and demoralization scores across illness perception classes (N = 477).

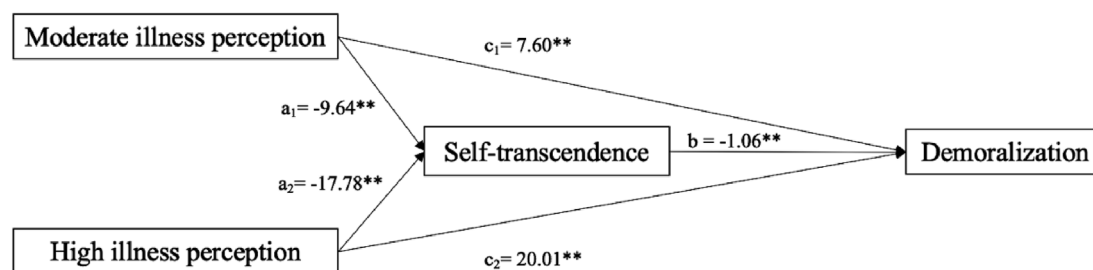
Variables	Class1 (n = 130)	Class2 (n = 191)	Class3 (n = 156)	F	P	LSD
	(M ± SD)	(M ± SD)	(M ± SD)			
Interpersonal transcendence	22.25 ± 0.31	17.75 ± 0.30	14.01 ± 0.32	155.029	< 0.001	C1>C2>C3
Intrapersonal transcendence	26.50 ± 0.28	21.43 ± 0.32	17.06 ± 0.28	217.487	< 0.001	C1>C2>C3
Self-transcendence	48.75 ± 0.55	39.18 ± 0.58	31.07 ± 0.56	212.483	< 0.001	C1>C2>C3
Sense of failure	6.48 ± 0.29	10.87 ± 0.29	15.58 ± 0.29	211.998	< 0.001	C1<C2<C3
Loss of meaning	3.45 ± 0.23	6.89 ± 0.28	10.77 ± 0.35	133.773	< 0.001	C1<C2<C3
Helplessness	4.38 ± 0.21	5.85 ± 0.29	10.98 ± 0.28	244.700	< 0.001	C1<C2<C3
Dysphoria	4.38 ± 0.22	7.79 ± 0.25	11.01 ± 0.22	179.631	< 0.001	C1<C2<C3
Disheartenment	5.89 ± 0.28	10.51 ± 0.29	15.76 ± 0.27	271.925	< 0.001	C1<C2<C3
Demoralization	22.08 ± 0.95	41.91 ± 1.16	64.10 ± 1.15	311.308	< 0.001	C1<C2<C3

M, mean; SD, standard deviation; LSD, least significant difference.

Table 3
The mediating effect of self-transcendence on demoralization.

Variables	B	SE	t	P	LLCI	ULCI	R ²
Outcome variable: Self-transcendence (low illness perception as reference)							0.722
Moderate illness perception	-9.64	0.82	-11.738	< 0.001	-11.25	-8.02	
High illness perception	-17.78	0.90	-19.782	< 0.001	-19.54	-16.01	
Gender	0.17	1.08	0.157	0.875	1.96	2.30	
Educational level	1.10	0.49	2.241	0.026	0.14	2.06	
Family monthly income per capita	-0.27	0.51	-0.519	0.604	-1.28	0.74	
Occupation	0.19	0.30	0.638	0.524	-0.39	0.77	
Place of residence	-0.42	0.96	-0.439	0.661	-2.31	1.47	
Medical insurance type	1.12	0.44	2.543	0.011	0.26	1.99	
Ever smoked cigarettes	-0.39	1.13	-0.347	0.729	-2.60	1.82	
Ever drank alcohol	-1.17	0.87	-1.345	0.179	-2.88	0.54	
Cancer stage	0.24	0.49	0.482	0.630	-0.73	1.20	
Diagnostic time	0.64	0.25	2.593	0.010	0.15	1.12	
Surgery	0.75	0.91	0.828	0.408	-1.04	2.55	
Chemotherapy	0.68	0.92	0.736	0.462	-1.13	2.48	
Outcome variable: demoralization (low illness perception as reference)							0.864
Moderate illness perception	7.60	1.48	5.121	< 0.001	4.68	10.51	
High illness perception	20.01	1.94	10.330	< 0.001	16.20	23.82	
Self-transcendence	-1.06	0.07	-14.328	< 0.001	-1.20	-0.91	
Gender	2.48	1.72	1.442	0.150	-0.90	5.85	
Educational level	-1.59	0.78	-2.035	0.043	-3.13	-0.05	
Family monthly income per capita	-2.95	0.82	-3.615	< 0.001	-4.55	-1.35	
Occupation	0.43	0.47	0.919	0.359	-0.49	1.36	
Place of residence	-0.38	1.52	-0.248	0.804	-3.38	2.62	
Medical insurance type	-1.03	0.71	-1.454	0.147	-2.41	0.36	
Ever smoked cigarettes	-0.19	1.79	-0.109	0.913	-3.70	3.31	
Ever drank alcohol	0.34	1.38	0.250	0.803	-2.37	3.06	
Cancer stage	2.10	0.78	2.713	0.007	0.60	3.63	
Diagnostic time	0.62	0.39	1.589	0.113	-0.15	1.39	
Surgery	1.28	1.45	0.886	0.376	-1.56	4.13	
Chemotherapy	-0.00	1.46	-0.003	0.997	-2.87	2.87	
Direct and indirect effect of illness perception on demoralization (low illness perception as reference)							
	Variables		Effect	SE	LLCI	ULCI	
Direct effect	Moderate illness perception		7.60	1.48	4.68	10.51	
	High illness perception		20.01	1.94	16.20	23.82	
Indirect effect	Moderate illness perception		10.19	1.16	8.00	12.60	
	High illness perception		18.79	1.59	15.71	21.98	
Total effect	Moderate illness perception		17.79	1.56	14.71	20.86	
	High illness perception		38.80	1.71	35.44	42.17	

SE, standard error; LLCI, lower level of confidence interval; ULCI, upper level of confidence interval



Note: **P<0.001; Low illness perception as reference ; Covariates: gender, educational level, family monthly income per capita, occupation, place of residence, medical insurance type, ever smoked cigarettes, ever drank alcohol, cancer stage, diagnostic time, surgery, and chemotherapy.

Fig. 3. Mediating effects of self-transcendence on demoralization.

self-transcendence: intrapersonal, interpersonal, and transpersonal. Intrapersonal strategies, such as mindfulness meditation, life review, and group reminiscence, can help people expand their perspectives and give them the opportunity to integrate losses from different experiences. Interpersonal strategies emphasize establishing connections with others through various formal or informal channels, such as in-person meetings, telephone calls, or online platforms. Nostalgia therapy is commonly used in this category. Transpersonal strategies, such as meditation and journaling, can facilitate individuals' connections to a higher power or sense

of purpose that transcends their immediate selves. Therefore, the correct practice of the self-transcendence theory and selection of reasonable interventions are of great significance in improving patients' self-transcendence levels and mitigating negative emotions.

Implications for nursing practice and research

Utilizing latent profile analysis, the present study investigated the heterogeneity in illness perceptions among patients with lung cancer and

established correlations between various factors, including gender, family monthly income per capita, cancer stage, diagnostic time, and surgery, with distinct subgroups of illness perceptions. Further mediation effect analyses revealed that self-transcendence mediated the association between illness perception and demoralization. This study has important practical value for improving the demoralization in patients with lung cancer. Firstly, clarifying the illness perceptions characteristics of patients with lung cancer helps us to identify possible psychological problems, such as demoralization, and then implement targeted interventions. Secondly, the identification of influencing factors in lung cancer patients' illness perception offers health care professionals insights into recognizing high-risk individuals and tailoring personalized intervention strategies. Furthermore, the mediation role of self-transcendence introduces novel perspectives for the intervention of demoralization. Specifically, interventions grounded in self-transcendence, such as mindfulness meditation and life review, may empower patients to rediscover the meaning and value of life amidst disease challenges, thereby enhancing their psychological well-being and safeguarding their mental health. In summary, this study contributes novel theoretical and practical insights aimed at alleviating patients' illness perception and improving symptoms of demoralization.

Limitations

First, the use of convenience sampling led to inadequate representation of the target population, limiting the study's representativeness and generalizability. Future studies should employ random sampling and broaden the sample range to address these limitations. Second, the cross-sectional nature of this study did not allow the determination of causality between variables or the reproducibility of the results. Future studies should aim to enhance the reproducibility and reliability of these findings by establishing a validation cohort and conducting independent replicates. Third, the scope of the study was confined to patients from three tertiary-level hospitals in Wuhan owing to constraints on human and material resources. This limitation affects the sample's diversity across population, geographic, and socioeconomic dimensions, thereby reducing the applicability of the findings to other demographics and regions. Consequently, future studies should validate and replicate the results in diverse populations, expand the geographic scope of the sample, and enrich socioeconomic diversity to bolster the representativeness and generalizability of the research outcomes. Finally, resource limitations led to an exclusive focus on sociodemographic variables, neglecting other potential confounders, such as social support, personality traits, and access to palliative care. Future studies should incorporate a broader range of relevant factors to comprehensively assess and analyze these findings.

Conclusions

First, we identified three latent classes of illness perception among patients with lung cancer, thus elucidating the existence of heterogeneity. Individualized interventions should be applied to improve patients' accurate perception of their disease and mitigate the serious effects of negative illness perceptions on demoralization. Second, our findings indicate that self-transcendence mediates the relation between illness perception and demoralization. Clinicians can use self-transcendence-oriented interventions to help patients establish correct illness perceptions, find meaning in life, alleviate demoralization, and maintain their psychological health. Despite its limitations, this study offers new insights into the management of demoralization and development of personalized care for patients with lung cancer.

CRedit authorship contribution statement

Chunyan He: Writing – original draft, Conceptualization, Software. Shuhui Liu: Validation, Investigation. Xiaoping Ding: Writing – review &

editing, Resources. Yinying Zhang: Methodology, Data curation. Jie Hu: Resources, Investigation. Feng Yu: Resources, Investigation. Deying Hu: Writing – review & editing, Supervision. All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Ethics statement

This research adhered to the guidelines of the Declaration of Helsinki and received approval from the Ethics Committee of Huazhong University of Science and Technology, Tongji Medical College (No. 2024-S073). All participants provided written informed consent.

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Data availability statement

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

Declaration of competing interest

The authors declare no conflict of interest.

Declaration of generative AI and AI-assisted technologies in the writing process

No AI tools/services were used during the preparation of this work.

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