Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Latent profile analysis of psychological capital and its association with nutritional care competence among hematology nurses: a cross-sectional study

Weili Wang
The First Affiliated Hospital of USTC, University of Science and Technology of China
Zuxia Wu
The First Affiliated Hospital of USTC, University of Science and Technology of China
Qing Cheng
The First Affiliated Hospital of USTC, University of Science and Technology of China
Lu Huang
The First Affiliated Hospital of USTC, University of Science and Technology of China
Xiaohui Yang
The First Affiliated Hospital of USTC, University of Science and Technology of China
Daoqin Gu
The First Affiliated Hospital of USTC, University of Science and Technology of China
Min Fang
The First Affiliated Hospital of USTC, University of Science and Technology of China
Juan Yang
The First Affiliated Hospital of USTC, University of Science and Technology of China
Ting Chang
The First Affiliated Hospital of USTC, University of Science and Technology of China
Xuanxuan Zhang
The First Affiliated Hospital of USTC, University of Science and Technology of China
Meijuan Tu
goodtmj@163.com

The First Affiliated Hospital of USTC, University of Science and Technology of China

Research Article

Keywords: hematology nurses, psychological capital, latent profile analysis, nutritional care competence, occupational stress, nursing management

Posted Date: November 18th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11348180/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

Patients with hematological malignancies are at high risk of malnutrition owing to increased metabolic demands and chemotherapy-induced gastrointestinal injury, making nutritional care a core competency for hematology nurses. Psychological capital may buffer occupational stress; however, few studies have used latent profile analysis (LPA) to examine its heterogeneity or its relationship with nutritional care competence in this population. This study aimed to identify latent profiles of psychological capital among hematology nurses, examine factors associated with profile membership, and compare nutritional care competence across profiles.

Methods

A cross-sectional survey was conducted from June to August 2026. Using convenience sampling, we recruited 498 hematology nurses from 16 secondary-and tertiary-level general and oncology hospitals across several regions of China (Anhui Province, Beijing, Tianjin, and Shanghai). Participants completed online a general demographic questionnaire, the Psychological Capital Scale (PCS), and the Nutritional Care Competence Scale for Clinical Nurses (NCCS-CN). LPA was used to identify latent profiles of psychological capital; multinomial logistic regression was used to identify predictors of profile membership; and one-way analysis of variance (ANOVA) with post hoc comparisons was used to compare nutritional care competence across profiles.

Results

Three distinct latent profiles of psychological capital were identified: a "low psychological capital" profile (35.3%), a "moderate psychological capital" profile (45.4%), and a "high psychological capital" profile (19.3%). Multinomial logistic regression showed that educational attainment, professional title, years of hematology service, hospital grade, and monthly income were significantly associated with profile membership. Significant differences were observed among the profiles in all five dimensions and the total score of nutritional care competence ($P < 0.001$). Post hoc comparisons showed that nurses in the moderate psychological capital profile obtained the highest scores, whereas those in the low psychological capital profile scored the lowest.

Conclusions

Hematology nurses exhibit marked heterogeneity in psychological capital, and nutritional care competence follows an inverted-U pattern across latent subgroups. Nursing practice should deliver tailored psychological interventions and specialty-specific nutritional training according to profile membership. Prioritizing stratified mental-health support and standardized nutritional-skills training may enhance nurses' psychological well-being and the quality of hematological nursing care.

Background

With the accelerating aging of the Chinese population and the rising incidence of hematological malignancies[1], the demand for nutritional support among patients undergoing long-term chemotherapy, radiotherapy, or hematopoietic stem-cell transplantation has become increasingly prominent. As frontline providers of nutritional risk screening, individualized dietary intervention, and long-term follow-up[2], nurses' psychological status plays a critical role in determining the quality of nutritional care[3]. However, hematology nurses are continuously exposed to occupational stressors, including end-of-life care, patient death, and heavy night-shift workloads; such stressors progressively deplete psychological resources and consequently impair the quality of clinical nursing practice[4].

Hematological malignancies are clonal proliferative disorders of hematopoietic tissues and rank among the leading causes of cancer-related mortality worldwide[1]. Owing to their heterogeneity and high recurrence risk, chemotherapy remains a mainstay of treatment for these malignancies. Nevertheless, chemotherapy disrupts host energy metabolism and induces gastrointestinal mucosal injury, anorexia, nausea, and vomiting, thereby markedly increasing patients' risk of malnutrition[5]. Evidence indicates that malnutrition is an independent risk factor for poor prognosis and is closely associated with increased mortality in this patient

population[6]. Nurses, as frontline implementers of nutritional care, are responsible for routine nutritional risk screening, individualized dietary intervention, multidisciplinary collaboration, and continuous health education.

Nutritional care competence refers to nurses' comprehensive ability to perform nutritional risk screening, dietary assessment, nutritional evaluation, dietary guidance, and nutritional support, thereby optimizing patients' nutritional status and health outcomes[7]. Hematology nurses are frequently exposed to critically ill and terminally ill patients and perform intense emotional labor in response to disease deterioration and patient death, which may continually deplete their psychological capital[8]. Depletion of psychological resources may lead to simplified nutritional screening procedures and insufficient dietary follow-up; negative mental states can reduce nurses' initiative in delivering nutritional care and hinder adherence to standardized nutritional care protocols[9].

Proposed by Luthans and colleagues within the framework of positive psychology, psychological capital encompasses four malleable positive psychological resources: self-efficacy, hope, resilience, and optimism. Unlike stable personality traits, psychological capital can be developed through organizational support and targeted training[10]. Previous research has demonstrated that psychological capital is significantly associated with nurse burnout, work engagement, and overall nursing quality; adequate psychological resources buffer the adverse psychological effects of negative clinical events[11].

Conventional studies typically stratify participants by total scale scores and assume homogeneity of psychological traits across individuals, thereby failing to identify subgroups with imbalanced configurations across psychological capital dimensions[8, 12]. As a person-centered analytic technique, LPA identifies homogeneous subgroups based on multivariate indicator scores, thereby overcoming the limitations of total-score-based grouping. LPA has been widely used to investigate psychological heterogeneity among intensive care unit and emergency nurses[13]. However, few LPA-based studies have targeted hematology nurses, and existing surveys of psychological capital among Chinese oncology nurses have mostly relied on traditional correlational analyses; subgroup heterogeneity of psychological capital within this population remains underexplored.

Existing literature has documented that psychological capital positively predicts nurses' work performance, patient satisfaction, and safety-related nursing outcomes[14], yet no study has specifically examined nutritional care competence among hematology nurses. Nutritional care for patients with hematological malignancies combines standardized technical procedures with humanistic communication, placing differentiated demands on nurses' resilience, empathy, and professional prudence. Thus, nurses belonging to distinct psychological capital profiles are likely to exhibit divergent care-delivery performance. The Nutritional Care Competence Scale for Clinical Nurses developed by Zhu et al.[15] provides a reliable measurement tool for the present investigation. Traditional variable-oriented correlation analyses can generate only linear conclusions and cannot capture nonlinear competence discrepancies arising from imbalanced psychological capital dimensions[16]. The Yerkes-Dodson law[17] provides a theoretical framework for interpreting nonlinear motivation-performance relationships: performance is impaired by either excessively high or low arousal, whereas moderate arousal yields optimal outcomes. In addition, longitudinal studies among nursing interns suggest that nurses' psychological states evolve in response to their occupational environments[18]. Surveys of emotional labor among hematology nurses further confirm the high psychological demands of this specialty[19].

Considering the clinical importance of this issue and the identified research gaps, this cross-sectional survey was conducted to (1) identify latent profiles of psychological capital among hematology nurses, (2) examine the sociodemographic and occupational factors associated with profile membership, and (3) compare nutritional care competence across these profiles, thereby providing empirical evidence for stratified psychological interventions and specialty-specific nutritional training.

Methods

Design

This descriptive cross-sectional study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement[20]. Ethical approval for this study was approved by the Medical Ethics Committee of the First Affiliated Hospital of the University of Science and Technology of China (approval No. 2026-KY-450).

Participants

Between June and August 2026, convenience sampling was used to recruit full-time hematology nurses from 16 secondary-and tertiary-level general and oncology hospitals across several regions of China (Anhui Province, Beijing, Tianjin, and Shanghai). The inclusion criteria were as follows: (a) full-time nurses directly engaged in hematology nursing practice; (b) at least one year of work experience in hematology departments; and (c) voluntary participation with informed consent. The exclusion criteria were as follows: (a) cumulative work experience of ≥ 3 months in other departments or positions within the past 12 months; and (b) nursing students or rotating intern nurses. All respondents provided electronic informed consent and participated voluntarily.

Sample size

The sample size was estimated based on the rule of thumb requiring 10–15 participants per independent variable. With 19 independent variables, and accounting for a 20% invalid-questionnaire rate, the required sample size ranged from 228 to 342. Moreover, Ferguson et al.[21] recommended a minimum sample size of 300 for robust latent profile analysis. Therefore, the target sample size was set at no fewer than 342 participants. A total of 520 questionnaires were distributed, and 498 valid responses were retrieved, yielding an effective response rate of 95.77%.

Instruments

General demographic questionnaire

A self-designed questionnaire was developed based on a literature review. It comprised 10 items covering sociodemographic characteristics (gender, age, and marital status) and occupational characteristics (educational attainment, professional title, years of hematology service, average monthly night-shift frequency, hospital grade, average monthly income, and employment type).

Psychological Capital Scale (PCS)

The Chinese version of the Psychological Capital Scale (PCS), revised and translated by Luo et al.[22], was used. The scale consists of 20 items across four dimensions: self-efficacy, hope, resilience, and optimism. Responses are rated on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Total scores range from 20 to 120, with higher scores indicating greater psychological capital. Satisfactory reliability and validity of the PCS have been demonstrated among Chinese nursing populations[23]. In the current sample, the Cronbach's α coefficient for the overall PCS was 0.919.

Nutritional Care Competence Scale for Clinical Nurses (NCCS-CN)

The Nutritional Care Competence Scale for Clinical Nurses (NCCS-CN) developed by Zhu et al.[15] was used. It includes 63 items across five dimensions: nutritional professional knowledge, clinical nutritional assessment competence, nutritional health education competence, nutritional support nursing competence, and nutritional nursing-related quality. Items are rated on a five-point Likert scale ranging from 1 (completely inconsistent) to 5 (completely consistent). Total scores range from 63 to 315, with higher scores indicating greater nutritional care competence. The original scale reported a Cronbach's α of 0.991; in the present study, the Cronbach's α for the total scale was 0.905.

Data collection

Electronic questionnaires were distributed via Wenjuanxing (a Chinese online survey platform) and forwarded to department-level nursing groups by head nurses. A standardized introductory statement was displayed on the questionnaire homepage, explaining the research purpose, anonymity safeguards, and informed-consent procedures.

Quality-control measures included: (a) single-IP and single-WeChat-account restrictions to prevent duplicate submissions; (b) mandatory completion of all items to avoid missing data; (c) automatic exclusion of questionnaires completed in less than 180 seconds; and (d) manual screening to exclude patterned responses.

Data analysis

Mplus 8.3 was used to conduct the LPA, and models with one to five latent classes were fitted sequentially. Model fit was evaluated using the Akaike information criterion (AIC), Bayesian information criterion (BIC), and sample-size-adjusted BIC (aBIC), with smaller values indicating better fit. An entropy value > 0.8 was considered indicative of good classification accuracy. The Lo-Mendell-Rubin (LMR) test and the bootstrap likelihood ratio test (BLRT) were used to compare models, with $P < 0.05$ indicating that a k-class model fit significantly better than a (k − 1)-class model. The optimal number of classes was determined by integrating statistical indices with clinical interpretability[24, 25].

SPSS 25.0 was used for subsequent analyses. Categorical variables were described as frequencies and percentages, and between-group differences were examined using the chi-square test. Continuous variables were expressed as means ± standard deviations (M ± SD). Overall between-group differences were examined using one-way ANOVA, with post hoc pairwise comparisons performed using the least significant difference (LSD) method. Multinomial logistic regression was performed with the low psychological capital profile as the reference category to identify independent predictors of profile membership. All statistical tests were two-tailed, and the significance level was set at $\alpha = 0.05$.

Results

Participant characteristics

Of the 498 hematology nurses, 473 (95.0%) were female and 25 (5.0%) were male. Most participants (42.8%) were aged 26–35 years; 89.2% held a bachelor's degree or higher, and 31.7% held junior professional titles. Overall, 57.4% had worked in hematology for no more than five years; 28.7% worked five or more night shifts per month; 88.4% worked in tertiary-A hospitals; 37.6% earned a monthly income below ¥5000; and 66.8% were employed on contract or through personnel agencies. Further details are provided in Table 2.

Latent profile analysis of psychological capital

Models with one to five latent profiles were fitted sequentially (Table 1). The AIC, BIC, and aBIC values decreased continuously as the number of classes increased. The three-profile model yielded an entropy of 0.906 (> 0.80), indicating favorable classification accuracy. Both the LMR and BLRT reached statistical significance ($P < 0.001$). Although the four-profile model also showed significant test statistics, its smallest subgroup accounted for only 10.2% of the sample. The LMR test for the five-profile model was non-significant ($P = 0.198$). Synthesizing the fit indices and clinical interpretability, the three-profile solution was identified as optimal. The mean posterior classification probabilities ranged from 0.952 to 0.971, demonstrating high classification reliability. Therefore, the three-profile solution was retained.

As illustrated in Fig. 1, three latent profiles were identified. Profile 1 (35.3%, n = 176) was labelled the "low psychological capital profile." This profile exhibited the lowest overall scores, with particularly pronounced deficits in resilience and self-efficacy; hope and optimism were relatively less impaired but remained lower than in Profiles 2 and 3. Profile 2 (45.4%, n = 226), the largest subgroup, demonstrated moderate scores across all four dimensions and was named the "moderate psychological capital profile." Profile 3 (19.3%, n = 96) demonstrated consistently high scores across all four dimensions and was designated the "high psychological capital profile."

Table 1
Fit indices for latent profile models of psychological capital (N = 498).

Model	AIC	BIC	aBIC	Entropy	*P*-Vlaue		Class Proportions
					LMR	BLRT	
1	33112.359	33280.783	33153.821	-	-	-	
2	30243.466	30500.312	30306.696	0.919	0.0552	0.0000	0.66466/0.33534
3	29300.594	29645.863	29385.591	0.906	0.0001	0.0000	0.35017/0.45584/0.19399
4	28921.569	29355.260	29028.334	0.904	0.0003	0.0000	0.18474/0.30321/0.40964/0.10241
5	28788.169	29310.283	28916.702	0.901	0.1982	0.0000	0.17671/0.34337/0.09839/0.27711/0.10442

Note. Abbreviations. AIC, Akaike information criterion; BIC, Bayesian information criterion; aBIC, adjusted Bayesian information criterion; LMRT, Lo-Mendell-Rubin likelihood ratio test; BLRT, Bootstrap likelihood ratio test.

Differences in demographic characteristics across psychological capital profiles

Table 2 presents the comparisons of demographic characteristics across the three profiles. Statistically significant differences ($P < 0.001$) were found for educational attainment, professional title, years of hematology service, hospital grade, and monthly income. Notably, the high psychological capital profile contained the largest proportions of nurses with a master's degree or higher, junior professional titles, 6–10 years of hematology service, employment in tertiary-A hospitals, and a monthly income of ≥¥5000. Conversely, the low psychological capital profile had the highest proportions of nurses with a college education or below, intermediate or senior professional titles, ≤ 3 years of hematology service, employment in non-tertiary-A (secondary) hospitals, and a monthly income below ¥5000.

Table 2
Between-group comparisons of demographic and occupational characteristics across the three psychological capital profiles (N = 498).

Variables	Total sample (n = 498) n (%)	C1 (n = 176) n (%)	C2 (n = 226) n (%)	C3 (n = 96) n (%)	X^2	*P*
Gender					0.924	0.630
Female	473(95.0)	166(94.3)	214(94.7)	93(96.9)		
Male	25(5.0)	10(5.7)	12(5.3)	3(3.1)		
Age (years)					8.330	0.215
≤ 25	73(14.7)	25(14.2)	29(12.8)	19(19.8)		
26–35	213(42.8)	82(46.6)	88(38.9)	43(44.8)		
36–45	142(28.5)	46(26.1)	76(33.6)	20(20.8)		
≥ 46	70(14.1)	23(13.1)	33(14.6)	14(14.6)		
Education attainment					119.067	**< 0.001**
College or below	124(24.9)	77(43.8)	42(18.6)	5(5.2)		
University	320(64.3)	92(52.3)	171(75.7)	57(59.4)		
Masters or above	54(10.8)	7(4.0)	13(5.8)	34(35.4)		
Marital status					4.049	0.132
Married	435(87.3)	157(89.2)	200(88.5)	78(81.3)		
Unmarried/other	63(12.7)	19(10.8)	26(11.5)	18(18.8)		
Professional title					80.755	**< 0.001**
Junior	158(31.7)	24(13.6)	70(31.0)	64(66.7)		
Intermediate or above	340(68.3)	152(86.4)	156(69.0)	32(33.3)		
Years of hematology service					99.971	**< 0.001**
≤ 3	129(25.9)	71(40.3)	45(19.9)	13(13.5)		
4–5	157(31.5)	54(30.7)	90(39.8)	13(13.5)		
6–10	150(30.1)	32(18.2)	81(35.8)	37(38.5)		
≥ 11	62(12.4)	19(10.8)	10(4.4)	33(34.4)		
Monthly night shifts					2.475	0.649
0-<3	145(29.1)	50(28.4)	67(29.6)	28(29.2)		
3-<5	210(42.2)	73(41.5)	101(44.7)	36(37.5)		
≥ 5	143(28.7)	53(30.1)	58(25.7)	32(33.3)		
Hospital grade					51.378	**< 0.001**
Tertiary-A	440(88.4)	131(74.4)	216(95.6)	93(96.9)		
Non-tertiary-A	58(11.6)	45(25.6)	10(4.4)	3(3.1)		
Monthly income (RMB)					132.113	**< 0.001**

Note. Bold values indicate statistical significance ($P < 0.05$). C1, low psychological capital profile; C2, moderate psychological capital profile; C3, high psychological capital profile.

Variables	Total sample (n = 498) n (%)	C1 (n = 176) n (%)	C2 (n = 226) n (%)	C3 (n = 96) n (%)	X^2	*P*
< 5000 RMB	187(37.6)	122(69.3)	61(27.0)	4(4.2)		
≥ 5000 RMB	311(62.4)	54(30.7)	165(73.0)	92(95.8)		
Employment type					3.412	0.491
Agency-based	147(29.5)	44(25.0)	74(32.7)	29(30.2)		
Contract-based	186(37.3)	70(39.8)	78(34.5)	38(39.6)		
Permanent	165(33.1)	62(35.2)	74(32.7)	29(30.2)		

Note. Bold values indicate statistical significance ($P < 0.05$). C1, low psychological capital profile; C2, moderate psychological capital profile; C3, high psychological capital profile.

Predictor of latent profile membership

To identify demographic and work-related factors associated with psychological capital profile membership, a multinomial logistic regression analysis was performed with the low psychological capital profile (C1) as the reference category. Profile membership served as the outcome variable, and the predictors entered into the model were educational attainment, professional title, years of hematology service, hospital grade, and monthly income.

Table 3 presents the results, with statistically significant predictors highlighted in bold. Educational attainment, professional title, years of hematology service, hospital grade, and monthly income were significantly associated with profile membership.

For the comparison between C1 and C2, in terms of professional title, nurses with junior professional titles were more likely to belong to C1 than nurses with intermediate or senior professional titles (OR = 0.341, 95% CI: 0.185–0.630, $P = 0.001$). Nurses with 4–5 years (OR = 4.766, 95% CI: 1.718–13.220, $P = 0.003$) and 6–10 years (OR = 5.865, 95% CI: 2.062–16.685, $P = 0.001$) of hematology service were more likely to belong to C2 than nurses with ≥ 11 years of service; by contrast, no significant tendency for profile membership was observed for nurses with ≤ 3 years of hematology service ($P = 0.318$). In terms of hospital grade, hematology nurses who worked in non-tertiary-A hospitals were more likely to belong to C1 than those who worked in tertiary-A hospitals (OR = 9.075, 95% CI: 3.790-21.731, $P < 0.001$), and nurses with a monthly income below ¥5000 were also more likely to belong to C1 (OR = 0.163, 95% CI: 0.098–0.272, $P < 0.001$). However, there was no significant association with profile membership between C1 and C2 in terms of educational attainment ($P = 0.129$ and $P = 0.257$, respectively).

For the comparison between C1 and C3, first, nurses with a college education or below (OR = 0.016, 95% CI: 0.004–0.071, $P < 0.001$) and those with a university education (OR = 0.182, 95% CI: 0.057–0.580, $P = 0.004$) were more likely to belong to C1 than C3 when compared with nurses holding a master's degree or above. Second, nurses with junior professional titles were more likely to belong to C1 than nurses with intermediate or senior professional titles (OR = 0.054, 95% CI: 0.024–0.125, $P < 0.001$). Third, nurses with ≤ 3 years (OR = 0.176, 95% CI: 0.053–0.578, $P = 0.004$) and 4–5 years (OR = 0.202, 95% CI: 0.060–0.684, $P = 0.010$) of hematology service were more likely to belong to C1 than C3 relative to nurses with ≥ 11 years of service; however, there was no significant association with profile membership for nurses with 6–10 years of hematology service ($P = 0.764$). Fourth, hematology nurses who worked in non-tertiary-A hospitals were more likely to belong to C1 than those who worked in tertiary-A hospitals (OR = 12.638, 95% CI: 2.713–58.862, $P = 0.001$). Finally, nurses with a monthly income below ¥5000 were more likely to belong to C1 (OR = 0.034, 95% CI: 0.011–0.107, $P < 0.001$).

Table 3
Predictors of psychological capital latent profile membership derived from multinomial logistic regression(N = 498).

Variables	C2 vs C1					C3 vs C1				
	β	SE	OR	95% CI	*P*	*β*	SE	OR	95% CI	*P*
Education attainment(ref: Masters or above)										
College or below	−0.878	0.578	0.416	0.134–1.291	0.129	−4.134	0.763	0.016	0.004–0.071	**< 0.001**
University	0.622	0.548	1.862	0.636–5.452	0.257	−1.703	0.591	0.182	0.057–0.580	**0.004**
Professional title(ref:Intermediate or above)										
Junior	−1.076	0.313	0.341	0.185–0.630	**0.001**	−2.910	0.424	0.054	0.024–0.125	**< 0.001**
Years of hematology service (ref:≥11)										
≤ 3	0.526	0.526	1.692	0.603–4.747	0.318	−1.739	0.608	0.176	0.053–0.578	**0.004**
4–5	1.562	0.521	4.766	1.718–13.220	**0.003**	−1.599	0.622	0.202	0.060–0.684	**0.010**
6–10	1.769	0.533	5.865	2.062–16.685	**0.001**	−0.170	0.569	0.843	0.277–2.571	0.764
Hospital grade (ref: Non-tertiary-A)										
Tertiary-A	2.206	0.446	9.075	3.790-21.731	**< 0.001**	2.537	0.785	12.638	2.713–58.862	**0.001**
Monthly income (ref: ≥5000 RMB)										
< 5000 RMB	−1.813	0.261	0.163	0.098–0.272	**< 0.001**	−3.390	0.588	0.034	0.011–0.107	**< 0.001**

Note. C1, low psychological capital profile; C2, moderate psychological capital profile; C3, high psychological capital profile; reference category for the outcome = C1. *β*, unstandardized coefficient; SE, standard error; OR, odds ratio; 95% CI, 95% confidence interval; bold numbers indicate $p < 0.05$.

Differences in nutritional care competence across profiles

One-way ANOVA revealed statistically significant differences among the three profiles in all five dimensions and the total score of nutritional care competence (F = 7.723–29.762, $P < 0.001$). Post hoc LSD tests showed that nurses in the moderate psychological capital profile obtained significantly higher scores across all dimensions and the total score, whereas nurses in the low psychological capital profile obtained the lowest scores. Detailed results are presented in Table 4.

Table 4
Nutritional care competence scores across latent profiles among hematology nurses (N = 498).

Dimensions	C1 (n = 176) M ± SD	C2 (n = 226) M ± SD	C3 (n = 96) M ± SD	F	*P*
Nutritional assessment	2.88 ± 0.48	3.13 ± 0.45	2.97 ± 0.51	14.413	**< 0.001**
Nutritional intervention	2.88 ± 0.35	3.16 ± 0.39	2.98 ± 0.38	28.753	**< 0.001**
Nutritional evaluation	3.02 ± 0.42	3.17 ± 0.40	3.03 ± 0.42	7.723	**< 0.001**
Nutritional communication & collaboration	2.93 ± 0.32	3.14 ± 0.34	3.05 ± 0.34	18.420	**< 0.001**
Nutritional education	2.95 ± 0.36	3.12 ± 0.33	3.01 ± 0.34	11.558	**< 0.001**
Total	2.94 ± 0.25	3.14 ± 0.27	3.02 ± 0.27	29.762	**< 0.001**

Note. C1, low psychological capital profile; C2, moderate psychological capital profile; C3, high psychological capital profile. Abbreviation. M, mean; SD, standard deviation; ANOVA, one-way analysis of variance.

Discussion

Characteristics of the three latent psychological capital profiles

Three latent profiles of psychological capital were identified among hematology nurses, demonstrating substantial inter-individual heterogeneity in the configuration of psychological capital. The low psychological capital profile (35.3%) was characterized by generally low scores across the four dimensions, with particularly marked impairments in resilience and self-efficacy. The distribution pattern diverged from findings among general-internal-medicine nurses, with over one-third of participants categorised into this subgroup, reflecting unique psychological-resource consumption caused by occupational stressors within hematology departments[8]. Hematology nurses routinely care for critically ill and terminally ill patients, and sustained, high-intensity emotional labor gradually erodes resilience and occupational self-efficacy[26]. Chinese surveys have reported higher levels of occupational stress and compassion fatigue among hematology nurses than among general medical nurses; repeated exposure to patient deterioration and death constitutes a major source of psychological resource depletion[27]. Nurses in this subgroup are particularly susceptible to negative emotional outcomes under cumulative occupational stress and represent key targets for psychological intervention[28].

The moderate psychological capital profile was the largest subgroup (45.4%), displaying balanced yet modest levels across all four dimensions. Although these nurses are able to cope with routine clinical pressure, they remain susceptible to psychological decline under cumulative trauma-and emotional labor-related burdens in hematology settings and represent an at-risk subgroup for further psychological resource attrition[29]. Therefore, this subgroup should not be overlooked simply because its members exhibit no overt psychological symptoms. Regular psychological screening, peer-support activities, and flexible shift scheduling are recommended to maintain their balanced psychological capital configuration and prevent transition into the low psychological capital profile; they should be regarded as the core stabilizing stratum of the department's psychological resource pool.

Notably, the high psychological capital profile accounted for only 19.3% of participants, suggesting that only a minority of hematology nurses possess abundant positive psychological resources. This finding is noteworthy because members of this subgroup, having developed stable emotion-regulation abilities through extensive end-of-life care experience, can serve as internal buffers against occupational trauma within the department[29]. This profile does not imply that these nurses are free from work-related pressure; rather, it reflects well-developed coping capacities formed through long-term clinical practice. Understanding the characteristics of this subgroup may guide managers to leverage their supportive role for colleagues with insufficient psychological resources. Overall, the profile distribution suggests that nurses with abundant psychological capital are relatively scarce among hematology nurses, underscoring the importance of actively cultivating such backbone staff rather than relying on naturally formed resilience.

Factors associated with latent profile membership

Both individual-level factors (years of hematology service, professional title, and educational attainment) and organizational-level factors (hospital grade and monthly income) were significantly associated with profile membership. At the individual level, nurses with intermediate or senior professional titles, a master's degree or higher, and longer hematology-specific tenure tended to be categorized into the moderate or high psychological capital profiles. These findings are consistent with previous research showing that psychological capital varies by professional title, educational level, and clinical work experience[30]. Professional title and hematology-specific working tenure appeared to show the strongest associations with profile membership.

Compared with nurses holding junior titles and with fewer years of hematology experience, nurses with intermediate or senior titles and longer tenure have accumulated rich experience in managing patient deterioration and death and have stronger emotion-regulation abilities; consequently, they are better able to conserve psychological resources when facing sustained, high-intensity emotional labor[31, 32]. Therefore, nurses with junior titles and shorter hematology tenure may deplete their psychological resources more rapidly and are more likely to fall into the low psychological capital profile.

Notably, educational attainment was significantly associated with profile membership only in the comparison between the low and high profiles, not between the low and moderate profiles. Higher-educated nurses receive systematic training in humanistic care and emotion regulation during their formal education and continuing professional development. When confronted with repeated occupational trauma from caring for critically ill and terminally ill patients, they can adopt more adaptive coping strategies, thereby reducing psychological resource consumption[33, 34].

At the organizational level, nurses with a monthly income below ¥5000 were more likely to belong to the low psychological capital profile. Previous studies have identified salary as an important correlate of nurses' psychological capital[35]. Nurses with higher incomes tend to report greater job satisfaction and subjective well-being, experience less financial strain, and are therefore better able to maintain positive psychological resources for coping with occupational stressors[36]. This may partly explain why nurses earning less than ¥5000 per month were more likely to exhibit low psychological capital.

Hematology nurses working in non-tertiary-A hospitals were also more likely to belong to the low psychological capital profile. In China, high-quality hematology specialty care and stress-management training resources remain concentrated in tertiary-A hospitals[37]; nurses employed in such hospitals have more opportunities to participate in specialty training and to acquire skills for coping with end-of-life care pressures, which helps them maintain better psychological resources[38].

Association between psychological capital and nutritional care competence

Our findings are consistent with the Yerkes-Dodson inverted-U arousal theory[17]. This theory posits that performance does not increase linearly with motivation or arousal; either excessively low or high arousal impairs behavioral outcomes, whereas moderate arousal yields optimal performance. Post hoc LSD comparisons confirmed that nurses in the moderate psychological capital profile attained the highest scores on the total scale and all sub-dimensions. The high psychological capital profile outperformed the low psychological capital profile only marginally in the nutritional intervention and communication/collaboration dimensions, and it under-performed the moderate profile in standardized nutritional assessment.

Mechanistically, self-efficacy provides the psychological foundation for nurses to implement standardized, comprehensive nutritional screening workflows[39]. Nurses with low psychological capital lack sufficient self-efficacy, tend to avoid complex nutritional interventions, and show reduced initiative in delivering dietary health education. Previous research has confirmed that nurse self-efficacy is closely associated with clinical decision-making capacity and adherence to standardized workflows; low self-efficacy predisposes nurses to simplify operational procedures[40]. Nurses in the moderate psychological capital profile appear to maintain optimal arousal levels, balancing work motivation with professional prudence, whereas excessive optimism among high psychological capital nurses may lead them to overlook screening standards. Although nurses in the high psychological capital profile possess strong empathy, they may over-prioritize emotional comfort while neglecting objective indicator monitoring. Nurses' self-perception shapes their humanistic care performance; distorted self-cognition may cause highly empathic nurses to deviate from standardized objective assessment workflows[41].

Stratified-dimension analysis showed that the high psychological capital profile surpassed the low psychological capital group in nutritional intervention and communication-collaboration dimensions yet failed to gain advantages or even scored lower in nutritional assessment and therapeutic-evaluation dimensions compared with the moderate psychological capital group. This pattern suggests that the benefits of psychological capital predominantly manifest in interpersonal, humanistic care tasks. Standardized technical operations depend more heavily on professional prudence and procedural compliance; excessive empathy may interfere with objective clinical judgment[42]. Existing evidence indicates that nurse empathy is positively correlated with patient dietary adherence but only weakly correlated with the accuracy of nutritional assessment[43]. Conventional total-score-based analyses can produce only linear correlation conclusions. By adopting a person-centered LPA approach, this study provides empirical evidence of nonlinear relationships within specialty nursing contexts. Our results imply that psychological capital-oriented empowerment training alone cannot comprehensively improve nutritional nursing quality; standardized practical skills training must be delivered concurrently[44].

Implications for nursing management practice

Based on these findings, nursing managers may implement the following multi-faceted intervention strategies.

First, implement tiered psychological interventions based on tenure and professional title. Junior nurses and those with short hematology-specific tenure are particularly vulnerable to psychological resource depletion when confronting sustained occupational stress. For this subgroup, managers can provide resilience-focused group counseling and one-on-one psychological consultation to enhance emotion regulation and trauma-coping capacities, thereby alleviating the psychological toll of long-term, high-intensity emotional labor[28]. In contrast, nurses with intermediate and senior titles and rich clinical experience have developed stable psychological adaptation abilities. Hospitals and departments should capitalize on their mentoring potential to raise the overall level of psychological resources across the nursing team.

Second, optimize organizational support and salary incentive systems. Monthly income is a key organizational factor associated with profile membership. Nurses with low monthly income are more likely to fall into the low psychological capital profile owing to sustained economic pressure and diminished occupational well-being. Targeted salary optimization and welfare improvement measures should be implemented to stabilize nurses' positive psychological resources and enhance work motivation[35]. Furthermore, non-tertiary-A hospitals should compensate for deficiencies in specialty nursing resources by providing standardized hematology training and emotion-management courses, thereby narrowing the psychological resource gap between community-level and tertiary hospital nurses[45].

Third, establish a dual-track training system integrating psychological empowerment and nutritional care competence development. Psychological capital promotes nurses' autonomous learning motivation and professional practice ability, supporting the implementation of profile-differentiated training strategies[46]. Specifically, nurses in the low psychological capital profile should receive standardized foundational nutritional nursing training combined with confidence-building guidance to consolidate professional competence and improve psychological resilience[35]. For the moderate psychological capital subgroup, regular updates on evidence-based nutritional nursing knowledge are essential to maintain psychological resource stability and prevent progressive emotional exhaustion. Nurses in the high psychological capital profile could be assigned to advanced training focusing on precise nutritional assessment and objective indicator monitoring, thereby leveraging their role as professional backbones. Meanwhile, implementing a senior-junior nurse mentoring mechanism can effectively improve younger nurses' professional skills and stress-coping abilities, fundamentally alleviating psychological resource depletion among frontline hematology nurses.

Limitations

This study has several limitations. First, convenience sampling was used across several regions of China (Anhui Province, Beijing, Tianjin, and Shanghai), which limits the generalizability of the findings because the participating hospitals were not randomly selected. Future multi-regional, large-sample longitudinal studies are needed to validate these findings. Second, as a cross-sectional investigation, only correlations rather than causal relationships can be inferred. Longitudinal designs or interventional trials are warranted to verify causal links between psychological capital and nutritional care competence as well as intervention efficacy. Third, all data were collected via self-report questionnaires and are therefore susceptible to social desirability bias. Future studies should incorporate multi-source data, such as objective supervisor evaluations and long-term patient nutritional outcomes, for

cross-validation. Fourth, this study did not examine potential mediating variables, such as departmental leadership support and team climate. The underlying mechanisms through which psychological capital shapes nutritional nursing competence therefore remain incompletely elucidated; future structural equation modeling analyses are recommended to explore potential mediating and moderating pathways. Fifth, although the inverted-U pattern was consistent across all competence dimensions, it was identified in a single cross-sectional sample; replication in independent samples and across cultural settings is warranted before the pattern can be generalized.

Conclusion

Marked heterogeneity in psychological capital exists among hematology nurses, with three identifiable latent profiles: low, moderate, and high psychological capital. The proportion of nurses in the low psychological capital profile is substantial (35.3%), whereas nurses with abundant psychological capital remain scarce (19.3%). Educational attainment, professional title, years of hematology service, hospital grade, and monthly income were independently associated with profile membership. Membership in the low psychological capital profile was associated with the cumulative presence of adverse factors, including junior professional titles, lower educational attainment, and low income. The relationship between psychological capital and nutritional care competence follows an inverted-U (nonlinear) pattern: nurses with moderate psychological capital demonstrate optimal nutritional nursing performance. Nurses in the high psychological capital profile exhibited advantages only in communication-and intervention-related dimensions and under-performed in standardized assessment compared with the moderate psychological capital group. Nursing managers should implement stratified psychological interventions tailored to nurses' latent profile characteristics, concurrently optimize shift scheduling, personnel management, and salary structures, and integrate psychological empowerment programs with standardized specialty-specific nutritional nursing training, so as to comprehensively enhance nurses' mental well-being and the quality of clinical nutritional nursing services.

Abbreviations

LPA	latent profile analysis
PCS	Psychological Capital Scale
NCCS-CN	Nutritional Care Competence Scale for Clinical Nurses
AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
aBIC	adjusted Bayesian Information Criterion
LMR	Lo-Mendell-Rubin
BLRT	Bootstrap Likelihood-Ratio Test
ANOVA	Analysis of Variance
LSD	Least-Significant-Difference
M ± SD	Mean ± Standard Deviation
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Medical Ethics Committee of the First Affiliated Hospital of the University of Science and Technology of China (approval No. 2026-KY-450). All participants provided electronic informed consent before participation; participation was voluntary and anonymous.

Consent for publication

Not applicable.

Availability of data and materials

The data supporting the conclusions of this research will be made available from the corresponding authors upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This work was supported by the Scientific Research Project of Anhui Provincial Department of Education (Natural Science Category) (No. 2025AHGXZK30101).

Authors' contributions

W.L.W and Z.X.W designed the study. W.L.W, W.L.W, L.H, X.H.Y, D.Q.G and M.F collected the data. W.L.W and Z.X.W contributed to data analysis and produced the original draft. Q.C, J.Y, T.C and X.X.Z took responsibility for sorting raw data and interpreting study results. M.J.T took responsibility for revising the manuscript and supervising the whole research. All authors read and approved the final manuscript.

Acknowledgements

The authors sincerely thank all hematology nurses who participated in this study.

References

1. Yin W, Yan X, Cai J, Han B, Yin P, Lu G, et al. Incidence, mortality, and survival associated with acute leukaemia subtypes by age group in China: a population-based cancer registry analysis and cohort study. Lancet Haematol. 2025;12:e808–22. 10.1016/S2352-3026(25)00236-4.
2. Pasmann A, Friend P. Implementation of Nurse-Led Nutritional Screening in a Community Oncology Setting. Clin J Oncol Nurs. 2024;28:143–7. 10.1188/24.CJON.143-147.
3. Li WF, Xu LJ, Han YL, Li LH. [Study on the status of turnover intention and its influencing factors of 382 hemato-oncology nurses]. Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2023;41:408–13. 10.3760/cma.j.cn121094-20220424-00220. (in Chinese).
4. Grech A, Depares J, Scerri J. Being on the Frontline: Nurses' Experiences Providing End-of-Life Care to Adults With Hematologic Malignancies. J Hosp Palliat Nurs JHPN Off J Hosp Palliat Nurses Assoc. 2018;20:237–44. 10.1097/NJH.0000000000000433.
5. Macris PC, McMillen K. Nutrition issues in adult hematopoietic cell transplantation: A narrative review of latest advances. Nutr Clin Pract Off Publ Am Soc Parenter Enter Nutr. 2025;40:518–33. 10.1002/ncp.11288.
6. Newman R, Rozga M, Handu D, Fuchs-Tarlovsky V, Fay L, Robien K, et al. Nutrition Support Interventions in Adults with Hematologic Malignancies: A Systematic Review and Meta-Analysis. J Acad Nutr Diet. 2026;126:156221. 10.1016/j.jand.2025.156221.
7. LI H, Zhu X, Zhao M, Yu N, Chen J, Sun W. The current situation and influencing factors of nutritional care competence for clinical nurses from 4 general hospitals in Anhui Province. Chin J Nurs. 2022;57:602–8. 10.3761/j.issn.0254-1769.2022.05.014.
8. Zhang X, Chen S, Zheng Z, Zhao M, Song L, Zhao Y, et al. The relationship between psychological capital, burnout and perceived stress in junior nurses: a latent profile analysis. Front Public Health. 2024;12:1374941. 10.3389/fpubh.2024.1374941.
9. El-Fatah WOA, Mohamed T, Abdallah N, Ahmed HM, Ayaad SRAEF. Analyzing the nexus between burnout and psychological distress in pediatric oncology nurses: a descriptive correlational investigation. BMC Nurs. 2025;24:465. 10.1186/s12912-025-03061-5.

10. Luthans F, Youssef CM, Avolio BJ. Psychological capital: developing the human competitive edge. Oxford: Oxford University Press; 2007. 10.1093/acprof:oso/9780195187526.001.0001.
11. Orgambídez A, Borrego Y, Cantero-Sánchez FJ, León-Pérez JM. Relationship between psychological capital and nursing burnout: A systematic review and meta-analysis. Int Nurs Rev. 2025;72:e13072. 10.1111/inr.13072.
12. Yuan Z, Zhang X, Wang F, Jin M, Teng M, He H, et al. Levels of psychological capital among nurses: A systematic review and meta-analysis. Int Nurs Rev. 2023;70:89–96. 10.1111/inr.12803.
13. Zhao Q, Cao L, Li Y, Wang H, Li L, Yang H, et al. Work stressors, work-related quality of life, psychological capital, and innovative behavior in emergency and critical care nurses: a cross-sectional moderated mediation study. Front Psychol. 2026;17:1744086. 10.3389/fpsyg.2026.1744086.
14. Wang J, Chen J, Zheng L, Zeng B, Yan X, Xia M, et al. Influence of psychological capital on core competency for new nurses. PLoS ONE. 2023;18:e0289105. 10.1371/journal.pone.0289105.
15. Zhu X, Zhao M, Yang Y, Qing Q. The development and psychometric testing of Nutritional Care Competence Scale for Clinical Nurses. Chin J Nurs. 2021;56:1672–9. 10.3761/j.issn.0254-1769.2021.11.012.
16. Beerendonk L, Mejías JF, Nuiten SA, de Gee JW, Zantvoord JB, Fahrenfort JJ, et al. Adaptive arousal regulation: Pharmacologically shifting the peak of the Yerkes-Dodson curve by catecholaminergic enhancement of arousal. Proc Natl Acad Sci U S A. 2025;122:e2419733122. 10.1073/pnas.2419733122.
17. Yerkes RM, Dodson JD. The relation of strength of stimulus to rapidity of habit-formation. J Comp Neurol Psychol. 1908;18:459–82. 10.1002/cne.920180503.
18. Zhao L, Su Y, Jiang N, Zhou F, Liao L, Liu Y. Changes in professional commitment of undergraduate nurse students before and after internship: a longitudinal study. BMC Med Educ. 2022;22:282. 10.1186/s12909-022-03364-0.
19. Jawabreh B, Jaradat Y, Qtait M, Al Khatib S. Shift Work and Burnout Among Oncology and Hematology Nurses in Palestinian Hospitals. SAGE Open Nurs. 2025;11:23779608251406676. 10.1177/23779608251406676.
20. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370:1453–7. 10.1016/S0140-6736(07)61602-X.
21. Ferguson SL, Moore G, Hull EW. Finding latent groups in observed data: A primer on latent profile analysis in Mplus for applied researchers. Int J Behav Dev. 2020;44:458–68. 10.1177/0165025419881721.
22. Luo H, Hao Z. The relationships among psychological capital,job burnout and turnover intention in 466 nurses. Chin J Nurs. 2010;45:933–5. 10.3761/j.issn.0254-1769.2010.10.027.
23. Xue B, Wang S, Chen D, Hu Z, Feng Y, Luo H. Moral distress, psychological capital, and burnout in registered nurses. Nurs Ethics. 2024;31:388–400. 10.1177/09697330231202233.
24. Wang Y, Kim E, Yi Z. Robustness of Latent Profile Analysis to Measurement Noninvariance Between Profiles. Educ Psychol Meas. 2022;82:5–28. 10.1177/0013164421997896.
25. Ye Y, Kan Y, Dong T, Zhang J, Li X, Zhang L, et al. Patterns of Professional Practice Participation: A Latent Profile Analysis of Specialty Nurses in China. J Nurs Manag. 2026;2026:5574431. 10.1155/jonm/5574431.
26. Hotchkiss JT. Mindful Self-Care and Secondary Traumatic Stress Mediate a Relationship Between Compassion Satisfaction and Burnout Risk Among Hospice Care Professionals. Am J Hosp Palliat Care. 2018;35:1099–108. 10.1177/1049909118756657.
27. Chen F, Leng Y, Li J, Zheng Y. Compassion satisfaction and compassion fatigue in haematology cancer nurses: A cross-sectional survey. Nurs Open. 2022;9:2159–70. 10.1002/nop2.1226.
28. Gon R, Wu Y, Liu Y, Yang R, Zhang Y, Xing L. Influence of Group Training Based on Psychological Capital Theory on Nursing Staff's Occupational Benefits and Job Satisfaction in an Infusion Preparation Center. Altern Ther Health Med. 2023;29:186–92.
29. Frey R, Robinson J, Wong C, Gott M. Burnout, compassion fatigue and psychological capital: Findings from a survey of nurses delivering palliative care. Appl Nurs Res ANR. 2018;43:1–9. 10.1016/j.apnr.2018.06.003.
30. He Y, Wang D, Wang L, Liao R. Latent profiles of psychological capital in clinical nursing teachers and their association with the practice environment of nursing and perceived social support. Front Psychol. 2025;16:1527252. 10.3389/fpsyg.2025.1527252.
31. Liu X, Li C, Yan X, Shi B. Psychological capital has a positive correlation with humanistic care ability among nurses. Front Psychol. 2022;13:955627. 10.3389/fpsyg.2022.955627.

32. Wang Y-L, Yang Z-W, Tang Y-Z, Li H-L, Zhou L-S. A qualitative exploration of empathic labor in Chinese hospice nurses. BMC Palliat Care. 2022;21:23. 10.1186/s12904-022-00911-w.
33. Alenezi A, Alhowaymel FM, Abaoud AF, Mostafa MH. The relationship between psychological capital and humanistic caring ability among mental health nurses in Saudi Arabia. BMC Nurs. 2024;23:688. 10.1186/s12912-024-02344-7.
34. Zhou H, Peng J, Wang D, Kou L, Chen F, Ye M, et al. Mediating effect of coping styles on the association between psychological capital and psychological distress among Chinese nurses: a cross-sectional study. J Psychiatr Ment Health Nurs. 2017;24:114–22. 10.1111/jpm.12350.
35. Teng M, Wang J, Jin M, Yuan Z, He H, Wang S, et al. Psychological capital among clinical nurses: A latent profile analysis. Int Nurs Rev. 2024;71:786–93. 10.1111/inr.12918.
36. He Y, Guo Y, Guo X, Han N, Xin B, Wu Y, et al. Role function and job satisfaction of community nurses in China: A cross-sectional study. Nurs Open. 2024;11:e2109. 10.1002/nop2.2109.
37. Zhu R, Zhang J, Zhang Q, Dong W, Meng Y, Wang Y, et al. Content of medicine prescription and clinical practice training for haematology advanced practice nurses in China: A modified Delphi study. Nurse Educ Pract. 2024;77:103974. 10.1016/j.nepr.2024.103974.
38. Yan D, Chen L, Li M, Zhang Y, Zhang Y. Reducing anxiety and enhancing innovation in nurses: a psychological capital intervention study in China. BMC Nurs. 2025;24:204. 10.1186/s12912-025-02838-y.
39. Wei L-Z, Chong M-C, Lu X-X, Gunarathne NS, Ren S-W. Self-efficacy in nutritional care for older adults among hospital-based nurses: a latent profile and network simulation analysis. BMC Nurs. 2026;25:245. 10.1186/s12912-026-04391-8.
40. Toqan D, Ayed A, Aqtam I, Harazne L, Ejheisheh MA, Younis MB, et al. Academic Self-Efficacy as a Predictor of Clinical Decision-Making Among Nursing Students: A Cross-Sectional Correlational Study Conducted in Palestine. SAGE Open Nurs. 2026;12:23779608261444447. 10.1177/23779608261444447.
41. Zhao X, Zhang Y, Luan J, Luan Z, Zhang J. Current status and influencing factors of empathy and moral decision-making among Chinese clinical intern nurses - a cross-sectional study. BMC Nurs. 2025;24:751. 10.1186/s12912-025-03352-x.
42. Kesbakhi MS, Rohani C. Exploring oncology nurses' perception of the consequences of clinical empathy in patients and nurses: a qualitative study. Support Care Cancer Off J Multinatl Assoc Support Care Cancer. 2020;28:2985–93. 10.1007/s00520-019-05118-z.
43. Zhu X-Y, Guo X-X, Ge W-J, Cao Z-M, Zhu S-J. Nutritional care competence among ICU nurses in China: a latent profile analysis. BMC Nurs. 2025;25:82. 10.1186/s12912-025-04244-w.
44. Mahmoud MA, Abdelrahim SM, Hamed AEM, Zoromba MA, Mohamed AF. Fortifying the Nursing Workforce: Nursing-Led Psychological Capital Interventions to Advance Resilience, Occupational Hardiness, and Engagement: A Randomized Controlled Trial. Int Nurs Rev. 2025;72:e70094. 10.1111/inr.70094.
45. Li X, Yang F, Chen X, Zhao H, Yu R. Latent profile analysis of nurse burnout categories and influencing factor differences among nurses in Southwest China. Front Public Health. 2026;14:1764970. 10.3389/fpubh.2026.1764970.
46. Feng X-J, Chai X-H, Liu H, Li X-X, Heng C-N, Tong J-H, et al. Serial multiple mediation of psychological capital and self-directed learning ability in the relationship between perceived stress and professional identity among undergraduate nursing students in China: a cross-sectional questionnaire survey. BMC Med Educ. 2024;24:1450. 10.1186/s12909-024-06459-y.

Figures

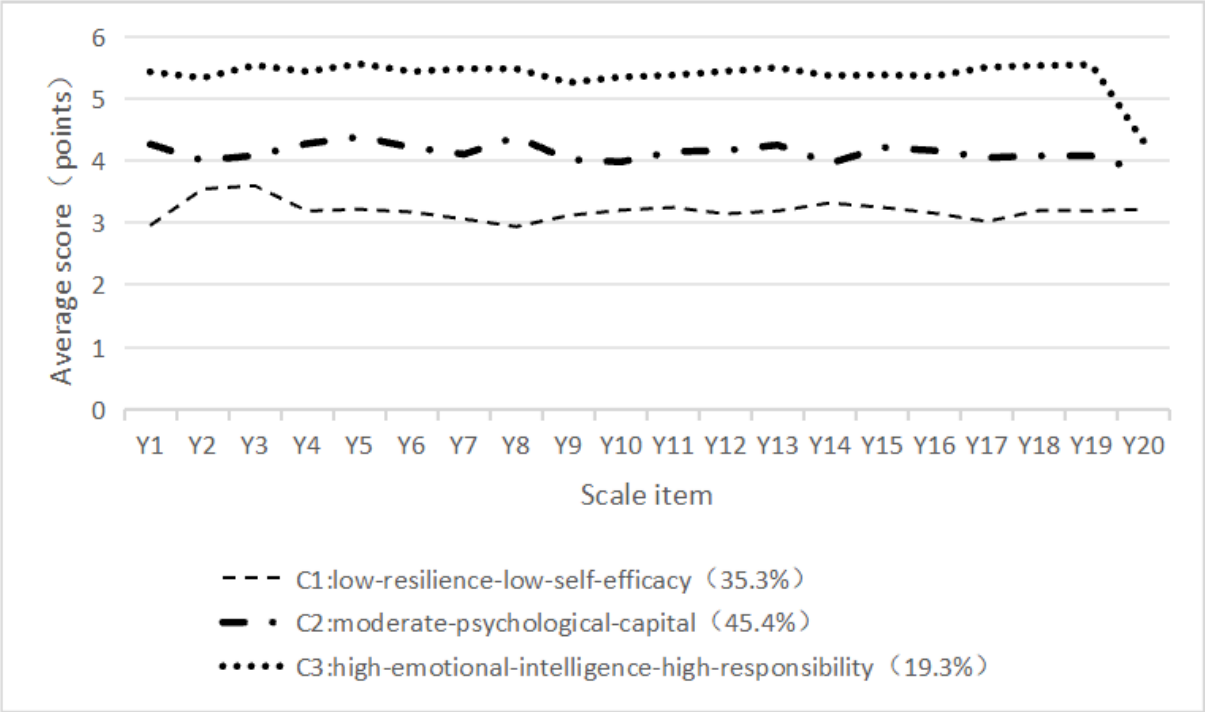


Figure 1

Score profiles across psychological capital dimensions for the three latent classes.

Supplementary Files

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

- Additionalfile.pdf