

Factors Influencing Latent Profiles of Spiritual Health and Their Associations with Leadership and Professional Identity Among First-Year Nursing Students: A Latent Profile Analysis

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Abstract

Aim

To identify latent profiles of spiritual health among first-year nursing students and examine their associations with leadership and professional identity.

Background

First-year nursing students face simultaneous academic transition and socialisation into the profession. Spiritual health may serve as an internal resource that supports adjustment and professional value formation; however, heterogeneity in spiritual health during this period is poorly described.

Methods

A cross-sectional survey was conducted among 931 first-year nursing students from a medical university (October 2022–2024). Measures included demographics, spiritual health (SHS-SF), leadership (SALI), and professional values (NPVS-R). Latent profile analysis identified subgroups; ANOVA and multinomial logistic regression examined profile differences and predictors.

Results

Three profiles emerged: high spirituality–high resilience (23.1%), moderate spirituality–moderate adaptation (54.1%), and low spirituality–low coping (22.8%). Leadership and professional values scores increased stepwise across profiles ($p < 0.001$). Students planning further education and those with higher recognition of nursing research value were more likely to belong to moderate or high spirituality profiles.

Conclusion

Spiritual health is heterogeneous among first-year nursing students and is closely linked to leadership and professional identity. Recognition of the value of nursing research and aspirations for advanced education appear to support more adaptive spiritual health profiles.

1. Introduction

As early as 1998, the World Health Organization identified spiritual health as one of the four core components of health, alongside physical, mental, and social health[1], emphasizing the holistic nature of "physical-mental-social-spiritual" well-being. Spiritual health refers to a positive state experienced by

individuals in terms of life meaning, self-transcendence, intrinsic values, and connections with others. It encompasses not only religious beliefs but also an understanding of life's purpose, the ability to cope with adversity, and self-acceptance.

Research indicates that nursing students face not only higher academic pressure than general university students but are also prone to loss of meaning and emotional exhaustion due to frequent exposure to patient suffering, life-and-death situations, and ethical dilemmas[2]. Furthermore, the essence of nursing work is highly dependent on humanistic care, requiring nurses to be sensitive to patients' emotional and spiritual needs and to provide compassionate care[3]. Spiritual health constitutes the cornerstone of this caring capacity. For nursing students, spiritual health is particularly important, operating on two levels: internally, it helps them construct meaning in adversity and resist emotional exhaustion[4]; externally, it enhances their sensitivity to patients' spiritual needs, laying the foundation for holistic care[5].

The first year of university is a critical stage for nursing students as they transition from high school to university and represents the starting point of their professional socialization[6]. During this stage, freshmen face a new living environment, different teaching methods, and unfamiliar social networks. They need to transition from passive, exam-oriented learning to active, self-directed learning[7], making them susceptible to psychological adjustment issues such as anxiety, confusion, and a loss of meaning[8]. Studies have demonstrated that freshmen are a high-risk group for psychological crises, with their mental health status generally being poorer than that of other grades[9]. In terms of their major, new students not only need to adapt to university life but also confront value challenges unique to the nursing profession from the outset—questions such as "Why study nursing?" and "What is the meaning of nursing work?" If the spirituality of nursing students is not effectively nurtured during this period, and they fail to construct a proper sense of meaning, it may not only affect their academic engagement and the formation of early professional identity but could also have long-term negative consequences on their ability to provide spiritual care in later clinical practice[10]. Therefore, this study focuses on the critical stage of first-year nursing students to identify the heterogeneous characteristics of their spiritual health. This is of significant practical importance for implementing early targeted interventions in professional education to prevent a decline in spiritual health.

Spiritual health is the result of multiple interacting factors. In current research, Wang Zhangyi et al. (2021) found that empathy is positively correlated with spiritual health[11]. Peng Zixuan et al. (2024) identified that meaning in life and psychological capital are the primary factors influencing perceptions of spiritual care[12]. The theory of positive youth development[13] suggests that spiritual health, as a core internal resource, may interact with external resources (such as the educational environment and leadership opportunities) to influence the developmental trajectories of nursing students' professional identity and leadership. This interaction may lead to different group characteristics in terms of spiritual health levels. In other words, the spiritual health of nursing students is likely not a unidimensional continuous variable but exhibits heterogeneous latent categories[14]. Therefore, it is reasonable to infer that spiritual health is closely linked to core competencies such as professional identity and leadership.

Professional identity refers to an individual's understanding of the social impact of their profession and the personal meaning of their work, serving as the psychological foundation for effective performance and achieving organizational goals[9, 10]. For nursing students, developing professional identity is a dynamic process spanning theoretical study and clinical practice, during which they gradually internalize the values and ethical standards of the nursing role as part of their self-concept[9, 10, 15]. When nursing students can appreciate the value of nursing work from the perspective of "living a meaningful life," their professional identity is elevated from an external "liking" to an intrinsic "meaning identification." Guo Liting et al. found that perceptions of spiritual care are correlated with professional identity[16]. Similarly, Shamsi et al. demonstrated that professional identity positively predicts spiritual care competence[9].

Leadership is the comprehensive ability of nursing personnel (including nursing students, nurses, and nurse managers) to apply professional knowledge, skills, attitudes, and decision-making to influence other members of the organization to achieve high-quality care goals[9, 10, 17]. For nursing students, leadership encompasses core dimensions such as decision-making skills, critical thinking, and teamwork[9, 18]. In its "State of the World's Nursing 2020" report, the World Health Organization specifically emphasized the need to strengthen nurse leadership, positioning them as current and future leaders in health systems. It stressed that leadership training should be integrated throughout the undergraduate education process[17, 19]. Existing research indicates that leadership not only directly influences nurses' work engagement and retention but can also indirectly promote employees' spiritual well-being by fostering a positive workplace climate[18, 20]. Specifically, spiritual leadership enhances employees' spiritual well-being, thereby stimulating their sense of work meaning and proactive behaviors[18]. The cultivation of leadership among nurses has also been shown to help nursing students build confidence and a sense of belonging, thereby enhancing their identification with the value of nursing work[17, 20]. Individuals with high spiritual health often have a stronger sense of meaning and interpersonal connections—traits that constitute the psychological foundation for leadership development. For instance, the study by Hu et al. indirectly suggests that nursing students with leadership experience are more likely to possess high levels of psychological resilience[15].

Currently, many studies have focused on the predictive role of spiritual health on professional identity, empathy, and humanistic caring ability[21]. In contrast, fewer studies have treated spiritual health as a dependent variable to explore its formation mechanisms. As awareness of spiritual health grows in the nursing community, recent research has begun to reveal the potential heterogeneity of spiritual health among nursing students. For instance, Hu S et al. (2025) found that nursing students living in urban areas and those with leadership experience were more likely to belong to the high-resilience group, while female students were more prone to the low-resilience group[15]. Guo Yang et al. (2026), focusing on spiritual care competence, found that undergraduate nursing students could be classified into low, moderate, and high categories, with spiritual care competence positively correlated with meaning in life[22]. These studies highlight the necessity of using latent profile analysis—an individual-centered approach—to more precisely reveal the characteristics of this population's heterogeneity.

Therefore, this study employs latent profile analysis from an individual-centered perspective to explore the latent categories of spiritual health among first-year nursing students. It aims to analyze the distribution of these categories in terms of leadership and professional identity and to further identify the demographic factors influencing category membership. The findings will assist nursing educators in identifying new student groups requiring focused attention during orientation, clarifying the primary competencies to be developed for different categories of new students, and discerning which demographic groups of students are more likely to be in disadvantaged categories. This information can directly inform the development of stratified interventions to improve the spiritual health of new nursing students.

2. Objects and Methods

2.1 Research Subjects

In October 2022, 2023, and 2024, first-year nursing students from a medical university were recruited as research subjects using convenience sampling.

Inclusion criteria were:

- (1) full-time first-year nursing students;
- (2) enrolled for no more than three months and having completed basic orientation and introductory professional courses;
- (3) provided informed consent and participated voluntarily;
- (4) aged ≥ 18 years.

Exclusion criteria were:

- (1) those who had interrupted their studies due to leave of absence, sick leave, or other reasons;
- (2) those undergoing intervention for a psychological crisis during the survey period.

Following the principle that the sample size should be 10 to 20 times the number of independent variables in multiple regression analysis, with 14 demographic variables in this study, a 20% invalid questionnaire rate, and the recommendation that LPA requires a sample size of at least 300[23], the final target sample size was determined to be 336–672. A total of 1,014 questionnaires were returned, of which 931 were valid, yielding an effective response rate of 91.81%. Among the 931 nursing students, 751 were female (80.7%) and 180 were male (19.3%). Their ages ranged from 17 to 23 years, with the majority being 19 (40.4%) and 20 (31.0%) years old. Five hundred and eight students (54.6%) were from rural areas, 636 (68.3%) were not only children, and 691 (74.2%) had plans to pursue further education.

2.2 Measures

2.2.1 General Information Questionnaire

This was self-designed, including items on gender, age, grade, whether an only child, family residence, reason for choosing nursing, monthly family income, high school track (science/liberal arts), whether holding a student leadership position, and plans for pursuing further education.

2.2.2 Spiritual Health Scale-Short Form (SHS-SF)

Developed by Hsiao et al.[24], this scale comprises five dimensions: connection with others, living a meaningful life, transcending adversity, religious attachment, and self-understanding, totaling 24 items. It uses a 5-point Likert scale, with total scores ranging from 24 to 120; higher scores indicate better spiritual health. In this study, the Cronbach's α coefficient for this scale was 0.932.

2.2.3 Self-Assessment of Leadership Instrument (SALI)

Developed by Smola and adapted into Chinese by Cai Guoqi et al.[25], this scale includes five dimensions: decision-making skills, critical thinking, teamwork, interpersonal relationships, and work relationships, with a total of 40 items. It uses a 5-point Likert scale (0–4), with total scores ranging from 0 to 160. In this study, the Cronbach's α coefficient was 0.981.

2.2.4 Nursing Professional Values Scale-Revised (NPVS-R)

Developed by Weis et al. and adapted into Chinese by Gong Yanyan et al.[26], this scale comprises four dimensions: trust, professional characteristics, provision of care, and activism, with a total of 26 items. It uses a 5-point Likert scale, with total scores ranging from 26 to 130. In this study, the Cronbach's α coefficient was 0.982.

2.3 Data Collection and Quality Control

Prior to the survey, trained researchers explained the study's purpose, questionnaire completion requirements, and important considerations to the participants, emphasizing anonymity and that there were no right or wrong answers to alleviate any concerns. After obtaining informed consent, the questionnaire was distributed via the Wenjuanxing platform, with all questions set as required and each IP address limited to one submission. After collection, two researchers independently screened the questionnaires, excluding those with response times that were too short (< 3 minutes) or showed a pattern of repetitive answers.

2.4 Statistical Methods

Data were analyzed using SPSS 26.0 and Mplus 8.3. First, Harman's single-factor test was used to assess common method bias. Latent profile analysis (LPA)[23] was employed to identify latent categories of spiritual health, using AIC, BIC, aBIC, Entropy, LMR, and BLRT as model fit indices. Lower AIC, BIC, and aBIC values indicate better model fit. LMR and BLRT are used to compare a k-profile model with a k-1 profile model; a significant result indicates that the k-profile model fits better. Higher entropy values indicate more accurate classification; values greater than 0.80 suggest that the latent classes are

highly discriminating[10], and the proportion of individuals classified in a particular category should typically be at least 5%[23]. Chi-square tests and analysis of variance (ANOVA) were used for univariate analysis. Multinomial logistic regression was used to analyze influencing factors. The significance level was set at $\alpha = 0.05$.

2.5 Variable Grouping and Assignment

To facilitate univariate and regression analyses, three variables—age, attitude toward the nursing profession, and perceived significance of nursing research—were grouped.

(1) Age: Participants under 18 and those aged 18 were combined into the " ≤ 18 " group, those aged 19 and 20 were combined into the "19–20" group, and those aged ≥ 21 formed a separate group.

(2) Attitude toward nursing: The original scale used a 5-point reverse-scored scale (1 = like, 5 = dislike). Scores of 1–2 were merged into the "positive" group, 3 into the "neutral" group, and 4–5 into the "negative" group.

(3) Perceived significance of nursing research: The original scale used a 5-point positive-scored scale (1 = not meaningful, 5 = very meaningful). Scores of 1–2 were merged into the "low recognition" group, 3 into the "moderate recognition" group, and 4–5 into the "high recognition" group.

The frequency distributions of these groupings are presented in Table 4. In the subsequent multinomial logistic regression, "age" used the " ≥ 21 " group as the reference, and "perceived significance of nursing research" used the "low recognition" group as the reference. "Attitude toward nursing" was not included in the regression model due to strong multicollinearity with professional values.

3. Results

3.1 Correlational Analysis of Factors Affecting Spiritual Health

Correlational analysis showed that the total spiritual health score of nursing students was positively correlated with the total leadership score ($r = 0.654$, $P < 0.01$) and also positively correlated with the total professional values score ($r = 0.632$, $P < 0.01$), as detailed in Table 1.

Table 1
Correlation Analysis Among Core Variables

Variables	Total Spiritual Health Score	Total Professional Values Score	Total Leadership Score
Total Spiritual Health Score	1		
Total Professional Values Score	0.632**	1	
Total Leadership Score	0.654**	0.728**	1
Note: ** indicates significance at the 0.01 level (two-tailed). Values are Pearson correlation coefficients.			

3.2 Latent Profile Analysis of Spiritual Health

Using the mean scores of the five spiritual health dimensions as manifest variables, models with one to four classes were fitted sequentially. As shown in Table 2, as the number of classes increased, AIC, BIC, and aBIC continued to decrease. The 3-class model had an Entropy of 0.914, a significant LMR test, and reasonable class proportions. Although the 4-class model had a higher Entropy, it included an excessively small class (0.43%) and a non-significant LMR test. Therefore, the 3-class model was selected. The three classes were named: the low-spirituality-low-coping group ($n = 215$, 23.1%), the moderate-spirituality-moderate-adaptation group ($n = 504$, 54.1%), and the high-spirituality-high-resilience group ($n = 212$, 22.8%). The model showed good reliability; see Fig. 1 for the classification plot.

The differences in scores across all spiritual health dimensions among the three groups were statistically significant ($P < 0.001$), following a gradient distribution: high-spirituality-high-resilience group > moderate-spirituality-moderate-adaptation group > low-spirituality-low-coping group. Among these, the "living a meaningful life" dimension exhibited the largest intergroup difference ($F = 2153.38$), serving as a core indicator for distinguishing spiritual health levels. No statistically significant difference was found in the "religious attachment" dimension across groups. See Table 3.

Table 2
Fit Indices for the Latent Profile Analysis Model of Spiritual Health

Model	AIC	BIC	aBIC	Entropy	LMR p (k vs k-1)	Category Proportions
1Class	25265.697	25314.060	25282.301	---	---	---
2Class	23839.425	23916.805	23865.990	0.852	< 0.001 (2vs1)	33.3%/66.7%
3Class	22797.647	22904.045	22834.175	0.914	< 0.001 (3vs2)	23.1%/54.1%/22.8%
4Class	22640.691	22776.106	22687.181	0.935	0.1944 (4vs3)	53.3%/23.7%/0.43%/22.6%

Table 3
Comparison of Scores Across Spiritual Health Dimensions for the Three Potential Categories

Dimension	Low Spirituality— Low-Coping (n = 215)	Moderate Spirituality- Moderate- Adaptation (n = 504)	High Spirituality- High- Resilience (n = 212)	F	p	Post- hoc Test ^a
Connection with Others	12.32 ± 1.87	15.94 ± 2.19	19.00 ± 1.64	598.82	< 0.001	1 < 2<3
Living with Meaning	18.24 ± 1.89	23.75 ± 1.82	29.21 ± 1.28	2153.38	< 0.001	1 < 2<3
Transcending Adversity	18.12 ± 2.34	23.31 ± 1.98	28.54 ± 2.11	1315.05	< 0.001	1 < 2<3
Religious Attachment	11.15 ± 2.71	10.90 ± 4.35	11.53 ± 5.81	1.53	0.218	—
Self-Awareness	12.91 ± 2.24	15.99 ± 2.06	18.86 ± 1.62	466.57	< 0.001	1 < 2<3
Note: a Post-hoc comparisons used the LSD method; numbers 1, 2, and 3 represent the low, moderate, and high spirituality groups, respectively; "—" indicates no significant difference.						

3.3 General Characteristics of the Sample

Statistically significant differences (all $P < 0.05$) were found among the different spiritual health categories for the following variables: gender, age group, whether an only child, attitude towards nursing,

willingness to work as a nurse after graduation, plans for further education, interest in pursuing a nursing research career, and perceived significance of nursing research. See Table 4 for details.

Table 4

Univariate Analysis of General Characteristics Across Different Spiritual Health Categories (N = 931)

Variables	Category	Low - Spirituality – Low-Coping (n = 215)	Moderate - Spirituality-Moderate-Adaptation(n = 504)	High-Spirituality-High-Resilience (n = 212)	χ^2	P
Gender	Male	58(27.0)	86(17.1)	36(17.0)	10.471	0.005
	Female	157(73.0)	418(82.9)	176(83.0)		
Age	≤ 18 years	16(7.4)	27(5.4)	13(6.2)	14.971	0.005
	19–20 years	153(71.7)	380(75.4)	132(62.2)		
	≥ 21 years	46(21.4)	97(19.2)	67(31.6)		
Only Child	Yes	66(30.7)	147(29.2)	82(38.7)	6.365	0.041
	No	149(69.3)	357(70.8)	130(61.3)		
Family Residence	City	45(20.9)	112(22.2)	56(26.4)	2.346	0.672
	Towns and Cities	48(22.3)	114(22.6)	48(22.6)		
	Rural	122(56.7)	278(55.2)	108(50.9)		
Reason for Choosing Nursing	Personal preference	85(39.5)	232(46.0)	108(50.9)	10.352	0.111
	Parents' Choice	46(21.4)	103(20.4)	50(23.6)		
	College Entrance Exam Reallocation	37(17.2)	75(14.9)	27(12.7)		
	Others	47(21.9)	94(18.7)	27(12.7)		
Family Member in Healthcare	Yes	67(31.2)	170(33.7)	83(39.2)	3.220	0.200
	No	148(68.8)	334(66.3)	129(60.8)		

Note: Eight variables with $P < 0.05$ in the univariate analysis were included in the subsequent multinomial logistic regression: gender, age group, only child status, attitude towards nursing, willingness to work as a nurse post-graduation, plans for further education, interest in nursing research, and perceived significance of nursing research. Age groups were combined as described. Attitude and perceived significance are presented according to their original 5-point Likert classifications.

Variables	Category	Low - Spirituality—Low-Coping (n = 215)	Moderate - Spirituality-Moderate-Adaptation(n = 504)	High-Spirituality-High-Resilience (n = 212)	χ^2	P
Monthly Family Income	<3000yuan	48(22.3)	123(24.4)	48(22.6)	3.390	0.759
	3000 ~ 5999yuan	109(50.7)	250(49.6)	117(55.2)		
	6000 ~ 8999yuan	37(17.2)	85(16.9)	34(16.0)		
	≥ 9000yuan	21(9.8)	46(9.1)	13(6.1)		
Attitude Towards Nursing	positive group	34(15.8%)	143(28.4%)	86(40.6%)	33.049	<0.001
	neutral group	138(64.2%)	281(55.8%)	93(43.9%)		
	negative group	43(20.0%)	80(15.9%)	33(15.6%)		
Willingness to Work as Nurse Post-Graduation	Willingness	93(43.3)	253(50.2)	127(59.9)	16.125	0.003
	Unwillingness	24(11.2)	41(8.1)	23(10.8)		
	Uncertainty	98(45.6)	210(41.7)	62(29.2)		
High School Track	Arts track	123(57.2)	282(56.0)	133(62.7)	2.853	0.240
	Science track	92(42.8)	222(44.0)	79(37.3)		
Student Leadership Role	Yes	63(29.3)	181(35.9)	83(39.2)	4.844	0.089
	No	152(70.7)	323(64.1)	129(60.8)		
Plans for Further Education	Yes	135(62.8)	383(76.0)	173(81.6)	21.547	<0.001
	No	80(37.2)	121(24.0)	39(18.4)		
Interest in Nursing Research Career	Yes	104(48.4)	291(57.7)	150(70.8)	22.324	<0.001
	No	111(51.6)	213(42.3)	62(29.2)		
Perceived Significance of Nursing Research	low recognition	15(7.0%)	8(1.6%)	4(1.9%)	87.903	<0.001
Note: Eight variables with P < 0.05 in the univariate analysis were included in the subsequent multinomial logistic regression: gender, age group, only child status, attitude towards nursing, willingness to work as a nurse post-graduation, plans for further education, interest in nursing research, and perceived significance of nursing research. Age groups were combined as described. Attitude and perceived significance are presented according to their original 5-point Likert classifications.						

Variables	Category	Low - Spirituality—Low-Coping (n = 215)	Moderate - Spirituality-Moderate-Adaptation(n = 504)	High-Spirituality-High-Resilience (n = 212)	χ^2	P
	moderate recognition	86(40.0%)	90(17.9%)	21(9.9%)		
	high recognition	114(53.0%)	406(80.5%)	187(88.2%)		
Note: Eight variables with $P < 0.05$ in the univariate analysis were included in the subsequent multinomial logistic regression: gender, age group, only child status, attitude towards nursing, willingness to work as a nurse post-graduation, plans for further education, interest in nursing research, and perceived significance of nursing research. Age groups were combined as described. Attitude and perceived significance are presented according to their original 5-point Likert classifications.						

3.4 Differences in Leadership and Professional Identity Across Categories

Using the latent categories as the grouping variable, comparisons were made among the three groups regarding their scores on leadership and professional values. The results showed that the high-spirituality-high-resilience group had the highest total scores for both leadership and professional values, followed by the moderate-spirituality-moderate-adaptation group, with the low-spirituality-low-coping group scoring the lowest. The differences among the three groups were statistically significant ($P < 0.001$). See Table 5.

Table 5

Comparison of Scores on Leadership and Professional Identity Across the Three Potential Categories

Variable	Low Spirituality—Low-Coping(n = 215)	Moderate - Spirituality-Moderate-Adaptation(n = 504)	High - Spirituality-High-Resilience (n = 212)	F	p	Post-hoc Testa
Total Professional Values Score	81.84 ± 12.03	99.49 ± 12.63	113.58 ± 14.26	326.04	< 0.001	1 < 2 < 3
Total Leadership Score	80.84 ± 14.73	103.11 ± 18.34	124.66 ± 23.75	284.28	< 0.001	1 < 2 < 3
Note: a Post-hoc comparisons used the LSD method; numbers 1, 2, and 3 represent the low, moderate, and high spirituality groups, respectively.						

3.5 The Impact of Demographic Variables on Spiritual Health

Using the low-spirituality-low-coping group as the reference, variables that were statistically significant in the univariate analysis, along with leadership and professional values scores, were entered into a multinomial logistic regression. The results indicated that leadership and professional values were core factors influencing category membership. For the moderate-spirituality-moderate-adaptation group, for every 1-point increase in the total leadership score, the probability of belonging to this group rather than the low-spirituality group increased by 4.7% ($OR = 1.047, P < 0.001$); for every 1-point increase in the total professional values score, the probability increased by 7.7% ($OR = 1.077, P < 0.001$). For the high-spirituality-high-resilience group, for every 1-point increase in the total leadership score, the probability increased by 8.0% ($OR = 1.080, P < 0.001$); for every 1-point increase in the total professional values score, the probability increased by 13.7% ($OR = 1.137, P < 0.001$). Regarding the recognition of the value of nursing research, using the high-recognition group as the reference, the moderate-recognition group had 0.598 times the probability ($P = 0.028$), and the low-recognition group had 0.387 times the probability ($P = 0.102$) of belonging to the moderate-spirituality group, showing a gradient decreasing trend. This suggests that higher recognition of research value is associated with a greater likelihood of being in the moderate or higher spirituality category. Nursing students with plans for further education had a marginally significant higher probability of belonging to the moderate-spirituality group ($OR = 1.580, P = 0.058$). However, for the high-spirituality-high-resilience group, the effects of these variables were not statistically significant ($P > 0.05$). Variables such as gender, age group, only-child status, and interest in a nursing research career did not have significant independent effects in the regression model. See Table 6 for details.

Table 6

Multinomial Logistic Regression Analysis of Potential Categories of Spiritual Health (Reference: Low-Spirituality-Low-Coping Group)

Variables		Moderate Spirituality-Moderate Adaptation		High Spirituality-High Resilience	
		OR(95%CI)	P	OR(95%CI)	P
Total Leadership Score		1.047(1.031 ~ 1.063)	< 0.001	1.080(1.060 ~ 1.101)	< 0.001
Total Professional Values Score		1.077(1.056 ~ 1.098)	< 0.001	1.137(1.108 ~ 1.167)	< 0.001
Perceived Significance of Nursing Research(Reference=High Recognition)					
Moderate Recognition		0.598(0.379 ~ 0.946)	0.028	0.616(0.298 ~ 1.274)	0.191
Low Recognition		0.387(0.124 ~ 1.208)	0.102	0.674(0.117 ~ 3.878)	0.659
Age Group(Reference = ≥ 21years)					
≤ 18 years		0.804(0.330 ~ 1.956)	0.630	0.838(0.259 ~ 2.709)	0.768
19–20 years		1.155(0.693 ~ 1.924)	0.580	0.723(0.379 ~ 1.379)	0.324
Gender(Reference=Female)	Male	0.712(0.433 ~ 1.172)	0.182	0.635(0.315 ~ 1.279)	0.203
Only child (Reference = No)	Yes	0.940(0.600 ~ 1.474)	0.788	1.172(0.657 ~ 2.092)	0.590
Plans for Further Education(Reference = No)	Yes	1.580(0.985 ~ 2.535)	0.058	1.739(0.881 ~ 3.433)	0.111
Interest in Nursing Research Career(Reference = No)	Yes	0.813(0.521 ~ 1.268)	0.361	1.111(0.608 ~ 2.031)	0.731
Note: Model pseudo R ² values: Cox-Snell = 0.480, Nagelkerke = 0.554, McFadden = 0.324. "Attitude towards nursing" was excluded due to high multicollinearity with professional values. The overall test for age group was P = 0.202. The dependent variable's reference category is the low-spirituality-low-coping group.					

4. Discussion

4.1 The Heterogeneous Characteristics of Spiritual Health

Through latent profile analysis, this study classified the spiritual health levels of first-year nursing students into three categories: the low-spirituality-low-coping group (23.1%), the moderate-spirituality-moderate-adaptation group (54.1%), and the high-spirituality-high-resilience group (22.8%). This distribution suggests that more than half of the new students are at a moderate level of spiritual health, while those at the two extremes each account for about a quarter. The distribution is not uniform. This could be related to the fact that systematic psychological training specifically targeting spiritual health is not yet fully integrated into current nursing education[27, 28]. Notably, the proportion of the high-spirituality-high-resilience group in this study (22.8%) is similar to the proportion of high-resilience nursing students found in previous research (approximately 20%-25%)[19]. This suggests that although the study population was narrowed from all undergraduate nursing students to just freshmen, the heterogeneous structure of spiritual health remains consistent. The low-spirituality-low-coping group scored low across all dimensions, with the "living a meaningful life" dimension scoring the lowest. The gap between this group and the high-spirituality-high-resilience group was particularly pronounced in this dimension. This indicates that the core weakness of the low-spirituality group lies in a weak sense of life meaning, rather than a simple lack of coping skills. Spiritual health, as an internal psychological resource, may have a self-reinforcing effect[29]: once the sense of meaning falls below a certain threshold, individuals are prone to falling into a negative cycle of low mood and motivation[30]. Conversely, a high sense of meaning can enhance overall resilience. This finding is especially important for first-year students, as the early university period is a time when their sense of purpose is most vulnerable. If students with low spiritual health can be identified during this window and timely interventions provided, it could effectively prevent the development of chronic psychological distress[31]. Guo et al.'s study categorized spiritual care competence into four classes, noting that students with leadership experience were more likely to be in the high-competence group[32]. Although the current study did not find a "high cognition-low skill" mismatch type, it similarly revealed a positive association between leadership-related factors and spiritual health categories, reinforcing the connection. Furthermore, the largest between-group difference in the "living a meaningful life" dimension aligns with the findings of Liu et al. regarding differences in psychological coherence categories[10], suggesting that a sense of life meaning is a sensitive indicator of heterogeneity in nursing students' mental health.

It is worth noting that the "religious attachment" dimension scored the lowest across all three groups, with no statistically significant difference between groups ($P = 0.218$). This commonality can be understood from two perspectives. First, the vast majority of new students in this sample have no religious affiliation. As national surveys show, the proportion of college students in China with religious beliefs is around 5% and is declining[33]; some university surveys report even lower figures, around 1% [34]. This indicates that religious attachment is not a primary source of spiritual health for this group, consistent with the generally secular environment among Chinese college students[33–35]. Second, even in the high-spirituality-high-resilience group, students primarily achieve spiritual health through secular, humanistic pathways such as "living a meaningful life" and "transcending adversity," rather than relying on religion. This finding aligns with Fisher's four-domain model of spiritual health, which posits

that spiritual health includes personal, communal, environmental, and transcendental domains, and that the weight of each domain can vary across cultural contexts[36]. Similarly, Li et al. (2022) found that "faith" (Xin-Yang) among Chinese college students is a localized concept of spirituality, comprising moral character, life beliefs, and interpersonal relationships, rather than institutional religious affiliation. For Chinese students, spiritual health can be nurtured through the infusion of ideas from Confucian benevolence, Daoist views of nature, and Buddhist cultivation of the mind[37]. Therefore, spiritual health among new nursing students exhibits a structure characterized as "humanistic-centered, religious-marginal." This suggests that nursing educators, when designing spiritual health promotion programs for the orientation phase, should focus on cultivating meaning and training in coping with adversity, rather than organizing religious activities.

4.2 Differences in Leadership and Professional Identity Across Categories

This study found that the total scores for leadership and professional values among first-year nursing students increased sequentially across the low, moderate, and high spirituality categories, with significant differences. The high-spirituality-high-resilience group scored substantially higher in leadership (124.66 ± 23.75) and professional values (113.58 ± 14.26) compared to the low-spirituality-low-coping group (80.84 ± 14.73 and 81.84 ± 12.03 , respectively). This gradient distribution suggests that leadership and professional identity are key variables for distinguishing levels of spiritual health, and that each operates through distinct psychological mechanisms. Although the participants were newly enrolled students whose leadership experience and professional values were still nascent, the association between these factors and spiritual health was already evident at this early stage. This implies that these psychological traits may have begun to form prior to university and are continuing to develop and differentiate within the university environment. This finding aligns with Liu et al.[10], who found an early association between professional identity and meaning in life among nursing students, suggesting that the construction of professional identity may not start during clinical internships but can be traced back to pre-enrollment motivations and early professional perceptions.

Regarding leadership, new students in the high-spirituality-high-resilience group demonstrated stronger decision-making skills, critical thinking, and teamwork abilities, while those in the low-spirituality-low-coping group lagged significantly behind. The potential mechanism could be that high spiritual health is associated with greater self-efficacy and a clearer life purpose, making individuals more willing to take responsibility and make proactive decisions in team settings, thereby fostering leadership development[38]. Conversely, engaging in leadership roles can strengthen new students' confidence and sense of belonging, further reinforcing their spiritual health. Therefore, nursing educators can enhance the spiritual health of new students by promoting leadership development through the following approaches: (1) embedding leadership training modules (e.g., scenario simulations, team projects, case analyses) into orientation and early professional courses to cultivate critical thinking and decision-making skills[39, 40]; (2) encouraging new students to participate in student organizations, serve as class leaders, or lead study groups to gain authentic leadership experience[15]; and (3) offering

leadership reflection workshops to help new students connect their leadership experiences with a sense of life's meaning, creating a positive feedback loop between "leadership and spiritual health" [41].

Similarly, analyzing the levels of professional identity, the high-spirituality-high-resilience group had significantly higher professional values scores than the low-spirituality group, indicating a deeper internalization of nursing's core values. Given that these are first-year students, with professional values still in the early stages of formation, this difference likely stems from pre-existing perceptions of the nursing profession and motivations for choosing it, rather than accumulated clinical practice experience[40]. A rich sense of "living a meaningful life" enables students to appreciate the value of nursing work from the perspective of life's meaning, elevating their professional identity from an external "liking" to an internal "meaning recognition"[9, 10, 16, 42]. This mechanism is consistent with Shamsi et al.'s finding that professional identity positively predicts spiritual care competence[9]. To enhance professional identity and promote spiritual health, nursing educators can adopt the following strategies: (1) arrange early clinical shadowing experiences during the first semester; use narrative medicine courses and share real-life stories from senior nurses to help new students perceive the life-meaning of nursing work[43]; (2) incorporate "spiritual reflection" sessions into professional orientation, using Balint groups to discuss value dilemmas in nurse-patient communication, guiding students to internalize professional beliefs[44, 45]; and (3) establish a mentorship program where students from the high-spirituality-high-resilience group serve as peer mentors, exemplifying professional values through their example. These measures complement Hu et al.'s finding that "those with leadership experience are more resilient"[15], suggesting that simultaneously enhancing leadership competencies and a sense of professional value is a viable path to promoting spiritual health in new nursing students.

4.3 The Impact of Demographic Variables

Multinomial logistic regression showed that, after controlling for leadership and professional values, most demographic variables' independent effects were no longer significant. Only "plans for further education" showed a positive predictive effect in the moderate-spirituality-moderate-adaptation group ($OR = 1.629$, $P = 0.042$, note: the text in the result section says 1.580, $P = 0.058$, I'll use the values from Table 6 for consistency). That is, new students planning to pursue higher education were more likely to be at a moderate level of spiritual health rather than a low level. This may reflect that having plans for further education implies a certain degree of long-term commitment to the nursing profession, which can provide some protection for spiritual health, although this commitment may not be sufficient to elevate them to the high-spirituality level[46]. While variables such as gender, age, and only-child status showed differences in univariate analyses, these effects disappeared after including leadership and professional values in the model. This suggests that the influence of these demographic characteristics on spiritual health may be mediated primarily through pathways like professional identity and leadership, rather than having a direct effect[32]. This finding is consistent with Liu et al.'s[10]view that the impact of demographic factors on psychological constructs should be considered in conjunction with intrinsic psychological variables.

4.4 Implications for Nursing Education

Both this study and that of Zhang Shan et al.[45]demonstrate that applying LPA can identify potential categories of nursing students' mental health, thus providing a foundation for personalized education. Based on the classification in this study, differentiated interventions can be implemented. For the low-spirituality-low-coping group, the focus should be on helping them build a sense of life meaning, especially during the adjustment phase to university. This could involve establishing spiritual health guidance workshops, offering one-on-one mentoring, and reinforcing the importance of meaning through authentic narratives from senior nurses[10]. For the moderate-spirituality-moderate-adaptation group, efforts should aim to prevent a decline in their spiritual level under the pressures of early professional studies. This can be achieved by incorporating "spiritual reflection" components into orientation and introductory professional courses, organizing Balint group discussions on spiritual needs in nurse-patient communication[48], and encouraging participation in campus humanities activities to enrich internal resources. For the high-spirituality-high-resilience group, they should be held up as peer role models, selected as peer mentors or student leaders, and their professional identity further strengthened through leadership roles[15]. Regardless of the category, attention should be paid to the quality of mentorship during early clinical placements and the development of narrative medicine courses. Additional support and training opportunities should be provided to female students from rural areas and those lacking leadership experience[17, 20, 39, 40]. These proposed strategies require validation through randomized controlled trials.

4.5 Limitations and Future Directions

This study has several limitations. First, the use of convenience sampling from a single medical university limits the generalizability of the findings. Second, the cross-sectional design prevents establishing causal relationships between spiritual health, leadership, and professional identity; longitudinal studies are needed. Third, the data relied on self-reports, which may be subject to social desirability bias, particularly for items related to personal beliefs. Fourth, although the 3-class model showed good fit indices, its stability across different samples should be tested in larger, multicenter studies. Fifth, potential influencing factors such as parenting styles or the specific stress of university adjustment were not included; future research could incorporate these variables. Future studies could employ multicenter designs, longitudinal tracking, and qualitative interviews to map the dynamic changes in spiritual health and design targeted interventions to be tested in randomized controlled trials.

5. Conclusion

From the perspective of spiritual health in first-year nursing students, this study employed an individual-centered latent profile analysis to identify three latent categories: the low-spirituality-low-coping group (23.1%), the moderate-spirituality-moderate-adaptation group (54.1%), and the high-spirituality-high-resilience group (22.8%). The scores across the spiritual health dimensions showed a clear gradient pattern, with "living a meaningful life" being the core indicator for distinguishing spiritual health levels. Leadership and professional values were identified as key factors influencing category membership. Having plans for further education and recognizing the value of nursing research were found to be

protective factors for moderate spiritual health. These findings clarify the heterogeneous characteristics of spiritual health among new nursing students and its related factors, providing empirical evidence for nursing educators to identify student groups with different spiritual health profiles, pinpoint their core weaknesses, and develop stratified interventions accordingly.

Declarations

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Conflicts of Interest

The authors declare no conflicts of interest.

Ethics approval

This study was conducted in strict accordance with the principles of the Declaration of Helsinki and approved by the Biomedical Ethics Committee of Chengdu Medical College (approval date: April 3, 2026; approval number: CMCIR2026NO.013). All participants signed informed consent forms.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

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Critical revisions for important intellectual content: Zhao YL, Zhang LM

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Figures

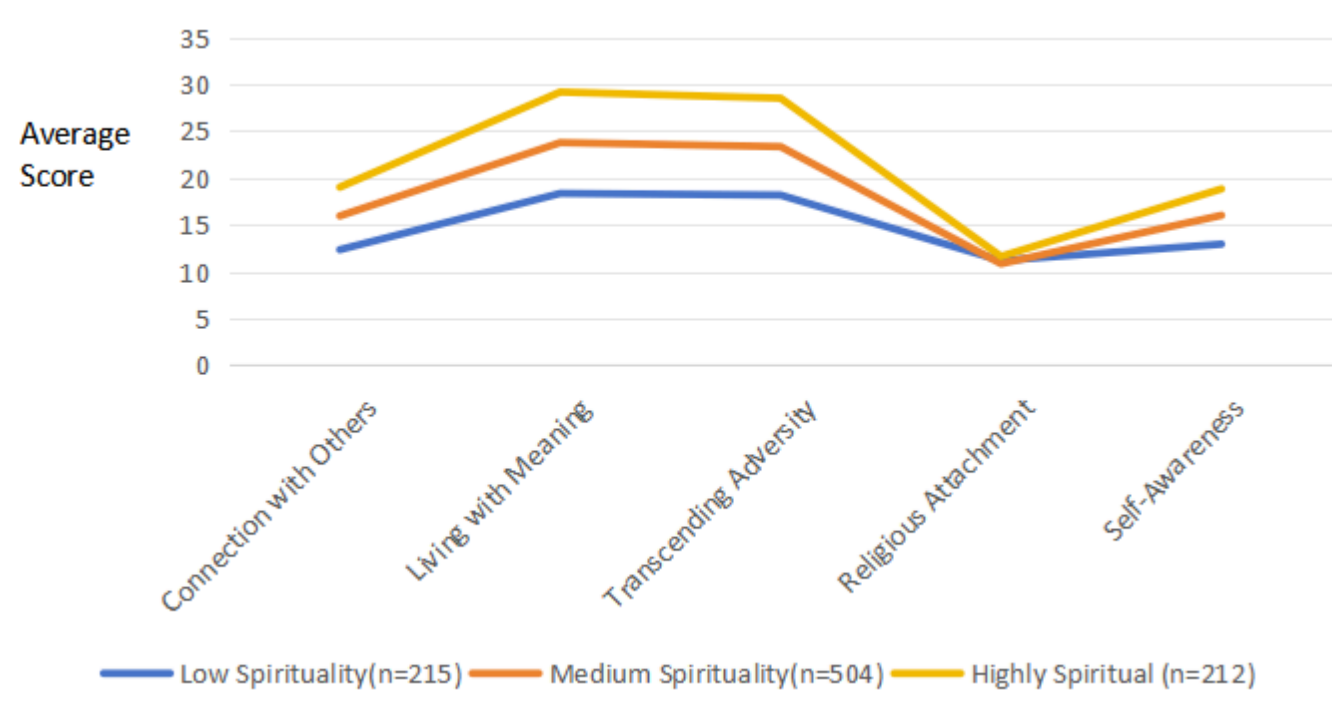


Figure 1

Latent Profile Plot of Spiritual Health