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Joint Latent Profiles of Career Exploration and Job Search Behavior Among Nursing Interns and Their Associations With Career Adaptability: A Multicenter Cross-Sectional Study

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Abstract

Background

Nursing interns must explore career options while preparing to enter the workforce. Whether career exploration and job-search behavior form distinct combinations, and how these combinations relate to career adaptability, remains unclear. This study identified joint latent profiles of these activities and examined their associations with career adaptability and related characteristics.

Methods

A multicenter cross-sectional survey was conducted among 632 nursing interns recruited by convenience sampling from four hospitals in Wuhan and Chengdu, China, between November 2025 and April 2026. Four dimensions of the Career Exploration Survey and two dimensions of job-search behavior were included in latent profile analysis. The Bolck–Croon–Hagenaars (BCH) method compared career adaptability scores across profiles, and three-step multinomial logistic regression (R3STEP) examined factors associated with profile membership.

Results

Four profiles were identified: low exploration–low job search (26.7%), high exploration–high job search (23.4%), high exploration–low job search (25.2%), and low exploration–high job search (24.7%). The two discrepant profiles accounted for 49.8% (315/632) of participants. Career adaptability differed across profiles (Wald $\chi^2(3) = 145.294$, $P < 0.001$); BCH-adjusted means were 3.014, 3.614, 3.491, and 3.364, respectively. All pairwise differences were significant after Bonferroni correction except between the two high-exploration profiles. Compared with the low–low profile, receiving career guidance was associated with higher odds of membership in the high–high profile (adjusted odds ratio [aOR] = 2.00, 95% confidence interval [CI]: 1.19–3.36) and the high-exploration–low-job-search profile (aOR = 1.74, 95% CI: 1.06–2.86).

Conclusions

Career exploration and job-search behavior formed distinct joint profiles among nursing interns. Career adaptability differed across these profiles, indicating that job-search activity alone may not adequately reflect students' career adaptability resources. Assessing both activities may help nursing educators identify differing career-development support needs.

Background

The transition from nursing education to professional practice represents a critical stage in nursing students' career development. During this period, students must not only meet the requirements of their clinical training but also make decisions about their future careers [1, 2]. Clinical placements provide opportunities for students to develop professional competencies and gain firsthand exposure to

different nursing specialties, work environments, and potential career pathways. Previous studies have demonstrated that clinical placement experiences are closely associated with nursing students' career preferences and career planning [3, 4]. As graduation approaches, decisions regarding potential employers, specialty choices, and job applications become increasingly important aspects of career decision-making [5]. Nursing interns therefore need to explore their career interests and potential development opportunities while preparing for and engaging in job search activities as they enter the nursing workforce. Although these activities are interconnected, they represent distinct aspects of career development. Understanding how nursing interns engage in career exploration and job search activities concurrently may provide insight into their career development during the transition from education to employment [6].

Career exploration and job search behavior are closely related but conceptually distinct career development activities. Career exploration involves developing an understanding of one's interests, abilities, and career goals, as well as gathering and evaluating information about occupational environments and career opportunities [7]. Job search behavior, by contrast, is more directly concerned with securing employment. It encompasses preparatory activities, such as identifying potential employers and preparing application materials, as well as active job search activities, including submitting applications and participating in recruitment processes [8]. Although both activities may involve gathering career-related information, they differ in their primary objectives and behavioral focus [9]. Previous studies have generally examined career development by focusing on overall levels of individual constructs or associations between variables. Person-centered approaches offer a complementary perspective by examining how multiple career-related characteristics coexist within individuals [10]. Among nursing interns, career exploration and job search activities may be simultaneously high or low, but they may also follow different patterns. It is therefore important to determine whether individual differences in these activities primarily reflect variations in overall activity levels or whether distinct combinations exist in which career exploration and job search behavior differ in their relative emphasis.

Career Construction Theory and its career adaptation model provide a theoretical framework for understanding the potential significance of these different combinations. This framework distinguishes between career adaptability resources and adapting responses [11], providing a conceptual basis for examining both individuals' psychosocial resources and their actual career development activities. Career adaptability refers to the psychosocial resources that individuals draw upon to manage career development tasks, occupational transitions, and career-related challenges. It comprises four dimensions: career concern, career control, career curiosity, and career confidence [12]. In contrast, career exploration and job search behavior can be understood as adapting activities through which individuals explore career possibilities and pursue their career goals [13]. Importantly, active engagement in career development activities does not necessarily indicate that individuals possess corresponding levels of career adaptability resources. Previous empirical research has demonstrated that career adaptability and adapting activities are associated but remain conceptually and empirically distinct [14]. Accordingly, identifying different combinations of career exploration and job search

behavior can reveal heterogeneity in students' career development activities. Examining how these combinations are associated with career adaptability may further clarify the psychosocial resources accompanying different patterns of career-related activity. However, these cross-sectional associations should not be interpreted as evidence that particular patterns of career activity cause changes in career adaptability.

Although previous studies have provided valuable insights into these relationships, several questions remain unanswered. Zhu et al. [15] examined the relationship between career exploration and job search clarity among nursing students, demonstrating an association between career exploration and students' understanding of their employment goals. However, job search clarity primarily reflects the cognitive clarity of employment goals and does not necessarily translate into actual job search preparation or active job search behavior. More directly relevant to the present study, Yang et al. [16] conducted a latent profile analysis of career exploration among 368 nursing interns and identified three profiles characterized by different levels of career exploration. They also found an association between career adaptability and profile membership. Their findings demonstrated heterogeneity in career exploration among nursing interns and its relationship with career adaptability resources. However, their profiles were derived exclusively from career exploration indicators, without incorporating job search activities into the classification [17–19]. Outside the field of nursing education, Stremersch et al. [10] demonstrated the value of person-centered approaches for understanding differences among job seekers by jointly examining individual, contextual, and job search characteristics. Nevertheless, it remains unclear whether nursing interns with similar levels of career exploration exhibit different patterns of job search behavior and whether these patterns are associated with differences in career adaptability.

Against this background, the present study employed a multicenter cross-sectional design to investigate the joint profiles of career exploration and job search behavior among nursing interns and their associations with career adaptability. Specifically, the study aimed to: (1) identify joint latent profiles based on multiple dimensions of career exploration and job search behavior; (2) compare career adaptability across the identified profiles; and (3) examine the associations of prespecified personal characteristics, clinical placement characteristics, and career guidance experiences with latent profile membership. By examining both the combined patterns of career development activities and their associations with career adaptability resources, this study seeks to provide a more comprehensive understanding of individual differences in nursing interns' career development. The findings may also offer empirical evidence to help nursing educators and clinical teaching institutions assess students' career exploration and job search activities and identify areas requiring attention in career preparation and employment guidance.

Methods

Study Design and Participants

This multicenter cross-sectional study was conducted between November 2025 and April 2026 in four hospitals responsible for clinical nursing education in Wuhan and Chengdu, China. Full-time nursing interns were recruited using convenience sampling. Eligible participants were required to be undertaking clinical internships, able to understand and complete the questionnaire independently, and willing to participate after providing informed consent. Students who had suspended or discontinued their internships during the survey period, did not meet the eligibility criteria, or withdrew from the study were excluded. The four participating hospitals were anonymized and designated as Hospitals A–D.

Data Collection and Quality Control

Before the formal survey, a pilot test was conducted among 30 eligible nursing interns to assess item clarity, the questionnaire completion process, and the time required for completion. Data from the pilot test were excluded from the final analysis. Paper questionnaires were distributed to nursing interns at the four hospitals. After providing written informed consent, participants completed the questionnaires independently and anonymously. Questionnaires were checked for completeness and consistency. Invalid questionnaires were excluded according to predefined criteria. The final dataset contained no missing values.

Sample Size Estimation

There is no single formula for determining the sample size required for latent profile analysis (LPA), as the sample size depends on the number of indicators, the expected number of profiles, the degree of profile separation, the proportion of the smallest profile, and model complexity. When profile separation is moderate to large and class proportions are relatively balanced, a sample of approximately 500 participants is generally sufficient to identify two to four profiles with reasonable accuracy [20]. Some methodological recommendations also suggest 300 participants as a minimum reference point to reduce difficulties associated with identifying small profiles [21].

The present study included six continuous indicators and anticipated identifying three to five profiles, representing a model of moderate complexity. Based on the available simulation evidence, the target analyzable sample size was set at 500 participants to guide profile enumeration and parameter estimation. Assuming an invalid questionnaire rate of approximately 10%, we planned to collect approximately 560 responses.

Instruments

General Information Questionnaire

A researcher-developed questionnaire was used to collect demographic and background information, including age, sex, internship hospital, time remaining until expected graduation, experience of receiving

career guidance, attendance at recruitment information sessions, and previous job application experience.

Age was treated as a continuous variable. Sex was coded as 0 for male and 1 for female. Time remaining until expected graduation was coded as 0 for more than 6 months and 1 for 6 months or less. Having received career guidance, attended a recruitment information session, and previously submitted a résumé or job application were each coded as 1, with 0 indicating no such experience. Internship hospitals were anonymized and coded as A–D.

Career Exploration Survey

Career exploration was assessed using the Chinese version of the Career Exploration Survey (CES), originally developed by Stumpf, Colarelli, and Hartman in 1983 [7] and revised by Xu Cun in 2008 [22]. The scale assessed participants' career exploration activities over the preceding three months. It comprises 18 items across four dimensions: environmental exploration (ENV, 5 items), self-exploration (SELF, 5 items), goal-directed/systematic exploration (PLAN, 4 items), and amount of information (INFO, 4 items).

Environmental exploration assesses the acquisition of information about occupations and work environments, whereas self-exploration concerns individuals' understanding of their career interests and abilities. Goal-directed/systematic exploration reflects exploration activities undertaken in relation to career goals, while amount of information represents the relevant information acquired during the career exploration process.

Each item is rated on a five-point scale ranging from 1 to 5. Scores for each dimension are calculated as the mean of its constituent items, with higher scores indicating greater levels of the corresponding type of career exploration. The four dimension scores were used as continuous indicators in the joint LPA. Cronbach's α coefficients for the four dimensions in this study were 0.894, 0.837, 0.784, and 0.780, respectively.

Job Search Behavior Scale

Job search behavior was measured using the Chinese version of the Job Search Behavior Scale, originally developed by Blau in 1994 [8] and revised by Zhou Ru in 2015 [23]. The scale consists of 12 items covering two dimensions: preparatory-phase job search behavior (PREP) and active-phase job search behavior (ACT), with six items in each dimension.

PREP reflects job search information gathering and related preparatory activities, whereas ACT reflects activities undertaken during the actual job search phase. Items are rated on a five-point frequency scale: 1 = 0 times, 2 = 1–2 times, 3 = 3–5 times, 4 = 6–9 times, and 5 = 10 times or more.

Each dimension score is calculated as the mean of its six items. Higher scores indicate a greater frequency of job search behavior during the corresponding phase. Both dimension scores were used as

continuous indicators in the joint LPA. Cronbach's α coefficients were 0.887 for PREP and 0.919 for ACT.

Career Adapt-Abilities Scale

Career adaptability was assessed using the Chinese version of the Career Adapt-Abilities Scale (CAAS-China), developed and validated by Hou, Leung, Li, Li, and Xu in 2012 [12]. The scale comprises 24 items across four dimensions, each containing six items: career concern, career control, career curiosity, and career confidence. These dimensions reflect concern about future career development, the ability to take responsibility for career decisions, the exploration of career opportunities, and confidence in managing career-related tasks, respectively.

Items are rated on a five-point scale ranging from 1 to 5. The total score is calculated as the mean of all 24 items, while each dimension score is calculated as the mean of its six corresponding items. Higher scores indicate greater career adaptability resources.

Career adaptability was not included in the formation of latent profiles. Instead, it served as the primary external variable for examining differences across profiles. Cronbach's α coefficient for the overall scale was 0.895, while the coefficients for career concern, career control, career curiosity, and career confidence were 0.754, 0.770, 0.753, and 0.730, respectively.

Statistical Analysis

Descriptive Statistics and Indicator Assessment

Data were managed and analyzed using Python. Descriptive statistics, Cronbach's α coefficients, and Pearson correlation coefficients were calculated. Categorical variables were summarized as frequencies and percentages, while continuous variables were described using means and standard deviations.

Cross-dimensional item correlations and variance inflation factors (VIFs) were examined to assess linear associations and potential information redundancy among the indicators. These assessments were not considered substitutes for testing within-class conditional independence.

Joint Latent Profile Analysis

LPA was conducted using Mplus version 8.3, with the analysis specified as a mixture model and the robust maximum likelihood estimator (MLR) applied. Six continuous indicators were included: environmental exploration, self-exploration, goal-directed/systematic exploration, amount of information, preparatory-phase job search behavior, and active-phase job search behavior. Item scores were first averaged within each dimension and then standardized as Z-scores.

In the baseline model, the means of the indicators were allowed to vary across profiles [24], while residual variances were constrained to be equal across profiles. Residual covariances between different

indicators within profiles were fixed at zero. Models containing one to five profiles were fitted sequentially.

Model selection was based on a comprehensive assessment of the Akaike information criterion (AIC), Bayesian information criterion (BIC), sample-size-adjusted BIC (aBIC), entropy, the adjusted Lo–Mendell–Rubin likelihood ratio test (aLMR), profile sizes, average posterior probabilities of profile membership, replication of the maximum log-likelihood, and substantive interpretability.

The final model was re-estimated with an increased number of random starting values to verify the stability of the solution (STARTS = 3000 750, STITERATIONS = 20, STSEED = 48291). Profile sizes and proportions were calculated according to participants' most likely profile assignments based on posterior probabilities. Profile plots displayed model-estimated standardized means. The terms "high" and "low" in profile labels were defined relative to the sample mean.

Reference Analysis Based on the Four Career Exploration Indicators

To examine the additional descriptive information provided by joint classification compared with classification based on career exploration alone, a separate reference LPA was conducted using the four career exploration dimensions (ENV, SELF, PLAN, and INFO) from the same 632 participants. Dimension scores were calculated as the means of their respective items. The same sample-based Z-score standardization, MLR estimation, equal residual variance constraints across profiles, and zero within-profile residual covariance assumptions were applied. PREP and ACT were excluded from the reference model.

Models containing two to five profiles were fitted using STARTS = 3000 750, STITERATIONS = 20, and STSEED = 48291. The one-profile model did not require random starting values. The reference solution was selected by jointly considering BIC, aBIC, aLMR, profile sizes, posterior membership probabilities, and profile interpretability.

To assess uncertainty in profile enumeration, the two- and three-profile solutions were re-examined using an increased number of random starting values (STARTS = 6000 1500) and an alternative random seed (92741). The two-profile solution was retained as a comparator.

Using participant identification numbers, the most likely profile assignments from the reference model were matched with those from the original four-profile joint model based on six indicators. Cross-tabulation frequencies and row and column percentages were reported. PREP and ACT were used only to describe the behavioral characteristics of the cross-tabulation cells.

The cross-tabulation was based on most likely profile assignments without adjustment for classification error and was intended solely as a within-sample descriptive analysis. Differences in AIC, BIC, or entropy between models using different sets of indicators were not used to determine the superiority of the joint model. Nor were these comparisons used to infer causal effects, predictive gains, or the effectiveness of educational interventions.

Comparison of Career Adaptability Across Latent Profiles

The Bolck–Croon–Hagenaars (BCH) method was used to account for classification error when comparing total career adaptability scores across profiles. Adjusted means, standard errors, and overall and pairwise Wald tests were reported [25].

For the six pairwise comparisons among the four profiles, a Bonferroni-adjusted significance threshold of 0.00833 was applied. Original P values were also reported. The four career adaptability subdimensions were examined descriptively only.

Factors Associated With Latent Profile Membership

A three-step multinomial logistic regression using the Mplus R3STEP procedure was conducted to account for classification error, with profile C1 specified as the reference category. Sex, time remaining until expected graduation, experience of receiving career guidance, and age were included as prespecified covariates. Covariates were not selected on the basis of univariate statistical significance[26].

Adjusted odds ratios (aORs), 95% confidence intervals (CIs), and P values were reported. Confidence intervals were calculated as $\exp(\beta \pm 1.96 \times SE)$ and should be regarded as approximate because of the limited precision of the original coefficient estimates.

A supplementary model additionally included attendance at recruitment information sessions and previous job application experience. Because these variables may overlap conceptually with the job search behavior indicators, this model was treated as a sensitivity analysis only. Hospital fixed effects were also included in a separate model to assess differences between study centers [27].

A two-sided P value of less than 0.05 was considered statistically significant. No adjustment for multiple testing was applied to the regression analyses. Hospital fixed effects were not considered sufficient to fully account for within-hospital clustering.

Sensitivity Analyses

Sensitivity analyses were conducted by separately relaxing the within-profile residual covariance constraints and the equality constraints on residual variances across profiles. Model fit and profile sizes were compared across the alternative specifications. The adjusted Rand index (ARI) and the proportion of consistent most likely profile assignments were used to assess classification agreement between the baseline and covariance models [28].

Hospital distribution analyses, detailed model specifications, and classification comparisons are presented in Supplementary Tables S1–S5 and Supplementary Figure S1.

Ethical Considerations

Before the formal survey commenced, ethical approval was obtained from the Ethics Committee of the Sichuan Applied Psychology Research Center (approval number: CSXL-25218). All participants provided written informed consent before completing the paper questionnaire. The study adhered to the principles of voluntary participation, anonymous data collection, and confidentiality. All collected information was used solely for research purposes.

Results

General Characteristics of the Participants

Of 672 paper questionnaires returned, 40 were excluded after quality screening, leaving 632 valid questionnaires (94.0%). The mean age of the participants was 21.62 years (SD = 0.87), 84.0% were female, and 54.3% had received career guidance. Further participant characteristics are presented in Table 1

Table 1
General characteristics of nursing interns (N = 632)

Characteristic	Category	n (%) or Mean ± SD
Age (years)	—	21.619 ± 0.866
Sex	Male	101 (16.0)
Sex	Female	531 (84.0)
Time until expected graduation	> 6 months	361 (57.1)
Time until expected graduation	≤ 6 months	271 (42.9)
Career guidance	No / Yes	289 (45.7) / 343 (54.3)
Recruitment information sessions	No / Yes	304 (48.1) / 328 (51.9)
Job application experience	No / Yes	310 (49.1) / 322 (50.9)
Internship hospital	A	186 (29.4)
Internship hospital	B	162 (25.6)
Internship hospital	C	161 (25.5)
Internship hospital	D	123 (19.5)

Descriptive Statistics and Correlations of Study Variables

The mean scores of the six profile indicators ranged from 2.976 to 3.386, while the overall mean career adaptability score was 3.362 ± 0.482 (Table 2). All six profile indicators were positively correlated with one another ($r = 0.162–0.688$, all $P < 0.001$). The variance inflation factors (VIFs) ranged from 1.433 to 2.334. Across the 373 pairs of cross-dimensional items, the largest correlation coefficient was 0.462.

Table 2
Descriptive statistics and internal consistency of study variables

Variable	No. of items	Mean ± SD
Environmental exploration (ENV)	5	3.000 ± 0.861
Self-exploration (SELF)	5	3.177 ± 0.717
Goal-directed/systematic exploration (PLAN)	4	2.976 ± 0.700
Amount of information (INFO)	4	3.091 ± 0.688
Preparatory-phase job search behavior (PREP)	6	3.386 ± 0.783
Active-phase job search behavior (ACT)	6	3.273 ± 0.891
Career adaptability	24	3.362 ± 0.482
Career concern	6	3.378 ± 0.590
Career control	6	3.428 ± 0.602
Career curiosity	6	3.300 ± 0.594
Career confidence	6	3.340 ± 0.598

Identification of Joint Latent Profiles of Career Exploration and Job Search Behavior

Comparison of the baseline models supported a four-profile solution (Table 3). The four-profile model had the lowest BIC and aBIC values, an entropy of 0.860, and a significant aLMR test ($P < 0.001$). Although the five-profile model showed a lower AIC, its BIC and aBIC values increased, entropy decreased to 0.818, and the aLMR test was not statistically significant ($P = 0.0544$). The average posterior probability of membership in the additional profile was approximately 0.710. Considering profile size and interpretability, the four-profile solution was selected. The maximum log-likelihood was replicated after increasing the number of random starting values

Table 3
Fit indices for the baseline latent profile models

No. of profiles	Log-likelihood	No. of parameters	AIC	BIC	aBIC	Entropy	aLMRP
1	-5377.613	12	10779.225	10832.612	10794.513	—	—
2	-4768.016	19	9574.032	9658.561	9598.238	0.912	< 0.001
3	-4661.46	26	9374.921	9490.592	9408.045	0.869	< 0.001
4	-4575.635	33	9217.27	9364.083	9259.312	0.86	< 0.001
5	-4565.482	40	9210.963	9388.919	9261.923	0.818	0.0544

The four profiles were characterized as follows: C1, low career exploration–low job search behavior (169 participants, 26.7%); C2, high career exploration–high job search behavior (148 participants, 23.4%); C3, high career exploration–low job search behavior (159 participants, 25.2%); and C4, low career exploration–high job search behavior (156 participants, 24.7%) (Fig. 1; Table S2). Profiles C3 and C4 together accounted for 49.8% of the sample. The average posterior probabilities of profile membership for C1–C4 were 0.956, 0.904, 0.912, and 0.922, respectively.

The horizontal axis represents environmental exploration, self-exploration, goal-directed/systematic exploration, amount of information, preparatory-phase job search behavior, and active-phase job search behavior, in that order. The vertical axis represents model-estimated standardized Z-scores, with the dashed horizontal line at 0 indicating the overall sample mean. Profile sizes and proportions were calculated based on most likely profile assignments. The connecting lines are intended to facilitate visualization of the joint configurations and do not represent changes over time.

Correspondence Between Career-Exploration-Only Profiles and Joint Profiles

All reference models based on the four career exploration indicators, with one to five profiles, terminated normally. The maximum log-likelihood was replicated for all models with two to five profiles. The three-profile model had the lowest BIC (6124.863) and aBIC (6067.715) among the reference models considered. It identified three profiles primarily reflecting different levels of career exploration: relatively low exploration (E1, 270 participants, 42.7%), intermediate exploration (E2, 91 participants, 14.4%), and relatively high exploration (E3, 271 participants, 42.9%).

However, the aLMR test comparing the three-profile and two-profile solutions was not statistically significant (P = 0.0540). Entropy was 0.770, and the average posterior probability for the intermediate profile was 0.716, indicating uncertainty in profile enumeration between the two- and three-profile solutions. Therefore, the three-profile solution was retained as the primary descriptive reference, while

the two-profile solution was also reported for comparison. The four- and five-profile solutions each included a profile containing only six participants (0.95%), and both had higher BIC and aBIC values than the three-profile solution. After changing the random seed and doubling the number of random starting values, the maximum log-likelihoods and individual-level profile assignments for the two- and three-profile solutions remained unchanged (Tables S6, S7, and S9).

The high-exploration reference profile E3 comprised 140 participants from joint profile C2 and 131 from C3, accounting for 51.7% and 48.3% of E3, respectively. The low-exploration reference profile E1 comprised 159 participants from C1 and 111 from C4, accounting for 58.9% and 41.1% of E1, respectively. Viewed from the joint profiles, 82.4% (131/159) of C3 participants were assigned to E3, while 71.2% (111/156) of C4 participants were assigned to E1; the remaining participants were assigned to the intermediate profile E2.

In the two-profile comparison, the high-exploration profile also included 148 participants from C2 and 156 from C3, whereas the low-exploration profile included 168 participants from C1 and 140 from C4 (Tables S8 and S9). The PREP and ACT characteristics of the cross-classification cells are described in Table S10.

These findings indicate that classification based on career exploration alone primarily captures differences in exploration levels, whereas the joint classification further identifies distinct combinations of job search behavior within similar levels of career exploration. However, these findings do not establish that the joint model has greater external predictive validity.

Comparison of Career Adaptability Across Latent Profiles

The BCH analysis revealed statistically significant differences in overall career adaptability across the four profiles (Wald $\chi^2(3) = 145.294$, $P < 0.001$). The BCH-adjusted mean scores for C1–C4 were 3.014, 3.614, 3.491, and 3.364, respectively (Fig. 2; Table 4).

Using the Bonferroni-adjusted significance threshold of 0.00833 for the six pairwise comparisons, all differences were statistically significant except for the comparison between C2 and C3 (original $P = 0.032$). Career adaptability was higher in C2, C3, and C4 than in C1, while C2 and C3 also had higher scores than C4.

BCH-adjusted mean career adaptability scores across the four joint latent profiles

Error bars represent approximate 95% confidence intervals calculated as the mean ± 1.96 × SE, without adjustment for multiple comparisons. Differences between profiles should be interpreted based on the BCH tests and Bonferroni-adjusted results presented in Table 4.

Table 4
BCH analysis of career adaptability across latent profiles

Profile	n	Adjusted mean	SE
C1	169	3.014	0.039
C2	148	3.614	0.051
C3	159	3.491	0.019
C4	156	3.364	0.034
Pairwise comparison	**χ^2**	**Original P**	**Significant at Bonferroni threshold**
C1 vs. C2	87.781	< 0.001	Yes
C1 vs. C3	117.676	< 0.001	Yes
C1 vs. C4	41.806	< 0.001	Yes
C2 vs. C3	4.576	0.032	No
C2 vs. C4	15.835	< 0.001	Yes
C3 vs. C4	10.151	0.001	Yes

Factors Associated With Latent Profile Membership

The results of the R3STEP multinomial logistic regression, with C1 as the reference category, are presented in Table 5. After adjustment for the other covariates, having received career guidance was positively associated with membership in C2 relative to C1 (aOR = 2.00, 95% CI: 1.19–3.36, P = 0.008) and with membership in C3 relative to C1 (aOR = 1.74, 95% CI: 1.06–2.86, P = 0.029). No statistically significant association was found between career guidance and membership in C4 (P = 0.633).

Compared with male participants, female participants had lower adjusted odds of membership in C2 (aOR = 0.34, 95% CI: 0.17–0.68, P = 0.002). Sex was not significantly associated with membership in C3 or C4. Neither time remaining until expected graduation nor age was significantly associated with membership in any of the three target profiles relative to C1 (all P > 0.05).

In the supplementary model, career guidance remained positively associated with membership in C2 and C3. However, the association between sex and C2 membership was no longer statistically significant, whereas the association between time remaining until graduation and C2 membership reached statistical significance (P = 0.040), suggesting that some findings were sensitive to covariate specification (Table 5).

Table 5
R3STEP multinomial logistic regression analysis of factors associated with latent profile membership

Target profile	Covariate	aOR (95% CI)	P
C2	Female vs. male	0.34 (0.17–0.68)	0.002
C2	≤ 6 months vs. >6 months until graduation	1.50 (0.92–2.46)	0.105
C2	Received vs. did not receive career guidance	2.00 (1.19–3.36)	0.008
C2	Age, per 1-year increase	1.08 (0.83–1.42)	0.566
C3	Female vs. male	0.85 (0.39–1.87)	0.682
C3	≤ 6 months vs. >6 months until graduation	1.28 (0.79–2.08)	0.32
C3	Received vs. did not receive career guidance	1.74 (1.06–2.86)	0.029
C3	Age, per 1-year increase	0.98 (0.75–1.27)	0.86
C4	Female vs. male	0.51 (0.25–1.02)	0.058
C4	≤ 6 months vs. >6 months until graduation	1.23 (0.74–2.06)	0.423
C4	Received vs. did not receive career guidance	1.13 (0.68–1.90)	0.633
C4	Age, per 1-year increase	0.83 (0.62–1.11)	0.219

Sensitivity and Supplementary Analyses

After allowing seven within-profile residual covariances, the four-profile model had the lowest AIC, BIC, and aBIC among the candidate models fitted under the same specification, with an entropy of 0.853. The five-profile model produced a profile containing only one participant and estimation warnings (Table S3). The adjusted Rand index (ARI) between the baseline and four-profile covariance models was 0.9793, with a classification agreement rate of 99.21% (Fig. S1). Comparison of models with unequal residual variances also supported the four-profile solution (Table S4).

Differences in profile distribution across hospitals were not statistically significant ($\chi^2(9) = 5.162$, P = 0.820; Table S1). After hospital fixed effects were included, career guidance remained positively associated with membership in C2 and C3, with aORs of 1.84 (95% CI: 1.08–3.14) and 1.66 (95% CI: 1.02–2.71), respectively (Table S5).

Discussion

This study identified four joint latent profiles of career exploration and job search behavior among nursing interns. Two profiles were characterized by consistently high or low levels of both activities, whereas the other two showed discrepant patterns between career exploration and job search behavior. Career adaptability differed across the four profiles, and students who had received career guidance

were more likely to belong to the high-exploration profiles. Notably, nearly half of the participants showed a mismatch between their levels of career exploration and job search activity, suggesting that assessing students' career transition preparedness solely on the basis of job search behavior may provide an incomplete picture.

Types and Distribution of Joint Profiles

The four joint profiles reflected differences in nursing interns' career development activities in terms of both overall activity levels and the relative emphasis placed on different activities. C1 and C2 represented patterns in which career exploration and job search behavior were both relatively low or high, respectively. In contrast, C3 and C4 showed discrepant patterns: C3 was characterized by relatively high career exploration but low job search behavior, whereas C4 showed the opposite pattern. Together, these two profiles comprised 315 participants, accounting for 49.8% of the sample and representing a substantial proportion of the four groups.

Previous studies have identified individual differences in career exploration among nursing interns. Yang et al. [16] used latent profile analysis to identify three career exploration profiles and found that career adaptability was associated with profile membership. Zhu et al. [15] also reported an association between career exploration and job search clarity among nursing students. However, neither career exploration profiles nor the cognitive clarity of employment goals fully captures students' actual job search preparation and activities. By incorporating both career exploration and job search behavior, the present study provides a more comprehensive picture of how these two types of career development activities co-occur at the individual level.

The reasons underlying the emergence of C3 and C4 remain unclear. Students in C3 may still be comparing career opportunities and may not yet have entered an intensive job search phase. In contrast, students in C4 may be focusing more on immediate recruitment demands while engaging less in the career exploration activities captured by the scale. These interpretations require further investigation. The four profiles represent different combinations of career development activities within a particular sample and should not be regarded as fixed career development stages or as categories of students with inherently better or poorer career prospects.

Associations Between Joint Profiles and Career Adaptability

Career adaptability differed significantly across the four joint profiles. The BCH-adjusted mean scores for C1 through C4 were 3.014, 3.614, 3.491, and 3.364, respectively. After Bonferroni correction, all pairwise comparisons were statistically significant except for the comparison between C2 and C3. These findings indicate that different patterns of career development activities were associated with different levels of career adaptability. However, they do not justify arranging the four profiles into a simple hierarchy of career adaptability resources

Three comparisons warrant particular attention. First, differences in career adaptability were observed between C2 and C4, both of which exhibited relatively high job search behavior, and between C3 and C1, both of which exhibited relatively low job search behavior. This suggests that broadly similar levels of job search activity may coexist with different patterns of career exploration and distinct career adaptability characteristics. Second, despite exhibiting relatively low job search behavior, participants in C3 had higher career adaptability than those in C4, whose job search behavior was relatively high. This finding indicates that the frequency of job search activities should not be taken as a direct indicator of the level of career adaptability resources. Finally, the difference between C2 and C3 did not remain statistically significant after Bonferroni correction, further cautioning against ranking students' adaptability resources solely according to the overall intensity of their career development activities.

These findings can be understood within the framework of Career Construction Theory. The career adaptation model distinguishes between adaptability resources and adapting responses. Career adaptability represents the psychosocial resources individuals can draw upon to manage career tasks and transitional challenges, whereas career exploration and job search behavior reflect related career development activities. The meta-analysis by Rudolph et al. [29] supports an association between career adaptability and adapting responses. Similarly, the study by Sönmez et al. [30] among nursing students provides evidence of associations between career adaptability and factors related to career construction. Extending this perspective, the present study demonstrates at the level of joint profiles that different combinations of career development activities are associated with distinct patterns of adaptability resources. More substantial adaptability resources may support career exploration and job search activities, while experiences gained through these activities may also be related to the development of such resources. However, the cross-sectional design of this study does not allow the temporal sequence or causal direction of these relationships to be established.

Although the BCH method accounts for classification error, it does not simultaneously adjust for demographic or hospital-level confounding factors. Furthermore, job search behavior was not entirely equivalent across the profiles. Therefore, the independent association of career exploration with career adaptability cannot be estimated from these comparisons. Career exploration also has some conceptual overlap with career curiosity, one of the dimensions of career adaptability. In addition, this study did not conduct inferential tests of the individual career adaptability dimensions. Although some differences in mean scores were statistically significant, their practical implications for nursing education require further evaluation in relation to effect sizes and actual career transition outcomes. Overall, patterns of career development activities are associated with career adaptability resources, but the two reflect distinct aspects of career development [31]. More active job search behavior should therefore not be equated directly with greater adaptability resources [31, 32].

Conclusion

This study identified four joint latent profiles of career exploration and job search behavior among 632 nursing interns, with 49.8% of participants exhibiting discrepant levels of the two activities. Career

adaptability differed across the profiles, with the high-exploration/low-job-search behavior profile demonstrating higher career adaptability than the low-exploration/high-job-search behavior profile. These findings suggest that the level of job search activity alone may not adequately reflect nursing interns' career adaptability resources. Nursing educators should therefore consider both career exploration and job search behavior when assessing students' employment preparedness. Given the cross-sectional design and convenience sampling, the external applicability and practical educational value of the joint profiles require further validation.

Declarations

Ethics approval and consent to participate**

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Ethics Committee of the Sichuan Applied Psychology Research Center (approval No. CSXL-25218) before the commencement of the study. All participants were informed about the purpose of the study and provided written informed consent prior to participation. Participation was voluntary, and all data were collected anonymously and treated confidentially.

Consent for publication

Not applicable. This manuscript does not contain any identifiable individual data.

Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Shibo Zhang, Hongyan Wang, Jun Cao, Fei Xu, Linfeng Liu, Wen Zhang, Xiaoli Liang, and Xiangeng Zhang contributed to the study and manuscript preparation. All authors read and approved the final manuscript.

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Generative AI in scientific writing

ChatGPT (OpenAI) was used to assist with drafting and language refinement of this manuscript. The authors are responsible for reviewing the content and ensuring the accuracy and integrity of the final manuscript.

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Figures

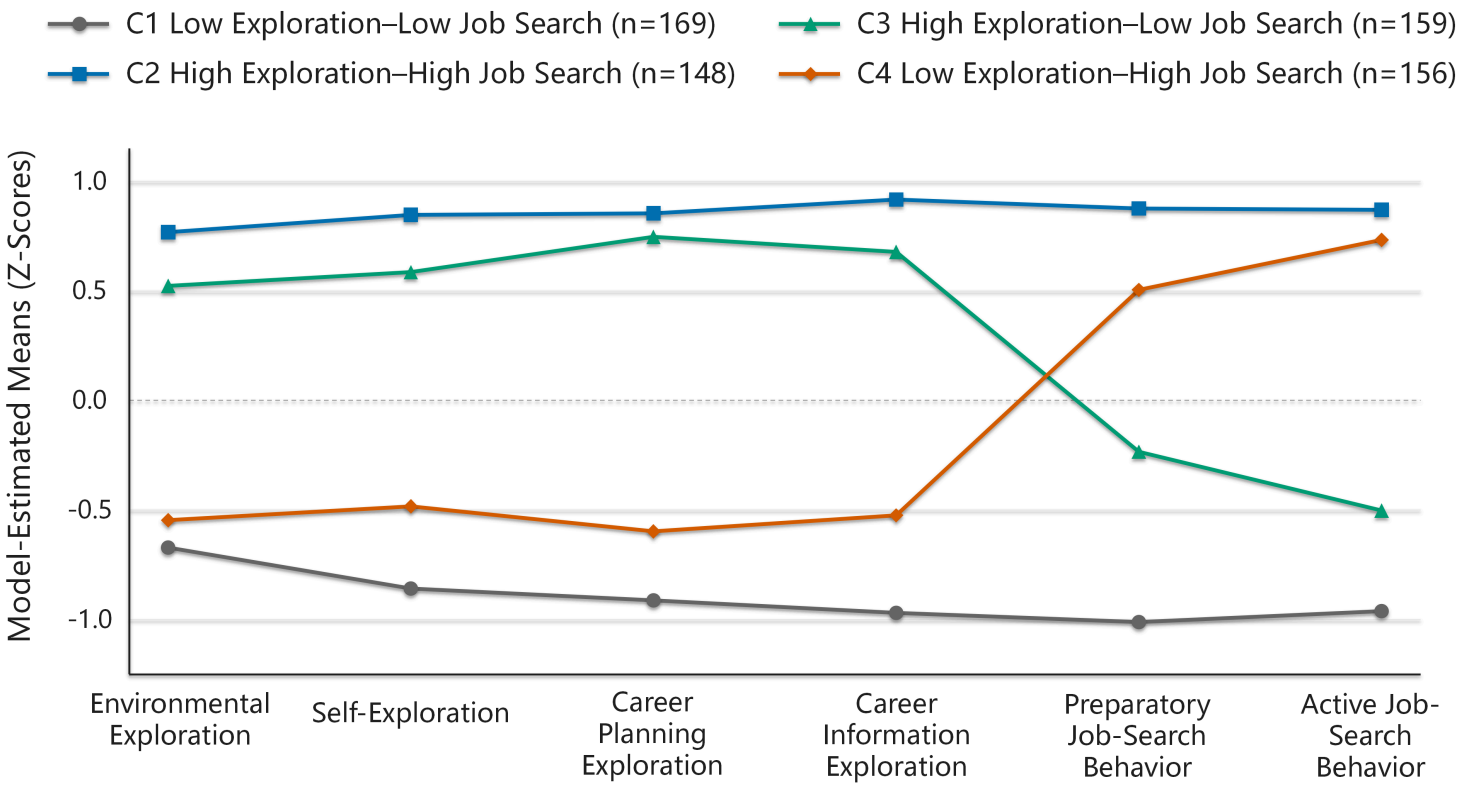

Figure 1

Joint latent profiles of career exploration and job search behavior

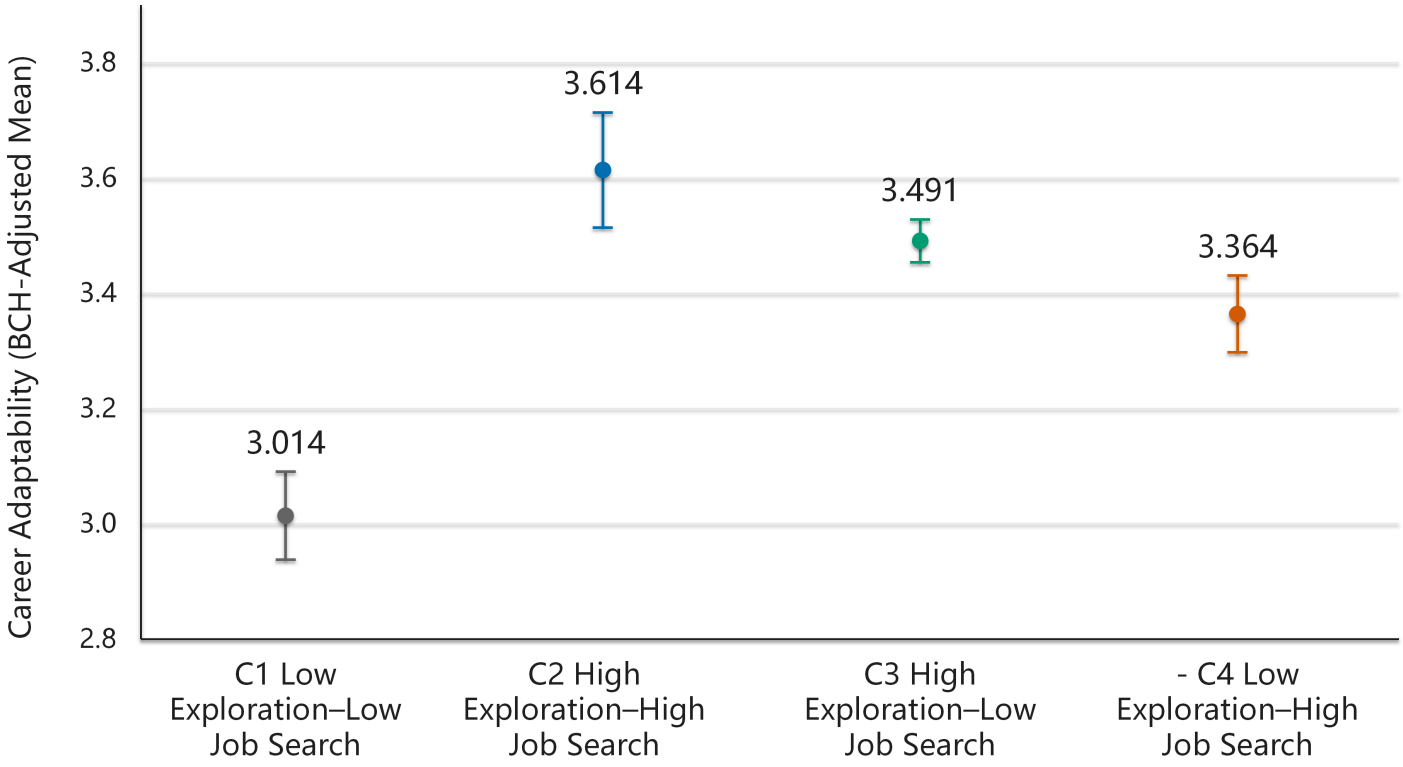

Figure 2

BCH-adjusted mean career adaptability scores across the four joint latent profiles

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