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Latent Profile Analysis of Second Victim Experiences Among Nurses and Nursing Work Environment: A Multicenter Study in China

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Abstract

Background

To identify latent profiles of second victim experiences among Chinese clinical nurses and examine associations between the nursing work environment and profile membership.

Methods

Between June and September 2025, 3,309 clinical nurses from 20 tertiary hospitals across three regions in China (Chongqing, Guizhou, and Hong Kong) completed an online survey comprising the Second Victim Experience and Support Tool (SVEST) and the Nursing Work Environment Scale. Latent profile analysis was used to identify distinct subgroups, and multinomial logistic regression was performed to examine predictors of profile membership.

Results

Three latent profiles were identified: Moderately Resourced (74.7%), Support-Deprived (9.4%), and Optimally Supported (15.9%). Supervisor support was the strongest predictor of Optimally Supported membership (OR = 0.14), followed by institutional support (OR = 0.19) and colleague support (OR = 0.50). The Support-Deprived group reported the highest adverse event exposure (51.4%) yet the lowest perceived support. Significant regional variations were observed, with Hong Kong having the highest proportion of Support-Deprived nurses (11.4%). Two novel concepts are proposed: Permissive Absence and Structural-Relational Asymmetry.

Conclusion

The nursing work environment is significantly associated with second victim experience profiles. A small but clinically vulnerable Support-Deprived subgroup warrants proactive, targeted intervention. Context-tailored strategies are needed to address regional disparities.

What is already known about this topic

- Multi-source organizational support is critical for nurses' recovery after being second victims of adverse events, yet the nursing work environment's relationship with second victim experiences remains underexplored.
- Person-centred approaches have identified subgroups of nurses with distinct patterns of second victim distress and support, but the environmental factors that predict these subgroups are not well understood.

What this paper adds

- A large multicentre study identifies three distinct work environment profiles among Chinese nurses—Moderately Resourced, Support-Deprived, and Optimally Supported—revealing a graded rather than qualitatively different pattern.
- Supervisor support emerges as the strongest predictor of membership in the most supportive profile, establishing a clear hierarchy of modifiable environmental factors.
- Two novel concepts are proposed: Permissive Absence—reframing higher absenteeism in supportive settings as an indicator of psychological safety to recover—and Structural-Relational Asymmetry—suggesting peer relationships may partially compensate for organizational-level resource deficits.

1. Background

Patient safety remains a major global healthcare priority, with adverse events affecting millions of patients annually worldwide. While patients and their families are considered the "first victims" of medical errors and adverse events, healthcare professionals directly involved in such incidents may also experience substantial psychological, emotional, and professional distress. Wu (2000) first described these affected healthcare providers as "second victims". Despite the significance of this phenomenon, the impact of adverse events on clinicians was, for many years, largely neglected, as institutional responses tended to focus primarily on patient harm, accountability, and system improvement. More recently, there has been growing recognition that healthcare professionals, particularly nurses, represent a vulnerable group requiring structured support after adverse events (Buhlmann et al., 2022; Fisher et al., 2025; Tang et al., 2024). Addressing the second victim phenomenon is therefore an important component of both healthcare worker well-being and patient safety improvement.

Nurses constitute the largest segment of the healthcare workforce and are particularly susceptible to second victim experiences due to their continuous frontline presence, close patient relationships, and high exposure to clinical risk. A systematic review by Seys et al., 2013 reported that the prevalence of second victim experiences among healthcare professionals ranges from 10.4% to 43.3%, with nurses consistently demonstrating higher rates than other professional groups. In China, the burden is similarly significant, Huang et al., 2022 found that approximately 45.26% of clinical nurses have experienced at least one patient safety incident that adversely affected their mental health. Furthermore, recent person-centered research suggests that this burden is not uniformly distributed, with nearly 40% of affected nurses falling into a high-distress, low-support subgroup (Shao et al., 2023). Following adverse events, affected nurses commonly experience guilt, anxiety, and fear of professional repercussions (Buhlmann et al., 2022; Fisher et al., 2025; Naya et al., 2023). Recovery follows a protracted, multi-phase trajectory, Buhlmann et al., 2022 described this process as beginning with intense emotional turmoil, followed by

a struggle to restore professional self-integrity—a process often complicated by unsupportive workplace practices. When left unaddressed, second victim distress can lead to burnout, absenteeism, and turnover intention, creating a vicious cycle that harms both nurse well-being and patient safety (Mahat, Lehmusto, et al., 2025; Seys et al., 2013; Wu, 2000).

The nursing work environment, defined as the organizational characteristics that facilitate or constrain professional nursing practice (Lake, 2002), has been widely recognized as a key determinant of nurse and patient outcomes. Lake (2002) identified five dimensions of the nursing practice environment: nurse participation in hospital affairs, nursing foundations for quality care, nurse manager ability, leadership and support, staffing and resource adequacy, and collegial nurse-physician relations. These dimensions reflect the organizational context in which nurses provide care and have been consistently associated with patient safety and nurse well-being. Cross-national studies by Aiken and colleagues have consistently shown that favorable nursing practice environments are associated with lower patient mortality, reduced burnout, and lower turnover intention across multiple countries (Aiken et al., 2002; Aiken et al., 2012).

Despite the established importance of the nursing work environment, its relationship with second victim experiences remains insufficiently examined. Emerging evidence suggests that organizational conditions may influence how healthcare professionals respond to adverse events. For example, Mahat, Lehmusto, et al., 2025 found that organizational support mediated the association between second victim distress and negative occupational outcomes, including absenteeism and turnover intention. Other studies have similarly emphasized the protective role of peer support, supervisor support, and constructive institutional responses in reducing the psychological burden experienced by clinicians after adverse events (Buhlmann et al., 2022; Burlison et al., 2017; Scott et al., 2009). Nevertheless, much of the existing literature has examined these forms of support separately, rather than considering the broader nursing work environment as an integrated system. There remains limited understanding of how key environmental factors, including staffing, leadership, resource adequacy, and nurse-physician collaboration, shape second victim experiences among nurses. This gap is especially relevant in China, where cultural expectations, healthcare system structures, and workplace norms may influence both the prevalence of second victim experiences and nurses' access to support following adverse events. Therefore, examining the association between the nursing work environment and second victim experiences among Chinese nurses may provide important evidence for developing organizational strategies to support nurses after adverse events and promote patient safety.

To date, second victim research has predominantly employed variable-centered approaches that treat distress as a unitary construct, potentially obscuring important heterogeneity. Latent Profile Analysis (LPA)—a person-centered method that identifies subgroups with similar response patterns—offers a more nuanced alternative (Muthen & Muthen, 2000; Nylund et al., 2007). LPA identifies qualitatively distinct profiles that differ not only in severity but also in the patterning of symptoms and support needs, using data-driven classification that accounts for measurement error (Hickendorff et al., 2018).

A recent study by Shao et al., 2023 applied LPA to identify three profiles of second victim experiences among Chinese nurses, demonstrating that subgroups of nurses exhibit distinct patterns of support and distress. However, that study focused on job insecurity and turnover intention as outcomes of profile membership, and did not examine how the broader nursing work environment shapes profile assignment. The present study builds on this emerging person-centered literature by investigating how work environment characteristics predict second victim profile membership, providing a more comprehensive understanding of the organizational factors that contribute to different second victim experience patterns.

Building on these considerations, the present study proposes two central hypotheses: first, that distinct latent profiles of second victim experiences exist among Chinese clinical nurses, characterized by different patterns of psychological distress, physical symptoms, and perceived support; and second, that the quality of the nursing work environment is significantly associated with profile membership, such that nurses in more favorable practice environments will be more likely to belong to profiles with lower distress and better support. The primary objectives of this multicenter study are: (a) to identify latent profiles of second victim experiences among clinical nurses in China; (b) to examine the associations between the nursing work environment and second victim profile membership; and (c) to explore whether specific work environment dimensions are differentially associated with profile characteristics. By adopting a person-centered approach, this study aims to advance understanding of second victim heterogeneity and its environmental determinants, ultimately informing the development of targeted, profile-specific support interventions that can better meet the diverse needs of affected nurses. Given the high prevalence of second victim experiences among Chinese nurses and the known impact of work environments on nurse outcomes, this study addresses a timely and clinically significant gap in both the international literature and the Chinese healthcare context.

2. Method

2.1 Study Design

This study employed a multicenter cross-sectional design. Data were collected from June to September 2025 across three regions in China—Chongqing, Guizhou, and Hong Kong, which were purposively selected to represent diverse levels of economic development and healthcare system maturity: Chongqing as a rapidly developing inland municipality, Guizhou as a western province with relatively lower economic development; and Hong Kong as a highly developed Special Administrative Region with an advanced healthcare system. This study was reported following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

2.2 Setting and Participants

The survey was conducted in 20 tertiary hospitals across the three regions (5 in Chongqing, 8 in Guizhou, 7 in Hong Kong), selected through convenience sampling based on existing research collaborations. The participating hospitals ranged from 800 to 2,500 beds and included both general and specialty centers.

2.3 Eligibility Criteria

Registered nurses were eligible if that: (1) held a valid nursing practice certificate; (2) had worked in the current hospital for at least one year; (3) were working in clinical departments with direct patient care responsibilities; and (4) voluntarily agreed to participate in the study. Nurses were excluded if they were (1) on extended leave (e.g., maternity, sick, or study) during the data collection period; or (2) working in administrative or non-clinical positions without direct patient care responsibilities.

2.4 Sample Size Calculation

The minimum sample size was determined using the formula for estimation a population proportion: $n = Z^2 \times p\ (1 - p) / d^2$, where Z = 1.96 (95% confidence level), $p = 0.50$ (to maximize variance in the absence of prior estimate), and $d = 0.05$, yielding 384 participants. A design effect of 2.0 was applied to account for cluster sampling (Bennett, 1991), increasing the required sample to 768. Allowing for a 20% invalid or incomplete response, the minimum target was 960 nurses. The achieved sample ($N = 3,309$) substantially exceeded this minimum, providing adequate power for the planned latent profile analysis and ensuring sufficient representation of smaller subgroups.

2.5 Measurements

2.5.1 Demographic and Occupational Variables

Demographic characteristics included sex, age, marital status, and education level. Occupational characteristics comprised years of experience, professional title, clinical position, employment type, department, weekly working hours, and region of practice. Adverse event-related characteristics included history of adverse events in the past 12 months (yes/no), injury severity level (I–IV), perceived responsibility (primary/secondary/none), and whether the adverse event was formally reviewed at the unit or nursing department level (yes/no).

2.5.2 Second Victim Experience and Support Tool (SVEST)

The Second Victim Experience and Support Tool (SVEST), developed by Burlison et al., 2017 and translated into Chinese by Chen (2019), was used to assess nurses' second victim experiences and perceived support. The Chinese version comprises 29 items across seven dimensions organized into three domains: (i) second victim distress—psychological distress (4 items), physical distress (4 items), and career self-efficacy (4 items); (ii) perceived support—colleague support (4 items), supervisor support (4 items), institutional support (3 items); and non-work related support (2 items); and (iii) work related outcomes—turnover intention (2 items) and absenteeism (2 items). Items are rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), with total scores ranging from 29 to 145. Support dimensions are reverse scored so that higher scores consistently indicate greater distress or poorer perceived support. The Chinese version has demonstrated adequate construct validity (Chen, 2019), and in this study, showed good internal consistency (Cronbach's α = 0.892). Although the SVEST was originally designed for providers who have experienced adverse events, all nurses were invited to complete it, as work environment perceptions and the support availability are relevant regardless of personal adverse event history.

2.5.3 Nursing Work Environment Scale

The nursing practice environment was measured using the Nursing Work Environment Scale developed by Ye, 2016 for the Chinese nursing context. The scale comprises 26 items across seven dimensions: career development (5 items), leadership and management (4 items), nurse-physician relationship (4 items), recognition climate (3 items), professional autonomy (4 items), basic guarantees (3 items), and adequate staffing (3 items). Items are rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Dimension scores are calculated as the mean of constituent items, with higher scores indicating a more favorable practice environment. The scale has demonstrated satisfactory construct validity (Ye, 2016) and showed excellent internal consistency in this study (Cronbach's α = 0.946).

2.6 Data Collection Procedure

Data were collected from June to September 2025 via an online survey platform (Wenjuanxing, China). After obtaining institutional permission, nursing department directors distributed the survey link or QR code to eligible nurses through official hospital communication platforms. The questionnaire was anonymous, and no personally identifiable information collected. To sure data quality, each IP address was restricted to one submission, all items were set as mandatory, and two attention-check questions were embedded. Responses completed in less than 5 minutes were flagged as potentially invalid.

2.7 Ethical Considerations

This study was approved by the Institutional Review Board of the Affiliated Hospital of Guizhou Medical University (Approval No. : 2023 − 887) and conducted in accordance with the Declaration of Helsinki. Before participation, nurses were informed of the study purpose, voluntary nature of participation, anonymity and confidentiality through an introductory page preceding the questionnaire. Completion and submission of the survey constituted informed consent.

2.8 Statistical Analysis

All analyses were conducted using SPSS 26.0 (IBM Corp., Armonk, NY, USA) and Mplus 8.3 (Muthén & Muthén, Los Angeles, CA, USA). Descriptive statistics were used to summarize participant characteristics. Categorical variables as frequencies and percentages, and continuous variables as means and standard deviations.

Latent profile analysis (LPA) was performed in Mplus 8.3 using maximum likelihood estimation with robust standard errors (MLR). Models with one to five classes were estimated, and model fit was compared using Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size adjusted BIC (aBIC), Entropy. Classification quality was evaluated using entropy and the Lo-Mendell-Rubin adjusted ratio test (LMR) and the bootstrap likelihood ratio test (BLRT). The final model was selected bases on statistical fit, classification quality (average posterior probabilities), parsimony and substantive interpretability. Participants were assigned to their most likely class based on maximum posterior probabilities.

Differences in demographic, occupational, and SVEST characteristics across latent classes were examined using chi-square tests for categorical variables and one-way ANOVA or Welch's *t* test for continuous variables, as appropriate. Variables that showed significant bivariate associations with class membership ($p < .05$) were subsequently entered as predictors in a multinomial logistic regression. Odds ratios (OR) and their 95% confidence intervals (CI) were reported. Post hoc pairwise comparisons for regional differences were adjusted using the Bonferroni correction. Statistical significance was set at two-tailed $p < .05$.

3. Results

3.1 Characteristics of the Nurses

A total of 3,800 questionnaires were distributed, of which 3,309 were retained as valid (effective response rate: 87.1%). Invalid responses were excluded for the following reasons: completion time < 5 minutes ($n = 142$), failed attention-check items ($n = 189$), patterned responses ($n = 96$), and inconsistent or illogical responses ($n = 64$) (see Table 1).

A total of 3,309 nurses were included. The sample was predominantly female (93.0%), with the largest age group being 25–30 years (44.4%). Most held a bachelor's degree (72.0%), and worked 40–50 hours per week (55.8%). Over two-third had more than three years of experience (68.1%), and 41.5% reported a history of adverse events.

Chi-square tests and Welch's ANOVA analyses revealed significant differences across the three latent profiles in age, region, clinical position, years of experience, weekly working hours, adverse event history, unit- and department-level event reviews, and all SVEST dimensions except psychological distress (Welch's $F = 0.40$, $p = 0.673$). These variables were subsequently entered as predictors in the multinomial logistic regression models.

Table 1
Differences in Demographic and Work Characteristics Across the Latent Profiles (*N* = 3,309)

Variables	Overall (n = 3,309) n (%)	Class 1 (n = 2,471) n (%)	Class 2 (n = 311) n (%)	Class 3 (n = 527) n (%)	χ^2/Welch's F	p
Sex					3.41	.182
Male	230 (7.0)	160 (6.5)	26 (8.4)	44 (8.3)		
Female	3,019 (93.0)	2,311 (93.5)	285 (91.6)	483 (91.7)		
Age, years					16.33	.012
20–25	568 (17.2)	448 (18.1)	41 (13.2)	79 (15.0)		
25–30	1,469 (44.4)	1,081 (43.7)	163 (52.4)	225 (42.7)		
30–35	906 (27.4)	675 (27.3)	80 (25.7)	151 (28.7)		
>35	366 (11.1)	267 (10.8)	27 (8.7)	72 (13.7)		
Region					13.12	.011
Chongqing	1,100 (33.2)	840 (34.0)	81 (26.0)	179 (34.0)		
Guizhou	1,252 (37.8)	917 (37.1)	121 (38.9)	214 (40.6)		
Hong Kong	957 (28.9)	714 (28.9)	109 (35.0)	134 (25.4)		
Education					4.42	.352
Associate degree	919 (27.8)	703 (28.5)	79 (25.4)	137 (26.0)		
Bachelor's degree	2,384 (72.0)	1,762 (71.3)	232 (74.6)	390 (74.0)		
Graduate degree	6 (0.2)	6 (0.2)	0 (0.0)	0 (0.0)		
Clinical position					11.95	.018
Staff nurse	3,047 (92.1)	2,286 (92.5)	293 (94.2)	468 (88.8)		
Teaching team leader	109 (3.3)	81 (3.3)	7 (2.3)	21 (4.0)		
Head nurse	153 (4.6)	104 (4.2)	11 (3.5)	38 (7.2)		
Professional title					10.15	.119
Nurse	768 (23.2)	583 (23.6)	68 (21.9)	117 (22.2)		
Senior nurse	1,909 (57.7)	1,445 (58.5)	178 (57.2)	286 (54.3)		
Supervisor nurse	586 (17.7)	412 (16.7)	59 (19.0)	115 (21.8)		
Associate chief nurse	46 (1.4)	31 (1.3)	6 (1.9)	9 (1.7)		
Employment type					1.78	.777
Permanent staff	387 (11.7)	279 (11.3)	41 (13.2)	67 (12.7)		
Personnel agency	31 (0.9)	24 (1.0)	3 (1.0)	4 (0.8)		
Contract-based	2,891 (87.4)	2,168 (87.7)	267 (85.9)	456 (86.5)		
Years of experience					12.67	.049
<1 year	253 (7.6)	192 (7.8)	18 (5.8)	43 (8.2)		
1–2 years	411 (12.4)	328 (13.3)	28 (9.0)	55 (10.4)		
2–3 years	393 (11.9)	297 (12.0)	44 (14.1)	52 (9.9)		
>3 years	2,252 (68.1)	1,654 (66.9)	221 (71.1)	377 (71.5)		
Marital status					2.49	.646
Unmarried	1,078 (32.6)	811 (32.8)	107 (34.4)	160 (30.4)		
Married	2,178 (65.8)	1,619 (65.5)	201 (64.6)	358 (67.9)		
Others	53 (1.6)	41 (1.7)	3 (1.0)	9 (1.7)		
Weekly working hours					66.56	< .001

Note. AE = adverse event; SVEST = Second Victim Experience and Support Tool; *M* ± *SD* = mean ± standard deviation. χ^2 test. Welch's ANOVA. Support dimensions (colleague, supervisor, institutional, non- work related) were reverse scored; higher scores indicate poorer perceived support.

Variables	Overall (n = 3,309) n (%)	Class 1 (n = 2,471) n (%)	Class 2 (n = 311) n (%)	Class 3 (n = 527) n (%)	χ²/Welch's F	p
≤40 hours	768 (23.2)	557 (22.5)	38 (12.2)	173 (32.8)		
40–50 hours	1,846 (55.8)	1,410 (57.1)	171 (55.0)	265 (50.3)		
≥50 hours	695 (21.0)	504 (20.4)	102 (32.8)	89 (16.9)		
AE history					16.82[a]	< .001
Yes	1,373 (41.5)	1,017 (41.2)	160 (51.4)	196 (37.2)		
No	1,936 (58.5)	1,454 (58.8)	151 (48.6)	331 (62.8)		
AE severity					8.63[a]	.196
Level I	714 (21.6)	541 (21.9)	62 (19.9)	111 (21.1)		
Level II	307 (9.3)	228 (9.2)	36 (11.6)	43 (8.2)		
Level III	1,290 (39.0)	963 (39.0)	132 (42.4)	195 (37.0)		
Level IV	998 (30.2)	739 (29.9)	81 (26.0)	178 (33.8)		
AE responsibility					4.50[a]	.343
Primary responsibility	839 (25.4)	614 (24.8)	78 (25.1)	147 (27.9)		
Secondary responsibility	959 (29.0)	732 (29.6)	93 (29.9)	134 (25.4)		
No responsibility	1,511 (45.7)	1,125 (45.5)	140 (45.0)	246 (46.7)		
Unit-level AE review					10.77[a]	.005
Yes	3,092 (93.4)	2,319 (93.8)	277 (89.1)	496 (94.1)		
No	217 (6.6)	152 (6.2)	34 (10.9)	31 (5.9)		
Department-level AE review					25.69[a]	< .001
Yes	2,980 (90.1)	2,231 (90.3)	257 (82.6)	492 (93.4)		
No	329 (9.9)	240 (9.7)	54 (17.4)	35 (6.6)		
SVEST (M ± SD)						
Psychological distress	3.47 ± 1.02	3.47 ± 0.91	3.51 ± 1.09	3.43 ± 1.39	0.40[b]	.673
Physical distress	3.07 ± 1.11	3.09 ± 1.01	3.32 ± 1.18	2.86 ± 1.46	12.39[b]	< .001
Career self-efficacy	2.99 ± 0.72	3.01 ± 0.64	3.10 ± 0.72	2.85 ± 1.01	8.92[b]	< .001
Colleague support	2.63 ± 0.59	2.66 ± 0.53	2.98 ± 0.55	2.27 ± 0.68	140.03[b]	< .001
Supervisor support	2.49 ± 0.72	2.54 ± 0.61	3.21 ± 0.70	1.90 ± 0.73	338.80[b]	< .001
Institutional support	2.68 ± 0.63	2.74 ± 0.50	3.18 ± 0.61	2.15 ± 0.77	235.99[b]	< .001
non- work related support	2.51 ± 0.94	2.59 ± 0.82	2.89 ± 1.00	1.88 ± 1.14	111.64[b]	< .001
Turnover intention	3.02 ± 1.05	3.02 ± 0.92	3.36 ± 1.12	2.79 ± 1.44	20.83[b]	< .001
Absenteeism	2.69 ± 0.97	2.70 ± 0.86	2.44 ± 1.04	2.80 ± 1.30	11.14[b]	< .001

Note. AE = adverse event; SVEST = Second Victim Experience and Support Tool; *M* ± *SD* = mean ± standard deviation. [a] χ^2 test. [b] Welch's ANOVA. Support dimensions (colleague, supervisor, institutional, non- work related) were reverse scored; higher scores indicate poorer perceived support.

3.2 Latent Profile Analysis

Latent profile models with one to five classes were estimated (Table 2). AIC, BIC, and aBIC all decreased as the number of classes increased, suggesting improvement in model fit with additional classes. Both LMR and BLRT were significant for all multi-class solutions ($p < .001$), with the exception of the five-class LMR test ($p = .0006$). Entropy values were high across models (0.927–0.961), with the three-class models showing the highest value (0.961). Although the four- and five-class models yielded lower information criteria, the three-class solution was retained based on multiple considerations. BIC showed diminishing improvements beyond three classes, and the four- and five-class models included classes as small as 8.0% and 3.5% of the sample, raising concerns about statistical stability. The three-class model also demonstrated the highest entropy (0.961) and superior classification quality (Min. APP = 0.958), compared with only acceptable accuracy in the four- and five-class models (Min. APP = 0.906 and 0.918). The three classes accounted for 74.7% (n = 2,471), 9.4% (n = 311), and 15.9% (n = 527) of the sample, respectively.

Table 2
Fit Indices for Latent Profile Models (*N* = 3,309)

k	AIC	BIC	aBIC	Entropy	LMR p	BLRT p	Class proportion, %	Min. APP
1	50,487.37	50,560.62	50,522.49	—	—	—	100.0	—
2	40,338.09	40,454.07	40,393.70	.948	< .001	< .001	79.4/20.6	.965
3	**35,969.36**	**36,128.08**	**36,045.47**	**.961**	**< .001**	**< .001**	**74.7/9.4/15.9**	**.958**
4	33,324.46	33,525.91	33,421.05	.927	< .001	< .001	8.0/56.7/21.7/13.6	.906
5	32,577.86	32,822.03	32,694.94	.929	.0006	< .001	6.5/3.5/21.4/55.0/13.7	.918

Note. AIC = Akaike information criterion; BIC = Bayesian information criterion; aBIC = sample-size adjusted BIC; LMR = Lo-Mendell-Rubin likelihood ratio test; BLRT = bootstrap likelihood ratio test; Min. APP = minimum average posterior probability across classes for the given model; values ≥ .90 indicate acceptable classification quality, and values ≥ .95 indicate high classification quality.

3.3 Profile Characterization

Latent profile analysis of the seven work-environment dimensions identified three subgroups of nurses (Fig. 1). Class 1 ("Moderately Resourced," *n* = 2,471, 74.7%) reported intermediate scores on all dimensions (2.84–3.34). Class 2 ("Support-Deprived," *n* = 311, 9.4%) showed uniformly low ratings (1.42–2.56), with scores below 1.5 for Basic Guarantees and Adequate Staffing. Class 3 ("Optimally Supported," *n* = 527, 15.9%) reported consistently high scores (4.49–4.82). Most nurses perceived only moderate work-environment support, with smaller subgroups experiencing either notably unfavorable or highly favorable conditions.

A heatmap of mean scores across the seven work-environment dimensions by latent class is presented in Fig. 2. Class 3 consistently showed the highest scores across all dimensions, Class 2 the lowest, and Class 1 intermediate levels. Notably, no dimension exhibited a crossover or reversed ordering across classes, indicating a parallel, gradient-like pattern. This suggests that the three classes capture graded differences in perceived work-environment quality rather than qualitatively distinct configurations. However, the gaps between classes were not uniform; Class 2 showed disproportionately low scores for Basic Guarantees (1.48) and Adequate Staffing (1.42), suggesting a particular deficit in structural and resource-related support.

3.4 Factors Associated with Latent Profiles of Work Environment Among Nurses

Table 3 presents the multinomial logistic regression results, using the Support-Deprived profile as the reference group. Among SVEST dimensions, higher colleague support (OR = 0.60 for Moderately Resourced; OR = 0.50 for Optimally Supported), supervisor support (OR = 0.32; OR = 0.14), and institutional support (OR = 0.42; OR = 0.19) were associated with lower odds of belonging to the Moderately Resourced and Optimally Supported profiles. Higher turnover intention similarly reduced the odds of membership in both profiles (OR = 0.68; OR = 0.65). In contrast, greater absenteeism increased the odds of being in the Moderately Resourced profile (OR = 1.33) and, more strongly, the Optimally Supported profile (OR = 1.68). Higher physical distress (OR = 0.70) and higher non-work related support (OR = 0.52) were associated with lower odds of belonging to the Optimally Supported profile only.

Among demographic and occupational characteristics, nurses aged 25–30 years were less likely to belong to the Moderately Resourced (OR = 0.39) and Optimally Supported (OR = 0.34) profiles compared with those aged ≥ 35 years. Nurses working ≤ 40 hours per week were more likely to be in the Moderately Resourced (OR = 2.16) and Optimally Supported (OR = 2.98) profiles relative to those working ≥ 50 hours. Having a history of adverse events reduced the odds of belonging to both profiles (OR = 0.59; OR = 0.46). Additionally, nurses reporting nursing department-level adverse event reviews were more likely to belong to the Optimally Supported profile (OR = 2.08).

Table 3
Multinomial Logistic Regression Analysis of Factors Associated with Work Environment Latent Profile Membership (*N* = 3,309)

		C1: Moderately Resourced (n = 2,471)			C3: Optimally Supported (n = 527)		
Category	**Variables**	**B**	**p**	**OR (95% CI)**	**B**	**p**	**OR (95% CI)**
SVEST	Physical distress	−.16	.163	0.86 (0.69–1.06)	**−.35**	**.008**	**0.70 (0.54–0.91)**
	Career self-efficacy	.01	.962	1.01 (0.77–1.32)	−.14	.374	0.87 (0.63–1.19)
	Colleague support	**−.52**	**.001**	**0.60 (0.44–0.82)**	**−.69**	**< .001**	**0.50 (0.34–0.73)**
	Supervisor support	**−1.15**	**< .001**	**0.32 (0.25–0.41)**	**−1.96**	**< .001**	**0.14 (0.10–0.20)**
	Institutional support	**−.87**	**< .001**	**0.42 (0.30–0.58)**	**−1.65**	**< .001**	**0.19 (0.13–0.28)**
	Non- work related support	−.11	.250	0.90 (0.75–1.08)	**−.65**	**< .001**	**0.52 (0.41–0.65)**
	Turnover intention	**−.39**	**< .001**	**0.68 (0.55–0.83)**	**−.43**	**< .001**	**0.65 (0.51–0.83)**
	Absenteeism	**.29**	**< .001**	**1.33 (1.13–1.58)**	**.52**	**< .001**	**1.68 (1.36–2.08)**
Region	Chongqing	.35	.055	1.42 (0.99–2.02)	.27	.244	1.30 (0.83–2.04)
	Guizhou	.07	.682	1.07 (0.77–1.48)	.06	.772	1.06 (0.70–1.61)
Age, years	20–25	−.49	.236	0.61 (0.27–1.38)	−.72	.151	0.49 (0.18–1.30)
	25–30	**−.95**	**.004**	**0.39 (0.20–0.74)**	**−1.07**	**.006**	**0.34 (0.16–0.74)**
	30–35	**−.55**	**.069**	**0.58 (0.32–1.04)**	−.69	.051	0.50 (0.25–1.00)
Years of experience	< 1 year	.11	.754	1.12 (0.55–2.26)	.18	.674	1.20 (0.51–2.82)
	1–2 years	.28	.314	1.33 (0.77–2.30)	.01	.973	1.01 (0.51–2.02)
	2–3 years	−.11	.617	0.89 (0.57–1.39)	−.26	.370	0.77 (0.43–1.37)
Clinical position	Staff nurse	−.36	.426	0.70 (0.29–1.70)	−.74	.161	0.48 (0.17–1.34)
	Teaching leader	.43	.509	1.53 (0.43–5.45)	.45	.539	1.57 (0.37–6.68)
Weekly working hours	≤ 40 hours	**.77**	**< .001**	**2.16 (1.38–3.38)**	**1.09**	**< .001**	**2.98 (1.73–5.16)**
	40–50 hours	.29	.064	1.34 (0.98–1.83)	.21	.329	1.24 (0.81–1.89)
AE history	Yes	**−.53**	**.004**	**0.59 (0.41–0.85)**	**−.78**	**< .001**	**0.46 (0.29–0.72)**
Unit-level AE review	Yes	.45	.135	1.57 (0.87–2.82)	−.01	.981	0.99 (0.44–2.22)
Dept-level AE review	Yes	.32	.193	1.38 (0.85–2.24)	**.73**	**.042**	**2.08 (1.03–4.22)**

Note. Reference category for the dependent variable: Class 2 (Support-Deprived). C1 = Class 1 (Moderately Resourced); C3 = Class 3 (Optimally Supported). SVEST dimensions were entered as continuous variables (item mean scores, range 1–5); OR represent the change in odds per one-unit increase. Support dimensions (colleague, supervisor, institutional, non-work related) were reverse scored; higher scores indicate poorer perceived support. **Bold values** indicate statistical significance at $p < .05$. Reference categories for predictors: Region—Hong Kong; Age—>35 years; Years of experience—>3 years; Clinical position—Head nurse; Weekly working hours—≥50 hours; AE history—No; Unit-level AE review—No; Department-level AE review—No.

Model fit: $\chi^2(48) = 1159.77$, $p < .001$; −2 Log Likelihood = 3651.30; Nagelkerke $R^2 = .38$; McFadden $R^2 = 0.24$.

3.5 Comparison of Latent Profile Distribution Across Three Regions

A chi-square test revealed a significant association between regions and work environment latent profiles, $\chi^2(4) = 13.12$, $p = .011$ (Fig. 3). Across all three regions, the Moderately Resourced profile was the most prevalent (73.2%–76.4%), followed by the Optimally Supported profile (14.0%–17.1%), with no significant between-region differences for these two profiles. In contrast, the Support-Deprived profile showed significant regional variation: Guizhou had a significantly higher proportion of nurses in this profile (9.7%) compared with Chongqing (7.4%) and Hong Kong (11.4%), whereas Chongqing and Hong Kong did not differ significantly from each other.

4. Discussion

4.1 Principal Findings

To our knowledge, this is the first multicenter cross-sectional study to examine latent profiles of the nursing work environment and their association with second victim experiences across three geographically and economically diverse regions of China. Using a person-centered analytic approach, we identified three distinct profiles of perceived work environment—Moderately Resourced (74.7%), Support-Deprived (9.4%), and Optimally Supported (15.9%)—that followed a parallel gradient pattern rather than qualitatively distinct configurations. The large, multi-region sample and the use of latent profile analysis represent important methodological strengths, as they capture the heterogeneity of nurses' experiences while accounting for contextual variation across healthcare settings in China. The findings reveal that although most nurses perceive only moderate workplace support, a small but clinically significant

subgroup experiences profound support deficits, and these profiles are differentially associated with second victim-related distress, support perceptions, and occupational outcomes.

The three-profile solution identified in this study aligns conceptually with the only other LPA study of second victim experiences among Chinese nurses (Shao et al., 2023), which also found three subgroups characterized by varying levels of support and distress. However, the distribution across profiles differs substantially: Shao's reported that 38% of nurses fell into the most vulnerable "low support-high distress" group, compared with only 9.4% in our Support-Deprived profile. This discrepancy may be explained by differences in sampling: Shao's recruited only nurses who had directly experienced patient safety incidents in the past year, whereas our study included all clinical nurses regardless of adverse event history. Additionally, the profile structures differ in dimensional emphasis: Shao's intermediate group was defined primarily by low management support, whereas our Moderately Resourced group showed intermediate levels across all support dimensions. These differences highlight the need for further replication and suggest that second victim profiles may vary depending on whether sampling is restricted to nurses with confirmed adverse event exposure.

Based on our empirical findings, we propose a Resource-Pathway Framework for second victim recovery (Fig. 4). The framework has three layers: (1) the three work environment profiles identified by LPA; (2) resource activation patterns based on Conservation of Resources theory (Hobfoll, 1989), showing how different profiles trigger cascading pathways from structural resources (staffing, guarantees) through relational resources (colleague, supervisor support) to recovery outcomes; and (3) the recovery outcomes—turnover intention, absenteeism, and psychological and physical distress—that are differentially associated with these pathways.

Two novel concepts emerge from this framework. First, Structural-Relational Asymmetry: in the Support-Deprived profile, structural resources (staffing, guarantees) are critically low but relational resources (colleague support) remain relatively intact, suggesting that peer relationships may partially compensate for the lack of organizational-level support. Second, Permissive Absence: nurses in supportive environments report higher absenteeism not because they are less committed, but because supportive climates give them the psychological safety to take recovery time. This reframes absenteeism from a simple negative indicator into a context-dependent signal—in supportive settings, it may reflect healthy recovery behavior rather than dysfunction.

4.2 Work Environment Profiles and the Vulnerability of the Support-Deprived Group

The latent profile plot (Fig. 1) illustrates a striking pattern: both the Moderately Resourced and Optimally Supported profiles show relatively flat trajectories across the seven work environment dimensions, indicating that nurses in these groups perceive their work environments as consistently moderate or consistently favorable across all domains. In contrast, the Support-Deprived profile exhibits substantial variability, with disproportionately low scores in three critical domains: adequate staffing (1.42), basic guarantees (1.48), and leadership and management (1.70). This pattern suggests that the Support-Deprived group is not merely experiencing uniformly poor conditions, but rather faces a specific constellation of structural deficits centered on resource adequacy and managerial support.

The particularly low scores in staffing (1.42) and basic guarantees (1.48) among the Support-Deprived group may reflect a "deprivation amplification" effect (Hobfoll, 1989): when structural resources are chronically inadequate, deficits cascade across multiple domains, eroding trust in management and amplifying the perception that the organization does not value its workforce. Notably, interpersonal dimensions (nurse-physician relationships, recognition climate) were relatively higher in this group, suggesting that peer relationships may be more resilient to structural constraints—or that nurses in under-resourced settings compensate by strengthening interpersonal ties (Lake, 2002).

4.3 Multivariable Predictors of Profile Membership

4.3.1 Second Victim Experiences and Support Perceptions

The multinomial logistic regression results revealed several important findings regarding SVEST dimensions as predictors of profile membership. Consistent with our expectations, colleague support, supervisor support, and institutional support were all significantly associated with lower odds of belonging to both the Moderately Resourced and Optimally Supported profiles relative to the Support-Deprived group. This aligns with a substantial body of literature demonstrating that multi-source organizational support is a cornerstone of positive work environments and a critical buffer against second victim harm (Buhlmann et al., 2022; Burlison et al., 2017; Seys et al., 2013). Indeed, the absence of such supportive mechanisms may leave nurses struggling to effectively process their emotions and traumatic experiences, with some studies documenting that the sadness, fear, and anxiety associated with second victim events can linger for as long as 15 years (Li et al., 2024). This underscores the critical need for adequate support structures to help nurses navigate the complexities of adverse events and maintain their mental health and career longevity (Li et al., 2024). Supervisor support was the strongest predictor (OR = 0.32 for Moderately Resourced, OR = 0.14 for Optimally Supported), confirming the pivotal role of frontline nurse managers. Immediate supervisors are often the most salient source of support for clinical nurses, as they occupy a uniquely central position for providing both emotional and practical assistance after adverse events (Deng et al., 2026) (Li et al., 2024).

Colleague support also emerged as a significant independent predictor, reflecting its unique value: colleagues share clinical context and lived experience, making their empathy more situationally specific than what formal systems typically offer (Edrees et al., 2016; Scott et al., 2009). Moreover, peer support is immediately accessible, carries less stigma than seeking help from supervisors, and does not require navigating bureaucratic procedures (Busch et al., 2020; Krzan et al., 2015). This positions colleague support as a critical compensatory resource, particularly where formal mechanisms are perceived as inadequate.

Institutional support remained a significant predictor despite known barriers to formal support utilization. This may seem paradoxical, given that many second victims avoid formal services due to stigma or skepticism. However, our measure captures perceived availability—not actual use. From a

Conservation of Resources perspective (Hobfoll, 1989), simply knowing that institutional support exists may function as a psychosocial resource, providing a baseline sense of safety even without active engagement with formal programs.

Finally, non-work-related support showed a more selective association: it significantly predicted Optimally Supported membership (OR = 0.52) but not Moderately Resourced membership (OR = 0.90, p = .250). This suggests that non-work social support may serve as a supplementary resource that differentiates optimal from adequate support, rather than a gradient predictor across all levels. Further research is needed to clarify the interplay between work-based and non-work support systems.

4.3.2 Distress Dimensions in Second Victim Profiles

Interestingly, psychological distress did not differ significantly across profiles (p = .673). This suggests that adverse events exert a near-universal emotional toll regardless of work environment quality. In contrast, physical distress was significantly associated with reduced odds of Optimally Supported membership (OR = 0.70) but not Moderately Resourced membership (OR = 0.86, p = .163). This differential pattern suggests that while emotional impact is similar across environments, the somatic toll may be more sensitive to the availability of supportive resources.

This pattern aligns with Scott's six-stage model (Scott et al., 2009), particularly the final “moving on” stage with its three pathways: dropping out, surviving, or thriving. Nurses in Support-Deprived environments, lacking sufficient buffering resources, may face elevated risk of chronic somatic depletion and the “dropping out” trajectory. Conversely, those with robust support may avoid somatic erosion and even experience post-traumatic growth (Deng et al., 2026). These findings suggest that support systems should aim not only at emotional relief but also at preventing long-term physical and occupational health deterioration.

4.3.3 Occupational Outcomes: Turnover Intention and Absenteeism

Turnover intention was significantly associated with lower odds of membership in both the Moderately Resourced (OR = 0.68) and Optimally Supported profiles (OR = 0.65), which is consistent with the well-established finding that supportive work environments reduce nurse turnover (Aiken et al., 2008; Aiken et al., 1994). Nurses working in better care environments have 24% to 42% lower odds of experiencing such deleterious outcomes compared to those in poorer environments (Aiken et al., 2008). In contrast, absenteeism showed an unexpected pattern: higher absenteeism was associated with increased odds of belonging to both the Moderately Resourced (OR = 1.33) and Optimally Supported profiles (OR = 1.68) relative to the Support-Deprived group. This counterintuitive finding warrants careful interpretation.

We propose that this pattern reflects what we term permissive absence: nurses in supportive environments feel more able to take time off for recovery, not because they are less committed or more distressed, but because the organizational climate signals that self-care is acceptable. This concept draws on psychological safety theory (Edmondson, 2016)—in supportive settings, taking time off after an adverse event is perceived as legitimate rather than a sign of weakness. Structural conditions may also contribute: supportive environments often provide better sick leave benefits and more flexible scheduling.

The opposite pattern appears in the Support-Deprived group, where low absenteeism likely reflects forced presence rather than well-being. In understaffed units with limited support, nurses face strong pressure to attend work even when unwell—fearing disciplinary consequences, increased workload for colleagues, or being perceived as incompetent (Aronsson & Gustafsson, 2005; Johns, 2009; Mohammadi et al., 2021). This has a direct practical implication: organizations should not interpret low absenteeism as a sign of workforce health. In deprived settings, suppressed absenteeism may instead indicate unaddressed distress and presenteeism. Future longitudinal research with objective attendance data is needed to further test this construct.

4.4 Demographic and Occupational Predictors

Age exhibited a clear gradient: nurses aged 25–30 had substantially lower odds of belonging to both the Moderately Resourced (OR = 0.39) and Optimally Supported profiles (OR = 0.34) compared with those aged ≥ 35 years. This likely reflects that younger nurses hold more junior positions with less autonomy and fewer resources (Lin et al., 2014), while a “survivor effect” may also operate—nurses who remain into their mid-30s and beyond may have selectively moved to more supportive environments or developed greater resilience (Orlowska & Laguna, 2023).

Weekly working hours showed a strong and consistent association: nurses working ≤ 40 hours per week had substantially higher odds of belonging to both the Moderately Resourced (OR = 2.16) and Optimally Supported profiles (OR = 2.98) compared with those working ≥ 50 hours. This finding is consistent with a large body of evidence linking excessive working hours to burnout, reduced job satisfaction, and poorer perceptions of the work environment (Aiken et al., 2008; Cho et al., 2026). The dose-response pattern observed here—with the strongest effect for the Optimally Supported profile—suggests that reasonable working hours are both a foundational element of a supportive work environment and an enabler of other supportive features. When nurses are chronically overworked, they may be less able to access or benefit from other support resources, such as peer mentorship, professional development opportunities, or employee assistance programs (Aiken et al., 2011; Lin et al., 2021).

History of adverse events in the past 12 months was consistently associated with lower odds of membership in both the Moderately Resourced (OR = 0.59) and Optimally Supported profiles (OR = 0.46). This finding aligns with the vulnerability paradox observed in the second victim studies (Draus et al., 2022; Mahat, Rafferty, et al., 2025): nurses who experience adverse events often have poorer perceived support, which in turn may increase their vulnerability to future adverse events and distress, creating a self-reinforcing cycle. Previous negative experiences with organizational responses to adverse events may erode trust in support systems, leading nurses to view their work environment as less supportive regardless of objective resources (Zong et al., 2026).

Notably, nursing department-level adverse event reviews were significantly associated with higher odds of Optimally Supported membership (OR = 2.08) but not Moderately Resourced membership (OR = 1.38, p = .193). This differential association suggests that formal adverse event review processes at the department level may contribute to perceptions of a supportive work environment only when other supportive conditions are also present—that is, when event reviews are conducted in a just culture atmosphere rather than as punitive exercises (Boysen P. G., 2013; Jeong et al., 2025). In moderately resourced

environments, adverse event reviews may be perceived as bureaucratic or blame-focused, failing to enhance perceptions of support. In contrast, in optimally supportive environments, these reviews may be experienced as constructive, learning-oriented processes that contribute to a sense of psychological safety and institutional commitment to improvement (Jeong et al., 2025; Kumah, 2025). This interpretation highlights that the mere existence of review processes is insufficient; their quality and the cultural context in which they operate determine whether they are perceived as supportive or punitive.

4.5 Regional Variations in Profile Distribution

Significant regional differences emerged ($\chi^2(4) = 13.12$, $p = .011$), with Support-Deprived proportions ranging from 7.4% in Chongqing to 9.7% in Guizhou and 11.4% in Hong Kong. Hong Kong's highest rate, despite its well-resourced healthcare system, may reflect the intense workload and bureaucratic hierarchy of its public sector, combined with cultural barriers to help-seeking that stem from both Chinese “face” culture and Western professional norms of emotional restraint (Lau & Wong, 2008; Tingzhen et al., 2026),. Guizhou's intermediate position may reflect a “support lag”, where infrastructure growth outpaces the development of institutional support mechanisms (Lv, 2023; Xiong et al., 2024). Chongqing's lowest proportion may reflect a transitional advantage—sufficient institutional maturity for basic support structures, without the bureaucratic burdens of more mature systems (Bai, 2025). These findings suggest that interventions must be contextually tailored: in developed settings, addressing cultural barriers to help-seeking may be paramount; in rapidly expanding regions, building basic support infrastructure should take priority.

Implications for Practice and Policy

Several clinically meaningful implications emerge from these findings. First, the strong association between supervisor support and Optimally Supported profile membership (OR = 0.14, C3 vs. C2) underscores the critical role of frontline nurse managers in shaping supportive practice environments; investing in leadership training that enhances supervisors' ability to provide emotional and instrumental support after adverse events may yield organizational benefits beyond individual well-being. Second, the vulnerability of the Support-Deprived group — characterized by high adverse event exposure yet the lowest perceived support — highlights the need for proactive identification and targeted outreach, rather than relying solely on voluntary support programs that the most distressed nurses may be least likely to access. Third, the significant regional variation in Support-Deprived proportions (7.4%–11.4%) suggests that support interventions should be contextually tailored: for rapidly expanding healthcare systems such as Guizhou, priority should be given to building formal institutional support infrastructure, whereas in more developed settings like Hong Kong, addressing cultural barriers to help-seeking and reducing stigma around psychological support may be more impactful. Finally, the Permissive Absence concept suggests that organizations should not interpret low absenteeism as a sign of workforce health. In under-resourced settings, suppressed absenteeism may instead indicate forced presenteeism. Organizations should supplement attendance metrics with indicators of psychological recovery and presenteeism levels.

Limitations

This study has several limitations that should be acknowledged. First, the cross-sectional design precludes causal inference; the observed associations between work environment perceptions and second victim experiences may be bidirectional — poor work environments may exacerbate second victim distress, but distress may also negatively shape perceptions of support — and longitudinal research is needed to clarify temporal ordering. Second, convenience sampling from tertiary hospitals in three Chinese regions limits generalizability to secondary or community hospitals and other geographic contexts, and the predominantly female sample (93.0%), while representative of the Chinese nursing workforce, restricts examination of gender differences. Third, all measures were self-reported, raising concerns about social desirability bias, particularly regarding adverse event history and psychological distress. Fourth, the latent profiles are data-driven and require replication in independent samples; the use of reverse-scored support items may also introduce method variance that influences profile structure. Finally, organizational-level indicators such as hospital staffing ratios, formal support policies, and patient safety culture were not included, limiting understanding of how objective contextual factors shape perceived support. Future research should employ longitudinal designs with multi-level data to test causal pathways and evaluate whether organizational interventions can shift nurses toward more supportive profile trajectories.

5. Conclusion

This multicenter study identified three subgroups of nurses based on work environment perceptions—Moderately Resourced (74.7%), Support-Deprived (9.4%), and Optimally Supported (15.9%)—revealing a parallel gradient pattern rather than qualitatively distinct configurations. The Support-Deprived group, though small, is clinically vulnerable, with high adverse event exposure yet the lowest perceived support, likely reinforced by eroded trust and blame culture. The Optimally Supported group illustrates how multi-source support and workload adequacy can buffer second victim harm. Regional variation across Chongqing, Guizhou, and Hong Kong highlights the need for context-specific strategies. Effective support requires not merely programs but a supportive organizational climate and leadership, with a dual focus on elevating the moderate majority toward optimal support and actively protecting the most vulnerable nurses. We propose an integrative Resource-Pathway Framework (Fig. 4) that organizes these findings into a coherent model, highlighting two novel concepts: Structural-Relational Asymmetry and Permissive Absence. These concepts extend existing second victim theories by specifying how different environmental configurations shape distinct recovery pathways.

Declarations

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Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

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

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References

1. Aiken, L. H., Clarke, S. P., Sloane, D. M., Lake, E. T., & Cheney, T. (2008). Effects of hospital care environment on patient mortality and nurse outcomes. *J Nurs Adm*, *38*(5), 223-229. https://doi.org/10.1097/01.NNA.0000312773.42352.d7
2. Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA*, *288*(16), 1987-1993. https://doi.org/10.1001/jama.288.16.1987
3. Aiken, L. H., Sermeus, W., Van den Heede, K., Sloane, D. M., Busse, R., McKee, M., Bruyneel, L., Rafferty, A. M., Griffiths, P., Moreno-Casbas, M. T., Tishelman, C., Scott, A., Brzostek, T., Kinnunen, J., Schwendimann, R., Heinen, M., Zikos, D., Sjetne, I. S., Smith, H. L., & Kutney-Lee, A. (2012). Patient safety, satisfaction, and quality of hospital care: cross sectional surveys of nurses and patients in 12 countries in Europe and the United States. *BMJ*, *344*, e1717. https://doi.org/10.1136/bmj.e1717
4. Aiken, L. H., Sloane, D. M., Clarke, S., Poghosyan, L., Cho, E., You, L., Finlayson, M., Kanai-Pak, M., & Aungsuroch, Y. (2011). Importance of work environments on hospital outcomes in nine countries. *Int J Qual Health Care*, *23*(4), 357-364. https://doi.org/10.1093/intqhc/mzr022
5. Aiken, L. H., Smith, H. L., & Lake, E. T. (1994). Lower Medicare mortality among a set of hospitals known for good nursing care. *Med Care*, *32*(8), 771-787. https://doi.org/10.1097/00005650-199408000-00002
6. Aronsson, G., & Gustafsson, K. (2005). Sickness presenteeism: prevalence, attendance-pressure factors, and an outline of a model for research. *J Occup Environ Med*, *47*(9), 958-966. https://doi.org/10.1097/01.jom.0000177219.75677.17
7. Bai. (2025). A mixed-methods study on the current status and influencing factors of work flourishing among clinical nurses in tertiary hospitals in Chongqing. China Medical Herald, 22(27), 180–184. https://doi.org/10.20047/j.issn1673-7210.2025.27.34 (in Chinese)
8. Bennett, S., Woods, T., Liyanage, W. M., & Smith, D. L. (1991). A simplified general method for cluster-sample surveys of health in developing countries. World health statistics quarterly. Rapport trimestriel de statistiques sanitaires mondiales, 44(3), 98–106.
9. Boysen P. G., n. (2013). Just culture: a foundation for balanced accountability and patient safety. Ochsner journal, 13(3), 400–406.
10. Buhlmann, M., Ewens, B., & Rashidi, A. (2022). Moving on after critical incidents in health care: A qualitative study of the perspectives and experiences of second victims. *J Adv Nurs*, *78*(9), 2960-2972. https://doi.org/10.1111/jan.15274
11. Burlison, J. D., Scott, S. D., Browne, E. K., Thompson, S. G., & Hoffman, J. M. (2017). The Second Victim Experience and Support Tool: Validation of an Organizational Resource for Assessing Second Victim Effects and the Quality of Support Resources. *J Patient Saf*, *13*(2), 93-102. https://doi.org/10.1097/PTS.0000000000000129
12. Busch, I. M., Moretti, F., Purgato, M., Barbui, C., Wu, A. W., & Rimondini, M. (2020). Psychological and Psychosomatic Symptoms of Second Victims of Adverse Events: a Systematic Review and Meta-Analysis. *J Patient Saf*, *16*(2), e61-e74. https://doi.org/10.1097/PTS.0000000000000589
13. Chen. (2019). Translation into Chinese and reliability and validity evaluation of the Second Victim Experience and Support Scale. Journal of Nursing Science, 34(14), 73–77.) (in Chinese)
14. Cho, H., Sagherian, K., & Steege, L. M. (2026). Latent Profiles of Nurses' Insomnia, Fatigue, Recovery, Psychological Distress and Burnout During the COVID-19 Pandemic: Examining the Role of Organisational Support. *J Adv Nurs*, *82*(3), 2216-2231. https://doi.org/10.1111/jan.17067
15. Deng, Y., Mo, B., Xu, B., Wang, L., Lai, J., & Zhao, C. (2026). The second victim of adverse events in health care: A systematic review of qualitative research. *Int J Nurs Stud*, *173*, 105248. https://doi.org/10.1016/j.ijnurstu.2025.105248
16. Draus, C., Mianecki, T. B., Musgrove, H., Bastien, D. J., Greggs, D., Halash, C., Larry-Osman Bellamy, C., Lewis, A., & Mackenzie, W. (2022). Perceptions of Nurses Who Are Second Victims in a Hospital Setting. *J Nurs Care Qual*, *37*(2), 110-116. https://doi.org/10.1097/NCQ.0000000000000603

17. Edmondson, A. (2016). Psychological Safety and Learning Behavior in Work Teams. *Administrative Science Quarterly*, *44*(2), 350-383. https://doi.org/10.2307/2666999
18. Edrees, H., Connors, C., Paine, L., Norvell, M., Taylor, H., & Wu, A. W. (2016). Implementing the RISE second victim support programme at the Johns Hopkins Hospital: a case study. *BMJ Open*, *6*(9), e011708. https://doi.org/10.1136/bmjopen-2016-011708
19. Fisher, S., Blau, A., & Gendler, Y. (2025). The Silent Struggle: An Integrative Review of PTSD Symptoms in Second Victim Experiences Among Nurses. *Int Nurs Rev*, *72*(2), e70049. https://doi.org/10.1111/inr.70049
20. Hobfoll, S. E. (1989). Conservation of resources. A new attempt at conceptualizing stress. *Am Psychol*, *44*(3), 513-524. https://doi.org/10.1037//0003-066x.44.3.513
21. Huang, R., Sun, H., Chen, G., Li, Y., & Wang, J. (2022). Second-victim experience and support among nurses in mainland China. *J Nurs Manag*, *30*(1), 260-267. https://doi.org/10.1111/jonm.13490
22. Jeong, S., Kim, S., Chang, H. E., & Jeong, S. H. (2025). How does just culture reduce negative work outcomes through second victim distress and demand for support in clinical nurses? A path analysis. *BMC Nurs*, *24*(1), 192. https://doi.org/10.1186/s12912-025-02685-x
23. Johns, G. (2009). Presenteeism in the workplace: A review and research agenda. *Journal of Organizational Behavior*, *31*(4), 519-542. https://doi.org/10.1002/job.630
24. Krzan, K. D., Merandi, J., Morvay, S., & Mirtallo, J. (2015). Implementation of a "second victim" program in a pediatric hospital. *Am J Health Syst Pharm*, *72*(7), 563-567. https://doi.org/10.2146/ajhp140650
25. Kumah, A. (2025). Adverse event reporting and patient safety: the role of a just culture. *Front Health Serv*, *5*, 1581516. https://doi.org/10.3389/frhs.2025.1581516
26. Lake, E. T. (2002). Development of the practice environment scale of the Nursing Work Index. *Res Nurs Health*, *25*(3), 176-188. https://doi.org/10.1002/nur.10032
27. Lau, Y., & Wong, D. F. (2008). Are concern for face and willingness to seek help correlated to early postnatal depressive symptoms among Hong Kong Chinese women? A cross-sectional questionnaire survey. *Int J Nurs Stud*, *45*(1), 51-64. https://doi.org/10.1016/j.ijnurstu.2006.08.002
28. Li, X., Chong, M. C., Che, C. C., Li, Y., Wang, L., Dong, A., & Zhong, Z. (2024). Barriers and Facilitators to Coping with Second Victim Experiences: Insights from Nurses and Nurse Managers. *J Nurs Manag*, *2024*, 5523579. https://doi.org/10.1155/2024/5523579
29. Lin, P. S., Viscardi, M. K., & McHugh, M. D. (2014). Factors influencing job satisfaction of new graduate nurses participating in nurse residency programs: a systematic review. *J Contin Educ Nurs*, *45*(10), 439-450; quiz 451-432. https://doi.org/10.3928/00220124-20140925-15
30. Lin, R. T., Lin, Y. T., Hsia, Y. F., & Kuo, C. C. (2021). Long working hours and burnout in health care workers: Non-linear dose-response relationship and the effect mediated by sleeping hours-A cross-sectional study. *J Occup Health*, *63*(1), e12228. https://doi.org/10.1002/1348-9585.12228
31. Lv. (2023). Occupational well-being and its influencing factors among healthcare workers in 21 integrated medical and elderly care institutions in Guizhou Province. (2023). Occupation and Health, 39(14), 1959–1963. https://doi.org/10.13329/j.cnki.zyyjk.2023.0400 (in Chinese)
32. Mahat, S., Lehmusto, H., Rafferty, A. M., Vehvilainen-Julkunen, K., Mikkonen, S., & Harkanen, M. (2025). Impact of second victim distress on healthcare professionals' intent to leave, absenteeism and resilience: A mediation model of organizational support. *J Adv Nurs*, *81*(9), 5376-5388. https://doi.org/10.1111/jan.16291
33. Mahat, S., Rafferty, A. M., Vehvilainen-Julkunen, K., & Harkanen, M. (2025). Registered nurses' emotional responses to medication errors and perceived need for support: A qualitative descriptive analysis. *J Adv Nurs*, *81*(9), 5458-5471. https://doi.org/10.1111/jan.16280
34. Mohammadi, M. M., Nayeri, N. D., Varaei, S., & Rasti, A. (2021). The nurse without a nurse: the antecedents of presenteeism in nursing. *BMC Nurs*, *20*(1), 143. https://doi.org/10.1186/s12912-021-00669-1
35. Muthen, B., & Muthen, L. K. (2000). Integrating Person-Centered and Variable-Centered Analyses: Growth Mixture Modeling With Latent Trajectory Classes. *Alcoholism: Clinical and Experimental Research*, *24*(6), 882-891. https://doi.org/10.1111/j.1530-0277.2000.tb02070.x
36. Naya, K., Aikawa, G., Ouchi, A., Ikeda, M., Fukushima, A., Yamada, S., Kamogawa, M., Yoshihara, S., & Sakuramoto, H. (2023). Second victim syndrome in intensive care unit healthcare workers: A systematic review and meta-analysis on types, prevalence, risk factors, and recovery time. *PLoS One*, *18*(10), e0292108. https://doi.org/10.1371/journal.pone.0292108
37. Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the Number of Classes in Latent Class Analysis and Growth Mixture Modeling: A Monte Carlo Simulation Study. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*(4), 535-569. https://doi.org/10.1080/10705510701575396
38. Orlowska, A., & Laguna, M. (2023). Structural and Psychological Empowerment in Explaining Job Satisfaction and Burnout in Nurses: A Two-Level Investigation. *J Nurs Manag*, *2023*, 9958842. https://doi.org/10.1155/2023/9958842
39. Scott, S. D., Hirschinger, L. E., Cox, K. R., McCoig, M., Brandt, J., & Hall, L. W. (2009). The natural history of recovery for the healthcare provider "second victim" after adverse patient events. *Qual Saf Health Care*, *18*(5), 325-330. https://doi.org/10.1136/qshc.2009.032870
40. Seys, D., Wu, A. W., Van Gerven, E., Vleugels, A., Euwema, M., Panella, M., Scott, S. D., Conway, J., Sermeus, W., & Vanhaecht, K. (2013). Health care professionals as second victims after adverse events: a systematic review. *Eval Health Prof*, *36*(2), 135-162. https://doi.org/10.1177/0163278712458918
41. Shao, Y., Li, S., Wei, L., Shan, X., Zhou, D., Zhang, Y., & Wei, H. (2023). Nurses' second victim experience, job insecurity, and turnover intention: A latent profile analysis. *Res Nurs Health*, *46*(3), 360-373. https://doi.org/10.1002/nur.22313
42. Tang, W., Xie, Y., Yan, Q., Teng, Y., Yu, L., Wei, L., Li, J., Chen, Y., Huang, X., Yang, S., & Jia, K. (2024). Exploring the Experiences and Support of Nurses as Second Victims After Patient Safety Events in China: A Mixed-Method Approach. *Risk Manag Healthc Policy*, *17*, 573-586. https://doi.org/10.2147/RMHP.S451766

43. Tingzhen, Y., Zubir, A., & Faudzi, F. N. M. (2026). A cognitively-sensitized stigma model of help-seeking inhibition in generalized anxiety disorder: A conceptual framework illustrated in the Chinese cultural context. *Acta Psychol (Amst)*, *262*, 106021. https://doi.org/10.1016/j.actpsy.2025.106021

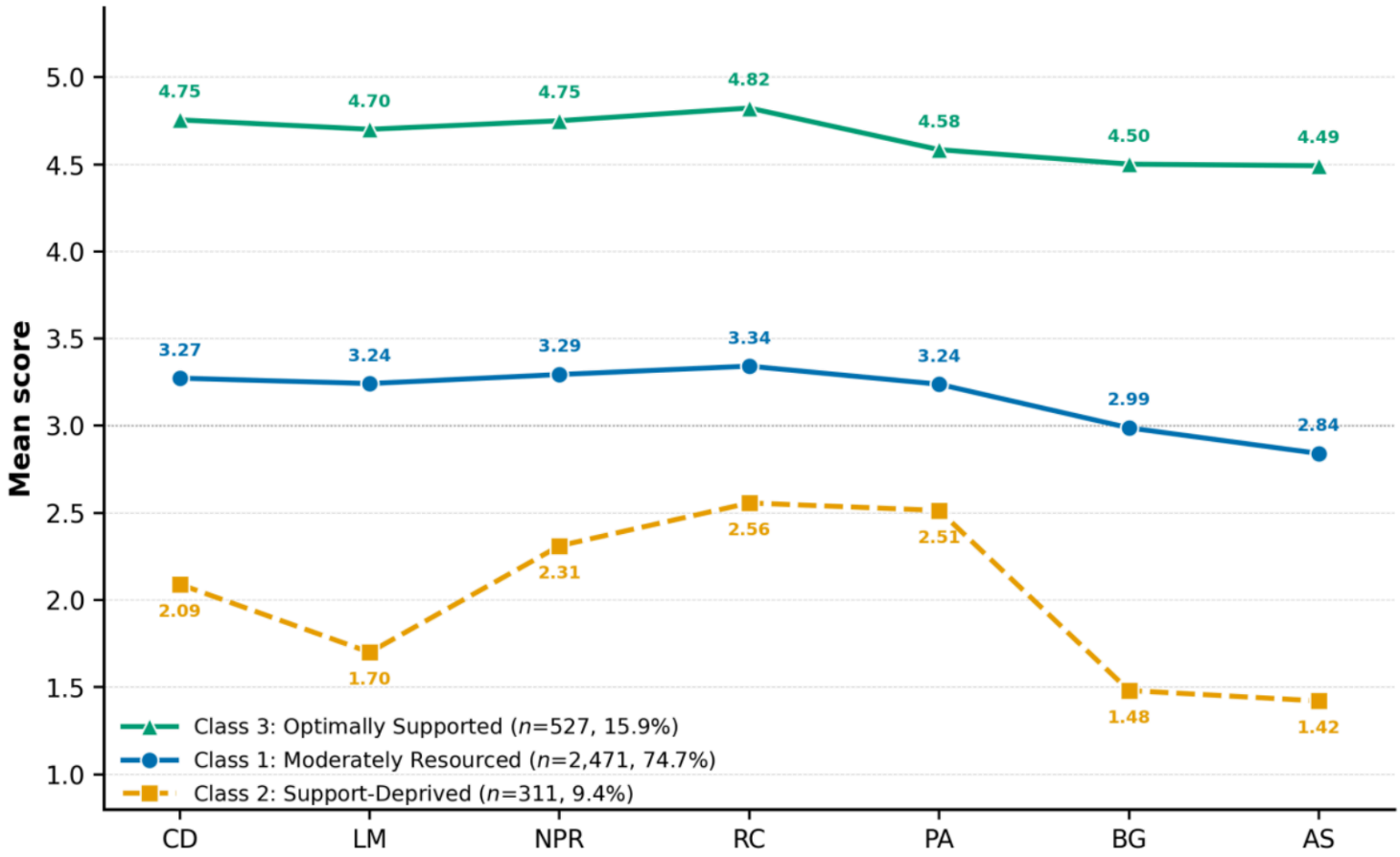
44. Wu, A. W. (2000). Medical error: the second victim. *West J Med*, *172*(6), 358-359. https://doi.org/10.1136/ewjm.172.6.358

45. Xiong, W., Liao, C., Zhang, C., Liang, Y., Xiong, W., & Zhu, A. (2024). Perception and needs: a qualitative study on sense of job security among nurses in central and western China. *BMJ Open*, *14*(4), e081169. https://doi.org/10.1136/bmjopen-2023-081169

46. Ye. (2016). Development and reliability and validity study of the Nursing Work Environment Scale. (2016). Chinese Journal of Nursing, 51(02), 142–147.https://kns.cnki.net/kcms2/article/abstract?v=hyKDWyHWvTuX47R6P0CgBLcdjLtybBBj7Z6J0-YNdO4Sg-s6yKDzihdd49YsuxThkd9azd29vh1qsSpiMBywnuyGc_djF4QrrMtUdfaycQ1mTCSGFeX1i7ojiIXbwruoF3Vu69Cxyy90UEYDCWPGkLFVQ87Y3iM9GngglhJ6D_py-05GQD0kU1IAX_H&uniplatform=NZKPT&language=CHS (in Chinese)

47. Zong, W., Qiu, J., Chen, L., Zhang, M., Wang, X., Yin, X., & Wei, J. (2026). The impact of received support on distressing experiences among nurses as second victims: the mediating role of psychological capital. *BMC Nurs*, *25*(1). https://doi.org/10.1186/s12912-026-04515-0

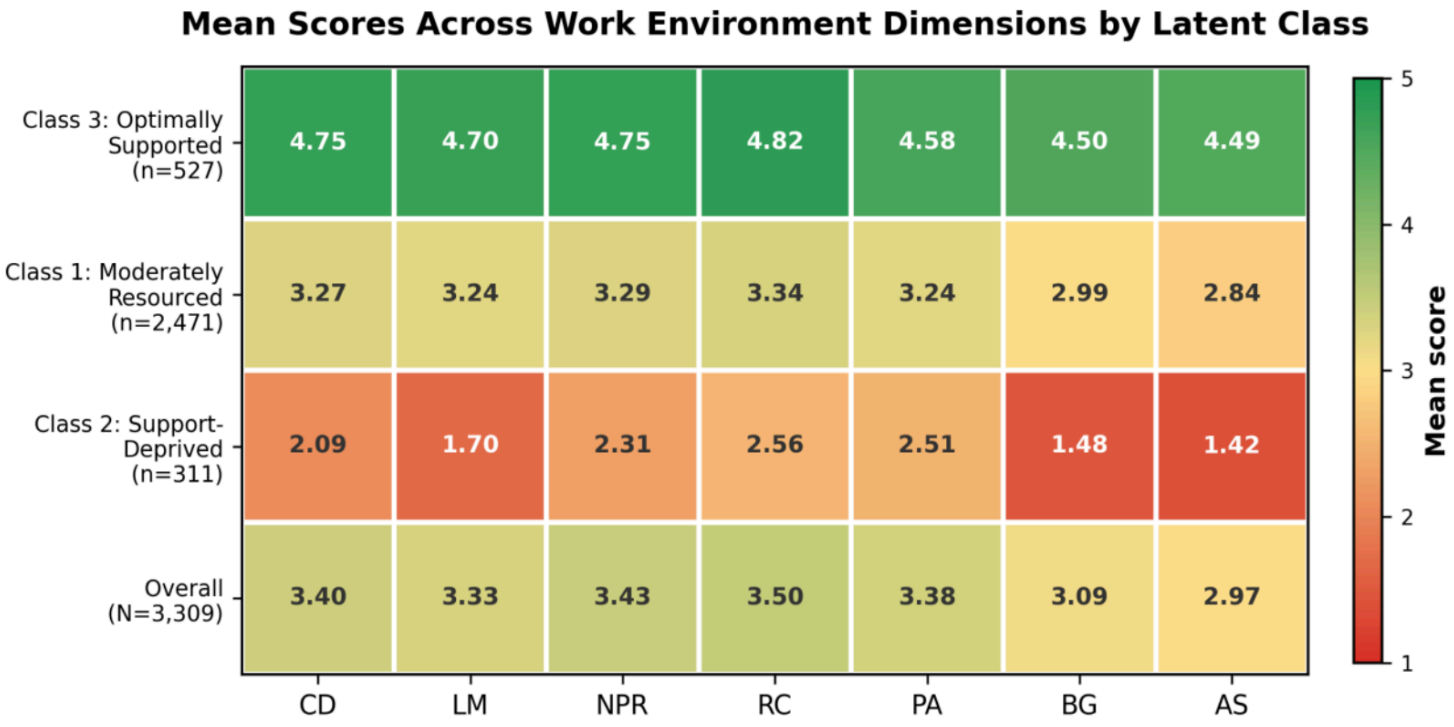
Figures



Note. CD = Career Development; LM = Leadership & Management; NPR = Nurse-Physician Relationship; RC = Recognition Climate; PA = Professional Autonomy; BG = Basic Guarantees; AS = Adequate Staffing. Scores range from 1 to 5; higher scores indicate a more favorable work environment. Dotted line = scale midpoint.

Figure 1

Latent profile plot of the three classes across seven work environment dimensions (*N* = 3,309).



Note. CD = Career Development; LM = Leadership & Management; NPR = Nurse-Physician Relationship; RC = Recognition Climate; PA = Professional Autonomy; BG = Basic Guarantees; AS = Adequate Staffing. Scores range from 1 to 5; Red = Low, Yellow = Mid, Green = High.

Figure 2

Heatmap of mean scores across work environment dimensions by latent class (*N* = 3,309).

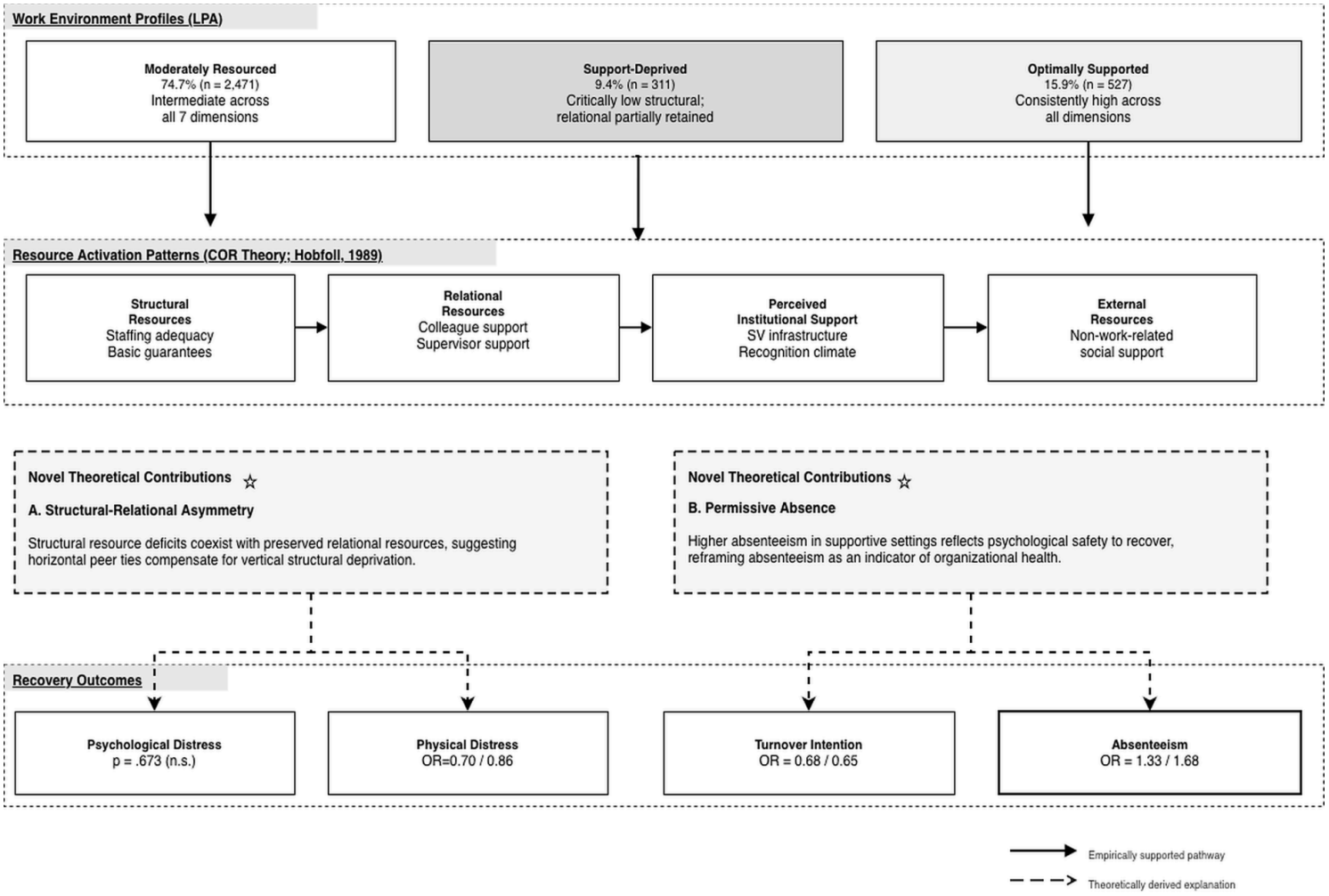


Figure 3

A Resource-Pathway Framework for Second Victim Recovery Across Nursing Work Environment Profiles.

Note. LPA = latent profile analysis; COR = conservation of resources; OR = odds ratio (reference category: Support-Deprived profile). Solid arrows represent empirically supported pathways from multinomial logistic regression; dashed arrows represent theoretically derived explanations emerging from the data. Shading intensity of the Support-Deprived profile box indicates severity of resource deprivation. The framework integrates two novel theoretical contributions: (A) Structural-Relational Asymmetry and (B) Permissive Absence. Grounded in COR theory (Hobfoll, 1989).

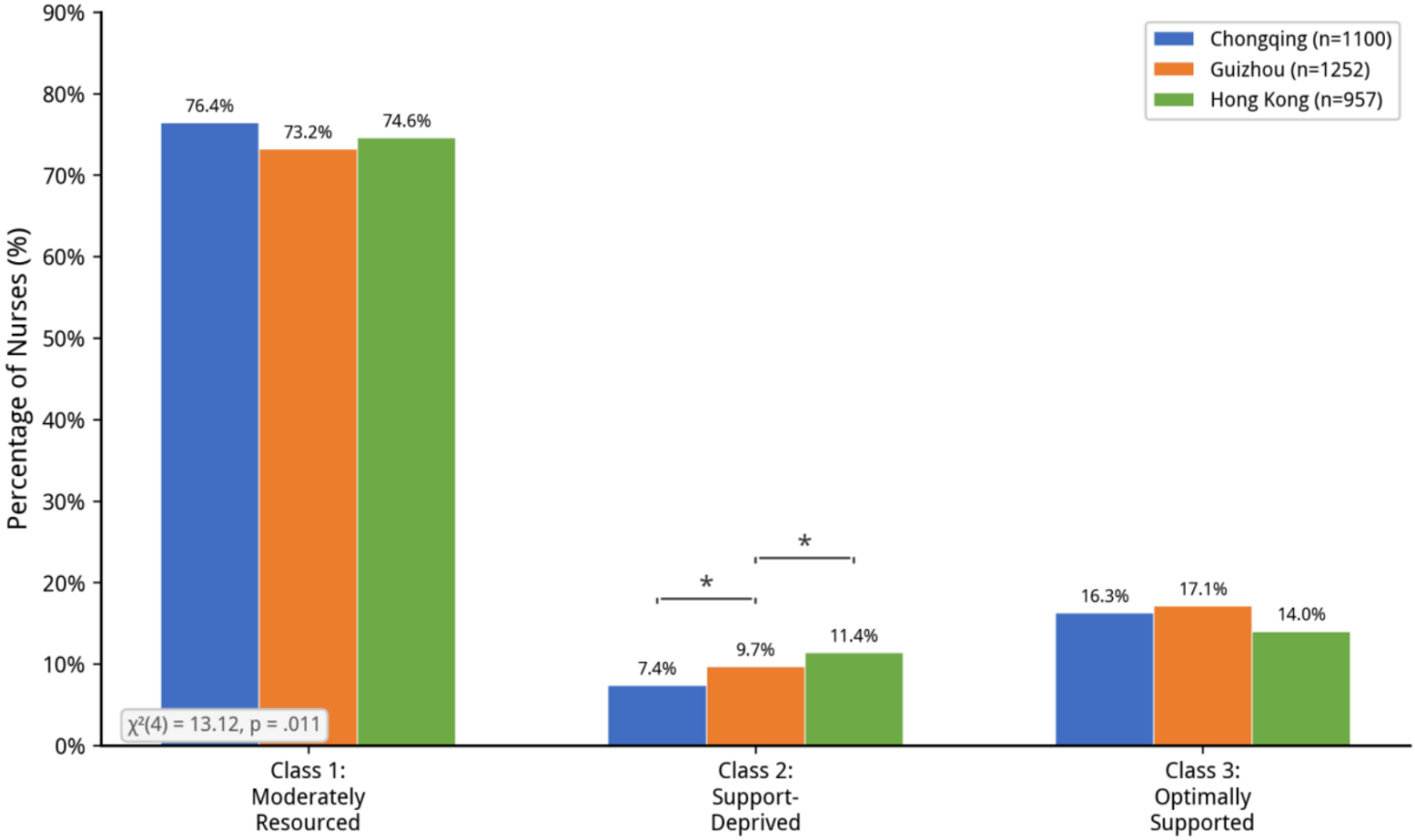


Figure 4

Distribution of work environment latent profiles across three regions (*N* = 3,309).

$\chi^2(4) = 13.12$, $p = .011$. * $p < .05$ (Bonferroni-corrected pairwise comparison). Percentages within each city sum to 100%.