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Career plateau among nurse managers in China: a mixed-methods study with a quantitative-dominant triangulation design of social media discourse and a multi-province convenience survey

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Abstract

Background: Nurse managers occupy a structurally constrained position between hospital administration and bedside nursing, yet career plateau — the perceived cessation of further hierarchical, content and centralisation mobility — has been studied almost exclusively among staff nurses. This study examined the level, protective resources and structural patterning of career plateau among nurse managers in China, and how hospital level operates through those resources.

Methods: We used a mixed-methods design with a quantitative-dominant triangulation (QUAN + qual) framed by career-plateau theory and role theory. The quantitative strand was a cross-sectional online survey of 624 incumbent nurse managers across mainland China (87.8% tertiary grade A hospitals) measuring career plateau, perceived organisational support, career planning, workplace resilience and healthcare resilience. Hypotheses were tested with latent-variable structural equation modelling and 5,000 bootstrap resamples, with observed-score regression, quantile regression and a random-forest model as sensitivity analyses. The qualitative strand analysed 1,502 coded units from 1,921 public Chinese social-media posts retrieved with an 18-phrase search across six platforms. Rather than nurse managers' own speech, the corpus is a public discourse field in which the position is constructed by three speaking positions — head nurses (8.6% of units), the clinical nurses they manage (46.5%) and the nursing managers above them (44.9%).

Results: Career plateau was moderate-to-low (2.63 ± 0.61 on a 1–6 scale) and lower in tertiary than hospitals of other levels (2.61 vs 2.81; $p = 0.003$; Cliff's $\delta = -0.21$). In the latent structural model (CFI = 0.986, TLI = 0.981, RMSEA = 0.054; $R^2 = 0.74$), career planning ($\beta = -0.438$, $p < 0.001$) and perceived organisational support ($\beta = -0.421$, $p < 0.001$) were the dominant protective factors; workplace resilience contributed less ($\beta = -0.117$, $p = 0.002$) and healthcare resilience was not significant. Mediation was indirect-only through career planning (−0.078, 95% CI −0.139 to −0.020); the direct effect of hospital level was not significant. Quantile regression did not establish a distributional gradient: although the point estimates were largest at the upper end of the plateau distribution, a joint Wald test of slope equality across quantiles did not reject homogeneity, so the protective associations are best described as holding across the whole outcome distribution rather than being confined to one end of it. In the discourse field, superior–subordinate relations (27.0% of units) and promotion and career development (24.4%) were the largest themes; sentiment towards the position was more often negative (32.3%) than positive (7.2%), and negativity was markedly more common among clinical nurses (52.7% of their units) than among head nurses themselves (31.8%).

Conclusions: Career plateau among Chinese nurse managers is moderate-to-low but structurally patterned. The advantage of tertiary grade A hospitals is conveyed through more active career planning rather than through organisational support or hospital level itself, and the protective resources of career planning and organisational support operate across the whole range of plateau rather than only among the most affected managers. The discourse field adds a structural observation the survey cannot make: the nurse-manager position is publicly defined mainly by those above and below it, with criticism arriving from below. Institutionalised career-planning pathways, with hospitals below tertiary grade A given priority, are therefore the most promising intervention target.

Keywords: Career plateau; Nurse managers; Head nurses; Career planning; Perceived organisational support; Psychological resilience; Mixed methods research; Social media; China

Background

Nursing is the largest occupational group in health care, and the stability of the nursing workforce is a precondition for universal health coverage. The 2025 State of the World's Nursing report estimated a global stock of 29.8 million nurses in 2023, but also a persistent shortage of 5.8 million, projected to fall only to 4.1 million by 2030; it further warned that aggregate progress masks deep regional inequity and explicitly called for stronger nursing leadership pathways and for investment in the next generation of nurse leaders [1]. China illustrates both the scale of the expansion and the structural pressure that accompanies it: by the end of 2024 the country had 6.062 million registered nurses, or 4.32 per 1,000 population, against a background of rapid population ageing and rising service volume [2]. Within this workforce, the nurse manager — the head nurse who translates hospital policy into bedside practice — occupies a central position. She

is simultaneously the recipient of administrative directives and the principal source of support available to frontline nurses, so her own retention determines the stability of the layer beneath her.

That position is also structurally exposed. A recent systematic review of 35 studies identified 155 factors influencing nurse manager retention, intention to stay or turnover, and concluded that managers who were empowered, satisfied, received constructive feedback and found meaning in their roles showed greater intent to stay [3]. A cross-sectional study of 380 nurse managers in western China found work stress to be negatively correlated with perceived organisational support, and identified secondary-hospital affiliation, emergency or paediatric wards and middle-rank professional titles as stress-amplifying conditions [4]; a survey of 495 head nurses reported a stress score of 77.68 ± 13.86 and identified hospital level, tenure and department as determinants [5]. A qualitative synthesis of nurses who had resigned found poor management practices in 100% of the included studies, with a lack of career growth and promotion opportunities among the core reasons for leaving [6]. Read together, this literature describes a group that is expected to supply support to others while occupying an occupational niche in which advancement is structurally scarce — the classical conditions for a career plateau.

Career plateau has been defined as the point in a career at which the likelihood of further promotion becomes very low [7], and has subsequently been differentiated into forms reflecting, respectively, the pyramid of available positions, the exhaustion of job challenge, and a generalised sense of being stuck [7]. In its contemporary, social-cognitive reading, plateau has been linked to reduced job performance [8]. Tremblay and colleagues reframed plateau as a subjective as well as an objective state and located its antecedents at individual, family and organisational levels, a framework that remains the most widely used in health-care research [9]. A review of four decades of empirical work, covering 72 studies, concluded that plateaued individuals report poorer satisfaction, well-being, performance and commitment and stronger turnover intentions, and attributed these outcomes to the perception that the organisation no longer supports them; the same review identified proactivity and the granting of additional responsibility as the two antecedents most consistently and negatively related to plateau [7]. Plateau is therefore not a personal failure of adaptation but a perceived rupture in the exchange relationship between employee and employer, which makes perceived organisational support and career planning the theoretically central buffers.

In nursing, the empirical literature has grown but remains narrowly targeted. A prediction model developed on 2,680 nurses from six tertiary hospitals reported a career-plateau prevalence of 34% and identified organisational support, promotion space, life satisfaction and position as influencing factors [10]. A qualitative study of nine nurses who had resigned because of blocked advancement found that they experienced disappointment with the present and uncertainty about the future, and attributed their plateau both to unmet personal needs and to an absence of organisational support [11]. In Chinese samples, career plateau predicted job burnout both directly and indirectly through psychological capital, which mediated 40.7% of the total effect among 1,100 tertiary-hospital nurses [12], and organisational support emerged as an independent correlate of plateau among senior psychiatric nurses [13]. What is striking is that virtually all of this work concerns clinical or specialist nurses. Studies addressed specifically to nurse managers

are almost absent: the one identifiable Chinese report, surveying 160 head nurses in Tianjin, found a moderate plateau level (2.85 ± 0.52) with the highest score on the hierarchical dimension (3.66 ± 0.79) and identified age as the principal predictor [14]. That study was published in 2011, was confined to a single municipality, and examined neither protective resources nor mechanisms. We therefore still lack a contemporary, multi-province estimate for this group and have no evidence at all on how structural advantage is translated into individual protection.

Three candidate protective resources follow from the theory. Perceived organisational support − the belief that the organisation values one's contribution and cares about one's well-being [15], first operationalised for Chinese samples by Chen [16] and later adapted for nursing research as a 13-item two-dimension measure that distinguishes emotional from instrumental support [17, 18] — is the direct antidote to the exchange rupture described above, and has been shown to shape Chinese nurses' occupational well-being both directly and through professional quality of life and perceptions of decent work [18]. Career planning, conceptualised within an equity-exchange framework of organisational involvement [19], is the behavioural counterpart: it is the proactive stance that the four-decade review identified as the most consistent negative antecedent of plateau [7], and its converse — career compromise — has been shown to raise nurses' turnover intention through reduced job satisfaction [20]. Resilience is the third candidate: a meta-analysis of 29 studies reported an inverse association with burnout ($r = -0.41$) as well as with exhaustion and depersonalisation [21], and a systematic review of organisational strategies to advance women nurses into leadership identified career planning and coaching, mentorship, sponsorship and networking as the principal levers [22]. What remains unknown is the relative weight of these three resources within a single model, whether any of them actually transmits a structural advantage such as hospital level, and whether their protective effect is uniform across the outcome distribution — questions that single-time-point correlation designs cannot answer.

A second gap is methodological. Nearly all existing evidence rests on self-report questionnaires administered in a hierarchical workplace, where social desirability is a live concern. Naturally occurring social-media discourse offers a complementary window: it is spontaneous, relatively anonymous and not solicited by researchers. Its value has been demonstrated in a mixed-methods analysis of 10,164 Chinese social-media posts on nurse burnout, which concluded that burnout is a systemic rather than an individual phenomenon and identified limited career-advancement opportunity as one of the largest themes [23]; the same logic has been applied to Chinese platform discourse on nursing education and professional identity [24]. Such discourse is best read not as a sample of any one group's opinions but as a field in which a position is constructed by several speaking positions at once — the incumbents, those they manage and those who manage them. Reading it through Katz and Kahn's role theory [25] is particularly apt for nurse managers, who stand between two role senders — hospital administration and bedside staff — whose expectations are frequently incompatible; role tension of exactly this kind is expected to amplify the experience of stagnation even when objective conditions are unchanged [9, 26]. If that is so, the three positions should talk about the same role in systematically different ways, and the pattern of difference should be visible in the corpus.

We therefore conducted a mixed-methods study with a quantitative-dominant triangulation design with three aims: (i) to estimate the level of career plateau among nurse managers in China and its

association with perceived organisational support, career planning and resilience; (ii) to test whether the hospital-level difference in plateau is explained by these resources, using latent-variable modelling that corrects the path estimates for measurement error together with bootstrapped mediation; and (iii) to situate the quantitative findings against naturally occurring Chinese social-media discourse, treating that discourse as a multi-position field rather than as nurse managers' own testimony. We hypothesised that all four protective resources would be negatively associated with career plateau (H1); that nurse managers in tertiary grade A hospitals would report lower plateau than their counterparts in hospitals of other levels (H2); and that this hospital-level difference would be mediated by career planning and perceived organisational support (H3).

Methods

Study design and theoretical framework

We employed a mixed-methods design with a quantitative-dominant triangulation (QUAN + qual), in which a quantitative cross-sectional multi-province convenience survey and a qualitative directed content analysis of naturally occurring social-media discourse were collected independently and integrated at the interpretation stage through a joint display and meta-inferences [26]. The quantitative strand was weighted as dominant for hypothesis testing and effect-size estimation, while the qualitative strand served as a complementary, mechanism-explaining component.

The study was framed by two complementary theories. The primary framework was career-plateau theory, which defines career plateau as the perceived diminution of further hierarchical (upward), content (job enrichment) and centralisation (access to the core of the organisation) mobility, and locates its antecedents at individual, family and organisational levels [9]. Katz and Kahn's role theory (1978) was used as a secondary lens to interpret the qualitative discourse, where the nurse manager is caught between incompatible expectations from multiple role senders (hospital administration versus bedside nurses), producing role tension that amplifies plateau experiences [25]. These three facets were operationalised with the 16-item Career Plateau Questionnaire [27], whose hierarchical, content and centralisation subscales correspond to the three dimensions described above.

Quantitative strand (QUAN)

Participants and procedure

A cross-sectional online survey was conducted among incumbent nurse managers (head nurses) across mainland China. Inclusion criteria were: (a) currently holding a nurse-manager position (head nurse or above); (b) providing informed consent; and (c) completing the questionnaire online. The questionnaire was hosted on the Wenjuanxing (Questionnaire Star) platform and distributed through professional WeChat groups, enterprise WeChat and direct links shared by hospital nursing departments. Of the 624 valid responses, 571 (91.5%) were submitted via

WeChat, 47 (7.5%) via the mobile client, 5 via enterprise WeChat and 1 via a direct link. A total of 624 valid responses were collected between 9 and 10 September 2026. Hospital level was administered as five ordered options (community health centre or township health centre, secondary grade B, secondary grade A, tertiary grade B, tertiary grade A); the achieved distribution was tertiary grade A n = 548 (87.8%), tertiary grade B n = 46 (7.4%) and secondary grade A n = 30 (4.8%), with no respondents from community or township facilities or from secondary grade B hospitals, across multiple provinces. Non-incumbent or invalid responses were excluded during cleaning. Because hospital level was concentrated at the upper end of the scale, the analysis contrasts tertiary grade A hospitals with all other levels; the resulting comparison group (n = 76) comprises 46 participants from tertiary grade B and 30 from secondary grade A hospitals and is treated as an exploratory cohort with acknowledged limited power. No a priori power calculation was performed: the sample size was determined by the number of eligible responses returned during the fixed 48-hour collection window (9–10 September 2026). With n = 624 the primary latent structural model is amply supplied relative to the number of freely estimated parameters, whereas the comparison subgroup (n = 76) affords limited power and its comparisons are treated as exploratory.

Measurements

All constructs were measured with validated instruments administered in Chinese. Unless stated otherwise the response format was Likert-type (1 = strongly disagree to 6 = strongly agree). Career plateau was measured with the 16-item Career Plateau Questionnaire developed and validated in Chinese occupational samples by Xie, Long and Zhao [27], which comprises hierarchical (4 items), content (6 items) and centralisation (6 items) plateau — respectively the perceived limit on further upward promotion, on learning and enrichment within the present job, and on lateral movement towards the centre of the organisation. Twelve of the 16 items are positively worded (for example promotion prospects, learning and voice) and were reverse-scored, so that a higher composite indicates a higher level of career plateau. The 16 items were scored as a single career-plateau composite; the choice to treat the three subdimensions as one score rather than as separate latent factors is justified by the psychometric evaluation below, where the three dimensions proved empirically non-separable in this sample (a second-order structure changed CFI by only −0.007 and the bifactor ω hierarchical was 0.916). Perceived organisational support (POS) was measured with the two-dimension Chinese POS instrument of Chen [16] in its 13-item nursing adaptation by Zuo and Yang [17]; the two dimensions are emotional support (items 1–10) and instrumental support (items 11–13), mirroring the source scale's distinction between affective and instrumental support. Career planning was measured with the self career-management instrument of Long [28] in its 14-item nursing adaptation [29], which covers goal setting and strategy (4 items), continuing learning (4), self-presentation (3) and relationship building (3). Because this nursing adaptation is reported in a Chinese-language thesis that is not indexed in international bibliographic databases, the 14 items as administered, together with their original response anchors, are reproduced in full in Supplementary File S4. Workplace resilience was measured with the 19-item Chinese version of the Workplace Resilience Scale [30]; its validation study reported a Cronbach's α of 0.956 and four dimensions (proactive problem solving, team efficacy, confidence building and bricolage). Twenty items of this instrument were administered in the present survey; the 20th (thinking through what to do next

when situations become chaotic) was excluded from scoring in order to reproduce the validated 19-item Chinese form of Zhang et al. [30], and it is not analysed here. This exclusion is inconsequential: adding item 20 raised Cronbach's α from 0.973 to 0.975 and omega from 0.976 to 0.977, and the item correlated 0.861 with the 19-item mean score, so no reported result depends on it. Healthcare resilience was measured with the 18-item Medical Staff Resilience Scale, which was developed and validated in a four-dimension Chinese model of decision-making and coping, interpersonal connection, rational thinking and flexible adaptation [31]. Demographic items covered age, gender, tenure, management tenure, professional title, education, marital status, department, weekly working hours, hospital nature and hospital level.

Psychometric evaluation

Although Cronbach's α is a lower-bound estimate under tau-equivalence and has known limitations, McNeish (2017) argues it remains a serviceable and widely interpretable reliability estimate for most applied purposes [32]; we additionally computed McDonald's ω, composite reliability (CR) and average variance extracted (AVE) from the standardised loadings of single-factor confirmatory factor analysis (CFA) models, following current SEM best-practice recommendations for reporting reliability and validity [33]. Discriminant validity was assessed with the heterotrait–monotrait ratio of correlations (HTMT) [34].

For the structural models we used item parcelling: within each scale, items were ordered by their loading on the first unrotated principal component and sequentially allocated to three parcels in a round-robin (item-to-construct balance) sequence, giving three parcels per construct and 15 parcels overall [35]. Parcelling improves the variable-to-sample ratio, stabilises estimation and reduces the local item dependence that inflates misfit in single-factor CFA models of scales containing similarly worded items. A five-correlated-factors measurement model was estimated by maximum likelihood and judged against conventional criteria (CFI and TLI ≥ 0.95, RMSEA ≤ 0.06) [36]. The number of parcels was fixed at three per construct for all five scales so that every construct entered the structural models with the same number of indicators and with comparable indicator reliability. These parcels are balancing devices rather than substantive subscales: for the multidimensional source instruments — career planning (four subscales), perceived organisational support (two), workplace resilience (four), healthcare resilience (four) and career plateau (three) — the three parcels do not map one-to-one onto the published subdimensions, and no subscale-level hypothesis is tested. Workplace resilience therefore enters the model as a single workplace-resilience factor and not as the four dimensions of its validation study, and the same applies to the other multidimensional scales.

Common-method bias

All constructs were self-reported, so common-method variance was evaluated with the unmeasured latent method factor (ULMC) technique rather than Harman's single-factor test, which is now regarded as insensitive and obsolete [37]. A single method factor was specified to load on all 15 parcels and was constrained to be orthogonal to the five substantive factors. Model comparison used the change in CFI (ΔCFI) between the baseline measurement model and the ULMC model, together with the average variance explained by the method factor; $\Delta CFI \leq 0.01$ indicates that common-method variance is not substantial [37].

Primary analysis: latent-variable structural equation modelling

Hypotheses were tested with a latent-variable structural equation model (SEM) fitted by maximum likelihood. The career-plateau latent variable was regressed on perceived organisational support, career planning, workplace resilience, healthcare resilience, hospital level (tertiary grade A = 1 versus all other levels = 0), age and tenure; the four putative mediators were simultaneously regressed on hospital level, age and tenure. Because self-reported mediators share unmeasured common causes (for example dispositional affect and unit climate), residual covariances among the four mediators were freely estimated; a model that omitted these covariances misfitted (RMSEA = 0.132) and was rejected. Specific indirect effects were obtained by bootstrapping the entire model with 5,000 resamples and are reported as unstandardised indirect effects with bias-corrected percentile 95% confidence intervals [38]. Relative to observed-score regression, this latent specification disattenuates the path estimates for measurement error.

Sensitivity and supplementary analyses

Group comparisons across the three hospital levels used the Kruskal–Wallis test with Dunn–Bonferroni post-hoc tests, and tertiary-grade-A versus other-level comparisons used the Mann–Whitney U test with Cliff's delta; associations among observed composites used Spearman's rho. These non-parametric analyses were retained because the composites were moderately non-normal (Shapiro–Wilk; see Results). An observed-score multiple linear regression with the same predictors served as a sensitivity analysis, with variance inflation factors and the Durbin–Watson statistic inspected. To test whether the protective associations were uniform across the outcome distribution, quantile regression was estimated at $\tau = 0.10, 0.25, 0.50, 0.75$ and 0.90 [39]. To verify that a linear specification was adequate, a random-forest model with five-fold cross-validation and permutation importance was compared with the linear model [40]. No item-level missingness occurred: all 624 respondents returned complete data on every analysis variable (57,408 of 57,408 cells present across 92 variables), so neither imputation nor listwise deletion was required. Analyses used Python (pandas, scipy, statsmodels, semopy, scikit-learn) with a fixed random seed (20260919).

Qualitative strand (QUAL)

Data source and search strategy

The qualitative strand analysed publicly posted Chinese social-media content concerning the nurse-manager position. We use the term public discourse field deliberately: the corpus is not a sample of nurse managers' own speech, but the body of publicly visible talk in which the nurse-manager position is constructed, contested and evaluated by three different speaking positions — head nurses themselves, the clinical nurses they manage, and the senior nursing managers above them. Distinguishing these positions is substantively central rather than a coding nuisance, because role theory locates the nurse manager between incompatible role senders, and a discourse field that contains all three positions can show that tension directly.

Posts were retrieved from six major Chinese platforms (Zhihu, Douyin, Bilibili, Weibo, Toutiao and Xiaohongshu), supplemented by a long tail of smaller news, hospital and institutional outlets. The search combined the seed term head nurse with 18 Chinese search phrases organised a priori

into six thematic domains listed in Supplementary Table S1 (for example promotion, do not want to be a head nurse, scheduling authority, being made difficulties by a superior). Collection used a browser-driven script that read public search results only; no login-gated, private or paywalled content was accessed, and no platform authentication was used to reach material unavailable to an ordinary visitor. The corpus spans 2017–2026.

After de-duplication, 1,921 records constituted the retrieved corpus; 172 records were excluded because no analysable text could be retrieved, leaving 1,749; after merging pseudo-replicates (multiple answers posted under the same Zhihu question were treated as one analytic unit), 1,502 finally coded units remained and constitute the analysis set (Figure 1). A stricter relevance subset (n = 631, units passing the three-question relevance test) was analysed separately as a sensitivity check; because the thematic ordering was materially unchanged, the full 1,502-unit set is reported as primary. Because the material is publicly accessible and individuals cannot be identified or re-consented, no individual consent was sought; only aggregated discourse was analysed, and original posts were neither redistributed nor quoted verbatim (paraphrased, de-identified fragments with platform-level attribution only).

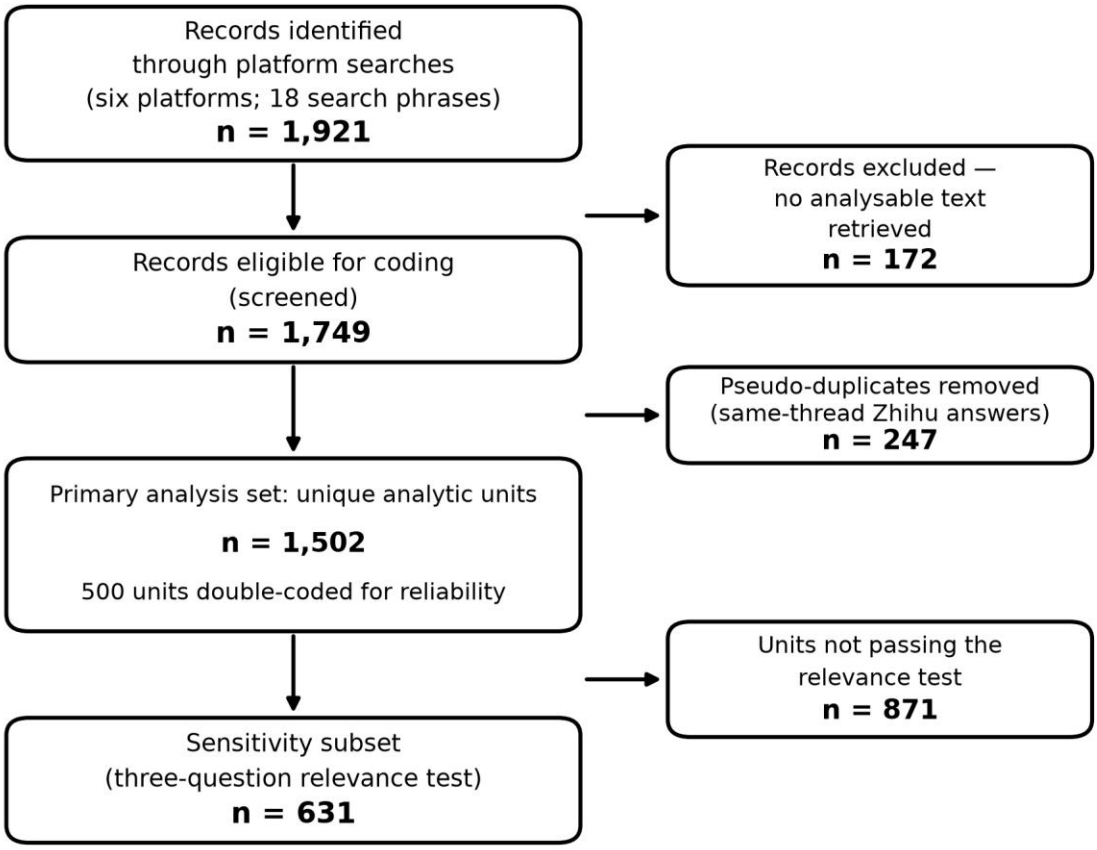


Figure 1. Flow of records through the qualitative strand. Records were identified on six Chinese platforms using 18 a priori search phrases combined with the seed term head nurse; 172 records

were excluded because no analysable text could be retrieved, and 247 pseudo-duplicates (multiple answers posted under the same Zhihu question) were merged, leaving 1,502 unique analytic units as the primary analysis set, of which 500 units (300 + 200) were double-coded for reliability. Of the 1,502 units, 871 did not pass the three-question relevance test, leaving a 631-unit sensitivity subset.

Coding procedure and reliability

Coding followed the directed approach to content analysis described by Hsieh and Shannon [41], with the six thematic domains and the speaking-position typology specified a priori from the career-plateau and role-theory frameworks. Three variables were coded by hand by two trained coders: speaking position (head nurse; clinical nurse; senior nursing manager above head-nurse level; patient or relative; other health professional or manager; media or institutional account; member of the public; indeterminate), sentiment towards the nurse-manager position (positive, neutral, negative, mixed, undecidable), and relevance. Thematic assignment was produced by rule-based automatic categorisation using the same six-domain keyword scheme and then verified by the lead coder; agreement between automatic assignment and the final assigned theme was 96.4% on a 274-unit check. Thematic assignment is therefore reported as computer-assisted categorisation with human verification, not as independent human coding, and no kappa is claimed for it.

Inter-rater reliability for the three hand-coded variables was estimated twice (Table 11). On a first stratified random subsample of 300 units, Cohen's kappa was 0.285 for speaking position, 0.148 for sentiment and 0.497 for relevance. Discrepancies were resolved by discussion, the codebook was revised with explicit decision rules, and both coders were retrained; on a second independent stratified subsample of 200 new units, kappa was 0.348 for speaking position, 0.285 for sentiment and 0.566 for relevance. Agreement therefore remained below the conventional 0.60 threshold even after retraining. We report this plainly rather than present the qualitative strand as a reliable stand-alone measurement: the hand-coded variables are used only for coarse description, the thematic distribution is treated as exploratory, and no inferential weight is placed on the qualitative frequencies in the integration. Trustworthiness was addressed through the four criteria of credibility (thick description, auditor review), transferability (maximum-variation sampling across platforms and years), dependability (audit trail and a versioned coding manual) and confirmability (reflexive statement), which were originally articulated by Lincoln and Guba and operationalised for thematic analysis by Nowell and colleagues [42].

Mixed-methods integration

Integration followed the GRAMMS criteria for mixed-methods health research [43]. The two strands were synthesised in a joint display that maps qualitative themes onto quantitative constructs and findings, from which meta-inferences were derived [26]. Reporting adhered to the relevant EQUATOR checklists: COREQ for the qualitative strand [44], STROBE for the cross-sectional quantitative strand [45], and GRAMMS for the mixed-methods design. All three completed checklists are submitted with the manuscript as Supplementary Files S1–S3; each item is recorded against the section or table in which it is addressed, and page numbers are entered at submission against the typeset text.

Ethical considerations

Ethical approval for this study was obtained from the Institutional Review Board of Tongji Hospital, Wuhan (approval number TJ-IRB20230845). The protocol reviewed and approved by the board covered both strands of the study, including the collection and analysis of publicly posted social-media content; for that component the board determined that individual consent was not required, the material being publicly accessible, used only in aggregate and analysed without any interaction with, or re-identification of, its authors. Informed consent was obtained electronically from all survey participants. Corpus collection was restricted to content that was publicly retrievable without authentication: no login-restricted material was accessed, no access controls were circumvented, and the terms of service of the platforms concerned were observed.

Results

Quantitative findings

Participant characteristics

Table 1. Participant characteristics (n = 624). All response categories are reproduced verbatim from the administered online instrument (Wenjuanxing; fielded 9–10 September 2026), and percentages are computed from the exported response file. Professional title was administered at the level of title grade rather than as named nursing titles, and is rendered as supervisor nurse (the intermediate grade); associate chief nurse; chief nurse; other. The "other" option is reproduced as administered and is not a nursing title; grade-level responses cannot be resolved further into the nursing title series. Hospital level was administered as five ordered options (community health centre/township health centre, secondary grade B, secondary grade A, tertiary grade B, tertiary grade A); no participant selected the two lowest options, so the effective distribution covers tertiary grade A, tertiary grade B and secondary grade A only. Throughout the analyses the hospital-level indicator contrasts tertiary grade A with all other levels, so the comparison group of 76 participants comprises 46 from tertiary grade B hospitals and 30 from secondary grade A hospitals. Department was administered as 11 categories and is reported in full. The complete administered questionnaire, with original item wording, response options and Likert anchors, is provided in the Supplementary Material.

Characteristic	n (%)
Total participants	624 (100%)
Hospital level — tertiary, grade A	548 (87.8%)
Hospital level — tertiary, grade B	46 (7.4%)
Hospital level — secondary, grade A	30 (4.8%)
Hospital level — secondary, grade B	0 (0.0%)
Hospital level — community health centre / township health centre (community health centre / township health centre)	0 (0.0%)
Hospital nature — general hospital	606 (97.1%)
Hospital nature — specialty hospital	17 (2.7%)
Hospital nature — other	1 (0.2%)
Gender — female	606 (97.1%)
Gender — male	18 (2.9%)
Age — ≤30 y	30 (4.8%)
Age — 31–45 y	462 (74.0%)
Age — ≥45 y	132 (21.2%)
Tenure — <5 y	11 (1.8%)
Tenure — 5–10 y	65 (10.4%)
Tenure — 11–15 y	156 (25.0%)
Tenure — >15 y	392 (62.8%)
Management tenure — <5 y	285 (45.7%)
Management tenure — 5–10 y	154 (24.7%)
Management tenure — 11–15 y	107 (17.1%)
Management tenure — >15 y	78 (12.5%)
Professional title — supervisor nurse	423 (67.8%)

Professional title — associate chief nurse	137 (22.0%)
Professional title — chief nurse	28 (4.5%)
Professional title — other	36 (5.8%)
Education — junior college	8 (1.3%)
Education — bachelor	501 (80.3%)
Education — master	112 (17.9%)
Education — doctor	3 (0.5%)
Marital status — married	574 (92.0%)
Marital status — unmarried	28 (4.5%)
Marital status — divorced	22 (3.5%)
Weekly working hours — ≤40	148 (23.7%)
Weekly working hours — 41–59	431 (69.1%)
Weekly working hours — ≥60	45 (7.2%)
Department — internal medicine	137 (22.0%)
Department — surgery	123 (19.7%)
Department — paediatrics	76 (12.2%)
Department — obstetrics and gynaecology	38 (6.1%)
Department — otorhinolaryngology and ophthalmology	37 (5.9%)
Department — medical technical departments	32 (5.1%)
Department — oncology	22 (3.5%)
Department — general/multidisciplinary	27 (4.3%)
Department — emergency, including intensive care	21 (3.4%)
Department — nursing department	11 (1.8%)
Department — other	100 (16.0%)

The sample was drawn predominantly from tertiary grade A hospitals (548/624, 87.8%), was overwhelmingly female (606/624, 97.1%) and was concentrated in the 31–45 year band (462/624, 74.0%); 501 participants (80.3%) held a bachelor's degree and 115 (18.4%) held a master's or doctoral degree. Most participants had more than 15 years of nursing experience (392/624, 62.8%) but fewer than 5 years of management experience (285/624, 45.7%), and 423 (67.8%) held an intermediate professional title (Table 1).

Psychometric properties, measurement model and common-method bias

Table 2. Internal consistency, convergent validity and descriptive statistics (n = 624). α = Cronbach's alpha; ω = McDonald's omega; CR = composite reliability; AVE = average variance extracted; λ = standardised confirmatory factor loading. Response scales differed by instrument, as administered: workplace resilience, healthcare-worker resilience and perceived organisational support used a 5-point Likert format; career planning a 4-point format; career plateau a 6-point format (all anchored 1 = lowest … k = highest). Higher career-plateau scores indicate a higher plateau level. α for workplace resilience (0.956a) is the value reported in the Chinese validation study of the 19-item Workplace Resilience Scale [30]; Cronbach's α in the present sample was 0.973. All other α values are from the present sample. a Workplace resilience α is the validation-study value; the present-sample value (0.973) is given for comparison. ω, CR, AVE and λ are computed from the present sample.

Construct (items)	Mean ± SD	α	ω	CR	AVE	Mean λ (min)

Career plateau (16)	2.63 ± 0.61	0.827	0.942	0.942	0.535	0.69 (0.14)
Perceived organisational support (13)	4.23 ± 0.70	0.983	0.983	0.983	0.816	0.90 (0.87)
Career planning (14)	3.33 ± 0.53	0.975	0.976	0.976	0.742	0.86 (0.76)
Workplace resilience (19)	4.03 ± 0.65	0.956[a]	0.974	0.974	0.662	0.81 (0.71)
Healthcare resilience (18)	4.37 ± 0.52	0.962	0.964	0.964	0.596	0.77 (0.68)

Internal consistency was satisfactory to excellent across all five scales (Table 2; $\alpha = 0.83–0.98$; $\omega = 0.94–0.98$; CR = 0.94–0.98). Convergent validity was supported for the four protective constructs (AVE = 0.60–0.82); the career-plateau scale reached a marginal AVE of 0.54, just above the 0.50 criterion.

Two features of the career-plateau scale require comment because they bear on interpretation. First, the scale showed a marked discrepancy between α (0.83) and ω (0.94). This is not a computational artefact of multidimensionality alone. The four lowest item loadings were all on the four negatively worded, plateau-affirming items (item 10, $\lambda = 0.14$; item 7, $\lambda = 0.24$; item 15, $\lambda = 0.25$; item 4, $\lambda = 0.48$), whereas the twelve positively worded items loaded between 0.70 and 0.89. Cronbach's α assumes essentially tau-equivalent items and is therefore severely downward-biased when a subset of items loads this weakly; ω does not make that assumption and is the preferred index here. Because the plateau scale is multidimensional by construction, we also estimated a bifactor model (one general factor plus hierarchical, content and centralisation group factors) and obtained ω hierarchical = 0.92, indicating that the great majority of reliable variance in the total score is attributable to a single general plateau factor rather than to the sub-dimensions. Second, the marginal AVE (0.54) is a direct consequence of those same four items; removing the weakest of them (item 10) raised AVE to 0.57 and α to 0.84 but left the substantive conclusions unchanged, and we therefore retained the full 16-item scale for comparability with previous work.

Single-factor confirmatory models fitted to the complete item sets did not reach conventional fit thresholds for any scale (CFI = 0.78–0.91; RMSEA = 0.122–0.200). Two explanations were tested rather than assumed. Local item dependence among similarly worded items is certainly part of the pattern, and is the reason the parcelled measurement model, rather than the item-level models, was used as the basis for the structural analysis. Multidimensionality of the career-plateau scale is not: a three-correlated-factors model of that scale fitted only marginally better than the single-factor model (CFI = 0.801 vs 0.781; RMSEA = 0.168 vs 0.174) and produced an inadmissible solution, with the hierarchical and centralisation dimensions correlated at 1.01. The three plateau dimensions are therefore not separable in this sample, which is consistent with the high ω hierarchical and supports treating the scale as essentially unidimensional for the purpose of parcelling.

Table 3. Measurement model fit and test of common-method bias (n = 624). ΔCFI between the baseline and ULMC models = 0.0059; the method factor explained on average 6.96% of parcel-level variance (maximum 19.41%).

Model	χ^2 (df)	CFI	TLI	RMSEA
Baseline five-factor measurement model (15 parcels)	241.6 (80)	0.989	0.986	0.057
Unmeasured latent method factor (ULMC) model	—	0.995	0.992	0.043

The parcelled five-factor measurement model fitted the data well (Table 3; $\chi^2 = 241.6$, df = 80; CFI = 0.989, TLI = 0.986, RMSEA = 0.057), supporting the hypothesised five-construct structure before any structural paths were interpreted.

Regarding common-method bias, adding an orthogonal method factor that loaded on all 15 parcels changed the fit only marginally (ΔCFI = 0.0059; ΔRMSEA = -0.0139), and the method factor explained on average 6.96% of parcel-level variance (maximum 19.41%). Because ΔCFI fell below the 0.01 criterion, common-method variance was judged not substantial; the substantive paths were therefore interpreted without correcting for a method factor.

Discriminant validity was limited, and we report the full pattern rather than only the breaches. The heterotrait–monotrait ratio ranged from 0.59 (workplace resilience–perceived organisational support) to 1.05 (career planning–career plateau). Every value above 0.85 involved career plateau (career planning–plateau 1.05; organisational support–plateau 0.96; healthcare resilience–plateau 0.84; workplace resilience–plateau 0.82), so the difficulty is specific to the plateau construct rather than general to the instrument set (the complete matrix is in Supplementary Table S2).

Because an HTMT value above 1.0 can indicate either genuine construct redundancy or item-level overlap, we tested the two competing explanations directly by comparing three measurement models on the same 15 parcels. A five-correlated-factors model fitted best ($\chi^2 = 241.6$, df = 80, CFI = 0.989, RMSEA = 0.057). Collapsing career planning and career plateau into a single factor — the model implied if the HTMT of 1.05 reflected redundancy — fitted substantially worse (CFI = 0.937, RMSEA = 0.133; ΔCFI = -0.052), as did a second-order model with a single higher-order factor (CFI = 0.982, RMSEA = 0.071; ΔCFI = -0.007). The two constructs are therefore not empirically collapsible, which argues against interpreting the HTMT breach as construct redundancy. The more likely explanation is item-level overlap: both scales were completed by the same respondents in the same session, and several plateau items and career-planning items are near semantic paraphrases of one another. We accordingly treat the career-planning pathway as the principal measurement caveat of the study, model the constructs as latent variables with freely estimated residual covariances among the mediators, and return to the implication in the Discussion. The hospital-level comparison is less affected, since it rests on between-group differences rather than on the inter-construct correlations.

Shapiro–Wilk tests rejected exact normality for all five composites (all $p < 0.001$), which is expected at this sample size. Skewness nevertheless remained within the conventional ±1 range for every composite (career plateau W = 0.96, skew = -0.61; workplace resilience skew = -0.78; the largest departure was perceived organisational support, skew = -0.85). Non-parametric tests were therefore retained for the group comparisons and correlations, and the latent structural model was estimated with maximum likelihood on parcelled indicators, which is reasonably robust to this degree of skew.

Hospital-level differences

Table 4. Between-hospital-level comparisons. KW = Kruskal–Wallis across the three levels actually observed (tertiary grade A, tertiary grade B, secondary grade A); MW = Mann–Whitney U, tertiary grade A versus all other levels pooled (n = 76, comprising 46 tertiary grade B and 30 secondary grade A); Cliff's δ effect size (|δ| 0.15 small, 0.33 medium, 0.47 large).

Construct	KW p (3 observed levels)	Tertiary grade A mean	Other levels mean	MW p (Cliff's δ)
Career plateau	0.0027	2.61	2.81	0.0030 (-0.21)
Perceived organisational support	0.0530	4.25	4.15	0.1228 (+0.11)
Career planning	0.0133	3.35	3.20	0.0057 (+0.19)
Workplace resilience	<0.0001	4.07	3.76	<0.0001 (+0.30)
Healthcare resilience	0.0211	4.38	4.24	0.0212 (+0.16)

Career plateau differed significantly across hospital levels (Table 4; KW p = 0.0027) and was lower in tertiary grade A than in hospitals of other levels (mean 2.61 vs 2.81; MW p = 0.0030; Cliff's δ = -0.21). Tertiary hospitals also showed higher workplace resilience ($p < 0.001$), healthcare resilience (p = 0.021) and career planning (p = 0.006); the POS difference was not significant (p = 0.123).

Correlations among constructs

Table 5. Spearman correlation matrix (n = 624). All $|\rho| \geq 0.58$, $p < 0.001$.

	Plateau	POS	Career plan.	Work res.	Health res.
Plateau	—	-0.73	-0.74	-0.61	-0.59
POS	-0.73	—	0.75	0.60	0.66
Career plan.	-0.74	0.75	—	0.69	0.72
Work res.	-0.61	0.60	0.69	—	0.75
Health res.	-0.59	0.66	0.72	0.75	—

Career plateau was negatively correlated with POS (Table 5; ρ = -0.73), career planning (ρ = -0.74), workplace resilience (ρ = -0.61) and healthcare resilience (ρ = -0.59); the two resilience measures and POS/career planning were mutually positively correlated.

Latent-variable structural model

Table 6. Latent-variable structural equation model for career plateau (n = 624; $\chi^2 = 327.5$, df = 116; CFI = 0.986, TLI = 0.981, RMSEA = 0.054; R^2 for career plateau = 0.74). Residual

covariances among the four mediators were freely estimated; all coefficients are from the maximally identified model.

Predictor of career plateau	β (standardised)	B	SE	p
Perceived organisational support	-0.421	-0.271	0.025	<0.001
Career planning	-0.438	-0.291	0.031	<0.001
Workplace resilience	-0.117	-0.083	0.026	0.002
Healthcare resilience	+0.042	+0.030	0.031	0.318
Hospital level (tertiary grade A = 1)	-0.034	-0.059	0.041	0.148
Age	+0.065	+0.077	0.032	0.017
Tenure	+0.029	+0.022	0.021	0.292

The structural model fitted the data well (Table 6; CFI = 0.986, TLI = 0.981, RMSEA = 0.054) and accounted for 74% of the variance in the career-plateau latent variable, a substantially larger share than the observed-score regression — as expected once the paths are disattenuated for measurement error. Career planning (β = -0.438, p < 0.001) and perceived organisational support (β = -0.421, p < 0.001) were the dominant protective factors; workplace resilience made a smaller but significant contribution (β = -0.117, p = 0.002), whereas healthcare resilience was not significant (β = +0.042, p = 0.318). The direct effect of hospital level on career plateau was not significant after the mediators were included (β = -0.034, p = 0.148), consistent with mediation.

On the mediator side, tertiary grade A hospital level was associated with higher career planning (β = +0.101, p = 0.012), higher workplace resilience (β = +0.159, p < 0.001) and higher healthcare resilience (β = +0.097, p = 0.015), but not with perceived organisational support (β = +0.050, p = 0.218).

Table 7. Specific indirect effects from the latent structural model, estimated by bootstrapping the full model with 5,000 resamples (bias-corrected percentile 95% confidence intervals). a = effect of hospital level on the mediator; b = effect of the mediator on career plateau. Coefficients are unstandardised (B), because the indirect effect is the product a × b and products of standardised coefficients are not themselves standardised; the corresponding standardised a paths are β = +0.101 for hospital level → career planning and +0.050 for hospital level → organisational support, and the standardised b paths are reported in Table 6 alongside their unstandardised counterparts. The total effect c is the effect of hospital level estimated with the mediators removed from the model; it is reported here so that the indirect-only pattern can be verified rather than assumed. The structural model specified all four protective resources as potential mediators of the hospital-level effect. The 5,000-resample bootstrap was applied to the two H3-specified mediators (career planning, organisational support); the indirect effects through workplace and healthcare resilience are provided for completeness with Sobel (normal-theory) 95% confidence intervals. The total effect (c = -0.198) is reproduced by the direct effect plus the four indirect effects within rounding.

Pathway	a (B)	b (B)	Indirect effect a × b (B)	BC 95% CI
Hospital level → career planning → career plateau	+0.269	-0.291	-0.078	-0.140 to -0.020
Hospital level → organisational support → career plateau	+0.136	-0.271	-0.037	-0.095 to +0.021
Hospital level → workplace resilience → career plateau	+0.392	-0.083	-0.033	-0.059 to -0.007
Hospital level → healthcare resilience → career plateau	+0.232	+0.030	+0.007	-0.008 to +0.022
Direct effect (c′): hospital level → career plateau	—	—	-0.059	-0.144 to +0.026
Total effect (c): hospital level → career plateau	—	—	-0.198	-0.330 to -0.061

The total effect of hospital level on career plateau was significant (B = -0.198, 95% CI -0.330 to -0.061; standardised β = -0.113, p = 0.006), confirming that there is an association to be explained. Mediation was supported for career planning only. The specific indirect effect through career planning (Table 7) was -0.078 (95% CI -0.140 to -0.020), which excludes zero, whereas the pathway through perceived organisational support was not significant (-0.037, 95% CI -0.095 to +0.021). Once career planning was included, the direct effect of hospital level was no longer significant (c′ = -0.059, 95% CI -0.144 to +0.026). The pattern is therefore one of indirect-only (full) mediation through career planning: nurse managers in tertiary grade A hospitals reported a lower career plateau because they reported more active career planning, not because of an unconditional hospital-level effect. The observed-score model reproduced the same decomposition (total effect β = -0.095, 95% CI -0.174 to -0.015, p = 0.020).

An observed-score parallel mediation model (PROCESS Model 4, 5,000 bootstrap resamples) [46] reached the same conclusion: the indirect effect through career planning was -0.067 (BCa 95% CI -0.124 to -0.013), excluding zero, whereas the pathway through perceived organisational support did not (-0.035, 95% CI -0.098 to +0.027). The concordance between the observed-score and latent-variable mediation analyses indicates that the inference does not depend on the estimator or on correction for measurement error.

Sensitivity analyses: observed-score regression, quantile regression and machine learning

Table 8. Observed-score multiple linear regression with career plateau as the outcome, retained as a sensitivity analysis (n = 624; R^2 = 0.65, adjusted R^2 = 0.64; Durbin–Watson = 1.78). All VIF < 3.3.

Predictor	Std. β	p	VIF
Hospital level (tertiary grade A = 1)	-0.030	0.234	1.07
Perceived organisational support	-0.416	<0.001	2.59
Career planning	-0.358	<0.001	3.22
Workplace resilience	-0.098	0.00847	2.37
Healthcare resilience	+0.006	0.883	2.94
Age	+0.050	0.0895	1.48
Tenure	+0.034	0.26	1.54

The observed-score model explained 65% of the variance (Table 8) and again identified perceived organisational support (β = -0.416) and career planning (β = -0.358) as the leading protective factors, followed by workplace resilience (β = -0.098, p = 0.008); hospital level was non-significant (β = -0.030, p = 0.23). One discrepancy should be stated plainly rather than smoothed over: the rank order of the two leading predictors reverses between specifications. In the latent model career planning is nominally first (β = -0.438 versus -0.421); in the observed-score model perceived organisational support is (-0.416 versus -0.358). We tested whether either ordering is reliable and it is not: constraining the two paths to be equal did not worsen the fit of the latent model ($\Delta\chi^2(1) = 0.18$, p = 0.67; bootstrap difference β = -0.013, 95% CI -0.181 to +0.161), and the same constraint was not rejected in the observed-score model ($F(1, 613) = 0.67$, p = 0.41). The two coefficients are therefore statistically indistinguishable in both specifications, and the reversal carries no substantive meaning. What is robust across specifications is that career planning and organisational support are jointly the leading pair of protective factors, clearly ahead of resilience, and that only career planning transmits the hospital-level advantage.

Table 9. Quantile regression of career plateau across the outcome distribution (n = 624; standardised coefficients). All variables were standardised before estimation, so the entries are comparable with the β values in Table 8. Coefficients in bold type are significant at p < 0.05; the p value for each coefficient is shown beneath it.

Predictor	τ = 0.10	τ = 0.25	τ = 0.50	τ = 0.75	τ = 0.90
Perceived organisational support	**-0.463** p = <0.001	**-0.390** p = <0.001	**-0.443** p = <0.001	**-0.435** p = <0.001	**-0.523** p = <0.001
Career planning	**-0.349** p = <0.001	**-0.375** p = <0.001	**-0.284** p = <0.001	**-0.386** p = <0.001	**-0.435** p = <0.001
Workplace resilience	-0.127 p = 0.195	-0.096 p = 0.123	-0.049 p = 0.203	+0.000 p = 1.000	**-0.193** p = <0.001
Healthcare resilience	-0.021 p = 0.809	-0.037 p = 0.537	+0.009 p = 0.831	+0.000 p = 1.000	**+0.177** p = <0.001
Hospital level (tertiary grade A = 1)	-0.039 p = 0.444	+0.011 p = 0.763	-0.045 p = 0.083	**-0.068** p = 0.005	**-0.068** p = 0.014

Quantile regression (Table 9) did not establish a gradient. The point estimates for career planning (β = -0.435 at τ = 0.90 versus -0.284 at the median) and for perceived organisational support (-0.523 versus -0.443) are both largest in magnitude at the top of the plateau distribution, and the

hospital-level advantage reached significance only in the upper quantiles ($\tau = 0.75$: $\beta = -0.068$, $p = 0.005$; $\tau = 0.90$: $\beta = -0.068$, $p = 0.014$) while being slightly positive at $\tau = 0.25$ ($\beta = +0.011$, $p = 0.76$). These differences are, however, within sampling error. A joint Wald test of slope equality across the five quantiles — contrasting each τ against the median, with the covariance obtained from 300 bootstrap resamples — did not reject homogeneity for career planning ($\chi^2(4) = 8.04$, $p = 0.09$), for perceived organisational support ($\chi^2(4) = 3.17$, $p = 0.53$) or for hospital level ($\chi^2(4) = 5.06$, $p = 0.28$); it was significant only for workplace resilience ($\chi^2(4) = 10.10$, $p = 0.039$), a minor predictor whose coefficient is small and imprecisely estimated at every quantile. We therefore treat the upper-tail pattern as suggestive and do not claim a distributional gradient; the defensible conclusion is that the protective associations of career planning and organisational support hold across the whole outcome distribution rather than being concentrated at one end of it.

One coefficient runs against the general pattern and is reported rather than smoothed over. Healthcare resilience is positively related to plateau at the top of the distribution ($\tau = 0.90$: $\beta = +0.177$, 95% CI +0.083 to +0.271, $p < 0.001$), whereas it is close to zero and non-significant at every other quantile ($|\beta| \leq 0.037$, all $p \geq 0.54$) and in the latent model ($\beta = +0.042$, $p = 0.318$). It is a single significant estimate among the 35 coefficients in Table 9, obtained without correction for multiplicity across quantiles; because it has no counterpart at any other point of the distribution or in the latent model, we do not interpret it substantively and flag it instead as a candidate for replication in an independent sample.

Finally, a random-forest model was fitted as a check on linearity, using five-fold cross-validation with the same folds as a linear model so that the two cross-validated R^2 values are directly comparable. The random forest achieved a cross-validated R^2 of 0.623 (SD 0.021) against 0.625 (SD 0.035) for the linear model on identical folds — a difference of -0.001, i.e. none. (The linear model's in-sample R^2 was 0.645; it is not comparable with a cross-validated figure and is reported only for completeness.) Permutation importance ranked perceived organisational support first (0.51) ahead of career planning (0.24), the same reversal noted above for the observed-score model. Because the flexible learner did not outperform the linear specification under equivalent validation, there is no evidence of material non-linearity, and the linear model was retained as parsimonious and adequate.

Qualitative findings

Composition of the discourse field and thematic distribution

Table 10. Thematic distribution by speaking position (n = 1502 coded units). Cell entries are counts with the percentage within that speaking position; the final column is the percentage of negative units within that theme. Percentages therefore read across rows within a column, not down columns.

Theme	Head nurses (n = 129)	Clinical nurses (n = 698)	Senior managers (n = 675)	All units (n = 1502)	Negative %
Superior–subordinate relations and	39 (30.2%)	170 (24.4%)	196 (29.0%)	405 (27.0%)	29.6%

management					
Promotion and career development	28 (21.7%)	119 (17.0%)	220 (32.6%)	367 (24.4%)	12.8%
Stress and turnover	27 (20.9%)	150 (21.5%)	59 (8.7%)	236 (15.7%)	63.1%
Night shift and schedules	5 (3.9%)	159 (22.8%)	44 (6.5%)	208 (13.8%)	39.9%
Training and competency	12 (9.3%)	20 (2.9%)	106 (15.7%)	138 (9.2%)	3.6%
Authority and scheduling	14 (10.9%)	78 (11.2%)	44 (6.5%)	136 (9.1%)	55.9%
Reward and sense of value	4 (3.1%)	2 (0.3%)	6 (0.9%)	12 (0.8%)	41.7%

The first and most consequential finding is compositional (Table 10): the discourse field around the nurse-manager position is not dominated by nurse managers themselves. Of 1502 coded units, only 129 (8.6%) were attributable to head nurses speaking in the first person, whereas 698 (46.5%) came from clinical nurses — the subordinates they manage — and 675 (44.9%) from nursing managers above head-nurse level. The nurse manager is thus the least represented of the three positions in the very talk that defines her role, a pattern that is itself consistent with the structural position the quantitative strand describes.

The three positions also talk about different things. Among units attributable to head nurses, the largest themes were superior–subordinate relations and management (30.2%), promotion and career development (21.7%) and stress and turnover (20.9%). Clinical nurses distributed their talk similarly across superior–subordinate relations (24.4%), night shift and schedules (22.8%) and stress and turnover (21.5%). Senior nursing managers, by contrast, concentrated on promotion and career development (32.6%) and on training and competency (15.7%) — that is, on the institutional machinery of advancement rather than on its lived experience. Read through role theory, the same position is narrated from below as a relational and workload problem and from above as a promotion-and-competency problem, while those who occupy it describe it chiefly in relational terms.

Sentiment towards the nurse-manager position was predominantly negative rather than neutral or positive (Table 10). Across all 1502 units, 485 (32.3%) were negative, 876 (58.3%) neutral, 108 (7.2%) positive, 2 (0.1%) mixed and 31 (2.1%) undecidable. Negativity was concentrated precisely where the career-plateau construct would predict: within stress and turnover (63.1% of that theme's units were negative), authority and scheduling (55.9%) and reward and sense of value (41.7%), and was rarest in training and competency (3.6%) and promotion and career development (12.8%). The picture is therefore not one of uniform grievance: talk about concrete advancement machinery is comparatively neutral, whereas talk about authority, workload and reward is where criticism accumulates.

Sentiment also varied sharply by speaking position, and the gradient is theoretically informative. Clinical nurses were negative in 52.7% of their units and positive in only 4.3%; senior nursing managers were negative in 11.3% and neutral in 75.9%; head nurses themselves occupied an intermediate position (negative 31.8%, positive 17.1%). The position-holder evaluates the role considerably more favourably than those she manages — the positive rate among head nurses is roughly four times that among clinical nurses — while the level above produces largely institutional, neutral talk. This is the discourse-field signature of a role incumbent caught between two senders: criticism arrives from below, procedural neutrality from above.

As a sensitivity check, restricting the analysis to the 631 units that passed the stricter three-question relevance test changed the thematic ordering materially only in that promotion and career development and authority and scheduling converged (16.5% and 16.3% of that subset); superior–subordinate relations remained the largest theme (35.5%). The compositional finding was unchanged in direction, with head nurses still the smallest speaking position (16.2% of that subset). Because relevance coding had the weakest agreement of the three hand-coded variables, this subset is reported as a check rather than as the primary analysis.

Illustrative paraphrased fragments (de-identified, not verbatim; grounded in the corpus; platform-level attribution only):

- *"Years on the post, yet no clear next step upward."*
- *"The promotion ladder seems to stop at head nurse."*
- *"Scheduling decisions feel made without our input."*
- *"Power sits above us; we just execute the roster."*
- *"The pay never matches the responsibility we carry."*
- *"Frontline value is recognised in words, not in reward."*
- *"The load pushes me to think about stepping away."*
- *"Burnout, not the work itself, wears me down."*

Inter-rater reliability

Table 11. Inter-rater reliability for the three hand-coded variables, estimated on two independent stratified subsamples before and after codebook revision and coder retraining (Cohen's κ). Agreement on thematic assignment is reported separately as agreement between rule-based automatic assignment and the verified final assignment, since themes were not independently coded by two coders.

Coded variable	Round 1 (n = 300)	Round 2 (n = 200)	Note
Speaking position	0.28	0.35	below the 0.60 threshold
Sentiment	0.15	0.28	below the 0.60 threshold
Relevance	0.50	0.57	below the 0.60 threshold
Theme (automatic vs verified)	—	96.4% agreement	rule-based, human-verified (n = 274)

Agreement remained below the conventional threshold on both occasions. We therefore treat the speaking-position and sentiment variables as coarse descriptive indicators and the thematic distribution as exploratory; no inferential claim in this paper rests on the qualitative frequencies.

Integration: joint display

Table 12 maps each qualitative theme onto the corresponding quantitative construct and reports the exploratory meta-inference. Because inter-rater agreement remained below conventional thresholds and the two strands describe neither the same individuals nor the same time window, these meta-inferences are offered as exploratory convergence and divergence rather than as confirmed conclusions.

Table 12. Joint display integrating qualitative themes with quantitative constructs. Quantitative entries are taken from the latent-variable structural model unless stated otherwise. Because inter-rater agreement on the qualitative variables remained below conventional thresholds (Table 11) and the two strands do not describe the same individuals or the same time window, the right-hand column is offered as exploratory convergence and divergence rather than as a confirmed meta-inference; no conclusion in this paper depends on the qualitative frequencies.

QUAL theme (dominant speaking position)	**QUAN construct**	**QUAN result**	**Exploratory meta-inference**
Promotion & career development; largest theme for senior managers (32.6% of their units)	Career plateau + career planning (latent)	Career planning $\beta = -0.438$; sole significant mediator (indirect -0.078, CI excludes 0)	Convergent: advancement is narrated from above as machinery, and it is precisely career planning — not support — that carries the hospital-level effect
Superior–subordinate relations & management; largest theme for head nurses themselves (30.2% of their units)	Perceived organisational support / role tension	POS $\beta = -0.421$; statistically stable across quantiles ($\tau = 0.90$: -0.523; slope-equality $\chi^2(4) = 3.17$, $p = 0.53$)	Convergent: the relation that incumbents talk about most is the one the model identifies as the strongest correlate of plateau
Stress & turnover; 63.1% of its units negative — the most negative theme	Workplace resilience; plateau upper tail	Workplace resilience $\beta = -0.117$, $p = 0.002$; the only predictor with significant cross-quantile heterogeneity ($\chi^2(4) = 10.10$, $p = 0.039$), but small at every quantile	Partly divergent: resilience is where discourse is harshest, yet it is the weakest of the significant predictors — coping talk cannot substitute for structure
Authority & scheduling; 55.9%	Perceived organisational	POS $\beta = -0.421$; no hospital-level	Convergent: contested authority is

negative	support	difference (p = 0.218)	voiced across hospital levels, matching the absence of a hospital-level difference in support
Composition of the field itself; head nurses only 8.6% of units vs clinical nurses 46.5%	Structural position of the nurse manager (role theory)	Clinical nurses negative in 52.7% of their units vs 11.3% for senior managers	Discourse-only finding: the role is defined mainly by those above and below it, with criticism arriving from below and procedural neutrality from above
Hospital-level gap	Hospital level (tertiary grade A vs other levels)	Tertiary lower plateau (Cliff's δ = -0.21, p = 0.003); fully mediated by career planning	Not represented in the discourse: hospital level is not a category participants use, so this quantitative pathway has no qualitative counterpart

Discussion

In a multi-province convenience sample of 624 incumbent nurse managers, career plateau was moderate-to-low (2.63 ± 0.61 on a 1–6 scale), lower in tertiary grade A than in hospitals of other levels, and accounted for to a substantial degree ($R^2 = 0.74$) by four protective resources. The estimate is slightly below the 2.85 ± 0.52 reported fifteen years earlier for 160 head nurses in Tianjin [14]; both fall below the midpoint of the 1–6 response scale, so the comparison across that interval is directionally reassuring rather than like-for-like, since the version of the instrument and its scoring used in 2011 cannot be verified from the published report. Three findings deserve emphasis. First, career planning and perceived organisational support were the dominant protective factors, and both operated, as the four-decade review would predict [7], by restoring a perceived exchange relationship rather than by improving individual coping. Second, and less expected, the hospital-level advantage was conveyed exclusively through career planning: the indirect effect through career planning excluded zero whereas the direct effect of hospital level did not, a pattern of indirect-only mediation. Third, quantile regression did not reveal a distributional gradient: a joint Wald test of slope equality across quantiles did not reject homogeneity, so the protective associations of career planning and organisational support were of similar magnitude across the outcome distribution. These resources are therefore relevant to nurse managers irrespective of how stuck they already feel.

Career planning is the central and most tractable mechanism

Career planning showed the numerically largest standardised association with career plateau in the latent model ($\beta = -0.438$) and was the only significant mediator of hospital level. It was not, however, statistically distinguishable from perceived organisational support: the constraint tests reported above could not separate the two paths, so they are best read as a leading pair rather than as a strict rank order, with career planning the nominal leader. This converges with the prediction-model literature, in which organisational support, promotion space and learning opportunity emerged as the modifiable correlates of plateau among staff nurses [10], and with the qualitative account of nurses who resigned specifically because advancement was blocked and who attributed their stagnation to unclear career paths and absent organisational support [11]. Theoretically, the result refines the framework of Tremblay and colleagues [9]: the organisational-level antecedent — a richer institutional environment in tertiary grade A hospitals — does not act on plateau directly, but becomes effective only once it is internalised as individual career-planning behaviour. It also gives empirical weight to the review finding that proactivity and the granting of additional responsibility are the antecedents most consistently protective against plateau [7]. The practical implication is direct. Hospital level is not modifiable at unit level, and perceived organisational support depends on organisational culture as a whole, but career planning is a behaviour that can be scaffolded: structured individual development plans, mentorship, protected study time and dual promotion ladders (managerial alongside clinical specialist tracks) all act on this specific pathway, and a systematic review of organisational strategies for advancing nurses into leadership identified career planning and coaching as one of the principal levers [22].

Organisational support protects, but does not transmit structural advantage

Perceived organisational support was almost as strongly associated with plateau as career planning ($\beta = -0.421$), yet it did not mediate the hospital-level effect: tertiary grade A hospital level was not associated with higher support ($\beta = +0.050$, $p = 0.218$), so the indirect pathway failed at its first stage. This dissociation is informative. It suggests that support is perceived locally rather than institutionally — that feeling valued depends on one's immediate supervisor, peer group and unit climate more than on the resources or prestige of the hospital as a whole. The western-China survey of nurse managers is consistent with this reading: organisational support was negatively correlated with stress, yet secondary hospitals reported lower support than tertiary ones [4], indicating that support tracks local management practice rather than hospital grade in any simple way. It is also consistent with broader evidence that organisational support shapes Chinese nurses' occupational well-being directly and through perceptions of decent work and professional quality of life [18]. For practice, the implication is that organisational support is the most powerful single correlate of plateau but must be built where it is actually experienced — the immediate managerial relationship — rather than assumed to follow from institutional status.

Resilience contributes, but cannot compensate for structural blockage

Workplace resilience made a small but significant contribution ($\beta = -0.117$, $p = 0.002$), whereas healthcare resilience did not ($\beta = +0.042$, $p = 0.318$). The asymmetry is theoretically coherent. Resilience is reliably protective against burnout — a meta-analysis reported an inverse association of $r = -0.41$ with burnout, and smaller but consistent associations with exhaustion and depersonalisation [21] — but burnout is an affective response to sustained demand, whereas career plateau is a cognitive appraisal of blocked mobility. Individual coping capacity can moderate how a person feels about stagnation; it cannot create a promotion channel that does not exist. This is precisely the social-exchange reading advanced by the four-decade review [7] and echoed in the analysis of Chinese nurse burnout, which concluded that burnout is systemic rather than a matter of individual adaptation [23]. It also carries a caution for managers: resilience training, currently popular, should be regarded as an adjunct. Deployed alone, it risks locating in the individual a problem that is produced by organisational structure — the same attributional error documented among nurses who resigned [11].

Age rather than tenure: a small but replicated demographic signal

Among the demographic covariates, only age was independently associated with career plateau in the latent model, and the association was positive: older nurse managers reported a higher plateau ($\beta = +0.065$, $p = 0.017$), whereas organisational tenure was not significant ($\beta = +0.029$, $p = 0.292$) and hospital level was not either ($\beta = -0.034$, $p = 0.148$). The effect is modest and specification-dependent — in the observed-score model, which additionally included gender, professional title and education, age did not reach conventional significance ($\beta = +0.050$, $p = 0.089$) — so it is best read as a weak, measurement-error-sensitive signal rather than as a strong determinant of plateau. Education was the only other demographic term to reach significance in that model, with more highly educated managers reporting somewhat lower plateau ($\beta = -0.091$, $p < 0.001$); we do not interpret it further here, as education was not a hypothesised predictor. The age finding is worth reporting for two reasons. First, it reproduces in a different decade, a different geography and a much larger sample the central result of the only previous Chinese study of nurse managers,

which surveyed 160 head nurses in Tianjin and identified age as the principal predictor of plateau [14]; the convergence of a specific demographic finding across 15 years and two independent designs argues against its being an artefact of the earlier single-municipality survey. Second, it separates age from accumulated organisational time. Tenure carried no independent effect once age was in the model, which is difficult to reconcile with a purely individual-adaptation account: time spent in a role should index adaptation, and adaptation should attenuate plateau. It fits the structural account better — under a pyramid with few remaining rungs, what accumulates with career stage is not coping capacity but the recognition that remaining opportunity is shrinking. The qualitative strand points the same way, with stagnation narrated as institutional blockage rather than personal deficit. The practical yield is nevertheless deliberately limited. Age is not modifiable, its association is small relative to those of career planning and organisational support, and it therefore carries no intervention implication of its own; its value is diagnostic, in reinforcing the structural reading of what the plateau scale measures. Two caveats apply. Age, career stage and birth cohort are fully confounded within a single cross-section, so the coefficient cannot be given a causal interpretation; and because few respondents sit at the extremes of the age distribution, the estimate is imprecise.

The protective resources are not confined to the most affected managers

Quantile regression was used to ask whether the protective associations were concentrated at one end of the outcome distribution. The point estimates were indeed largest in magnitude in the upper quantiles, but a joint Wald test of slope equality across the five quantiles did not reject homogeneity for career planning, perceived organisational support or hospital level [39]. Because the apparent upper-tail pattern lies within sampling error, we do not claim a distributional gradient. The defensible reading is the opposite of a targeted one: career planning and organisational support matter across the full range of plateau, and universal provision of career-planning structures is better supported by these data than screening-based targeting of a subgroup. This is a negative result against a tempting narrative, and it is worth stating plainly, because the plateau literature rests almost exclusively on mean-based models [11, 13, 14] in which distributional questions of this kind cannot even be posed. That the protective associations remain undiminished at the top of the distribution nevertheless matters clinically: the managers closest to the withdrawal and resignation documented in the qualitative literature [6, 12] are not, on this evidence, beyond the reach of career-planning support.

What the discourse field adds

The qualitative strand's most important contribution is not a theme but a composition. Of 1,502 coded units, only 129 (8.6%) came from head nurses themselves, while 698 (46.5%) came from the clinical nurses they manage and 675 (44.9%) from nursing managers above them. The nurse manager is the least represented of the three positions in the talk that defines her role. We report this plainly because it changes what the corpus can be used for: it is not nurse managers' testimony, and any reading of it as such would overstate the evidence. Properly reframed, however, it yields something a questionnaire cannot produce — a view of the role as it is constructed from three positions simultaneously, which is precisely the structure role theory describes.

The three positions talk about different things, and the differences are systematic rather than random. Senior nursing managers concentrated on promotion and career development (32.6% of their units) and on training and competency (15.7%) — the institutional machinery of advancement. Clinical nurses distributed their talk across superior–subordinate relations (24.4%), night shift and schedules (22.8%) and stress and turnover (21.5%) — the lived terms of being managed. Head nurses themselves fell between the two, with superior–subordinate relations (30.2%), promotion (21.7%) and stress and turnover (20.9%) prominent in their own accounts. The same position is thus narrated from above as a promotion-and-competency problem and from below as a relational and workload problem, while its occupant describes it chiefly in relational terms. That asymmetry is the discursive signature of the role conflict the quantitative strand can only infer: the incumbent's own account is squeezed between a procedural language from above and a grievance language from below.

Sentiment sharpens the point, and here the corpus is more critical than a neutral reading would suggest. Across all units, 32.3% were negative and only 7.2% positive. Negativity was concentrated in stress and turnover (63.1% of that theme's units), authority and scheduling (55.9%) and reward and sense of value (41.7%), and was rare in training and competency (3.6%) and promotion and career development (12.8%). The gradient by speaking position is the most informative result: clinical nurses were negative in 52.7% of their units and positive in 4.3%, senior nursing managers were negative in 11.3% and neutral in 75.9%, and head nurses themselves were intermediate (negative 31.8%, positive 17.1%). The incumbent evaluates the role about four times more positively than those she manages, while the level above produces largely institutional, neutral talk. Two readings follow, and both matter for practice. Criticism of the role arrives from below rather than from above, so interventions aimed only at the incumbent will not reach the source of the tension. And the comparatively neutral tone of superior-level talk suggests that the structural blockage measured by the plateau scale is not salient to those positioned to change it — a plausible reason why the problem persists.

These observations are convergent with, not confirmatory of, the quantitative model. Two limits must be stated in the same breath. Inter-rater agreement on the hand-coded variables remained below conventional thresholds even after codebook revision and retraining ($\kappa = 0.35$, 0.29 and 0.57 for speaking position, sentiment and relevance on the second pilot), and thematic assignment was rule-based with human verification rather than independently double-coded. The discourse frequencies are therefore exploratory, and no conclusion in this paper rests on them. Read within that limit, the strand does what it was designed to do: it shows that the relational and authority dimensions, which the quantitative strand identifies as the strongest correlates of plateau, are also the dimensions around which public talk about the position is most contested.

Implications for practice and policy

Four implications follow. First, career-planning infrastructure for nurse managers should be institutionalised rather than left to individual initiative: individual development plans, mentorship by senior nurse leaders, protected time for study, and dual managerial and clinical specialist promotion ladders all act on the one pathway that demonstrably transmits structural advantage [22]. Second, hospitals below tertiary grade A warrant priority: their managers reported higher plateau and, in the mediator model, less active career planning, yet they command the fewest

development resources. Third, organisational support should be strengthened where it is perceived, in the immediate supervisory relationship, since institutional status alone did not raise it [4, 19]. Fourth, resilience training should be positioned as an adjunct to, not a substitute for, structural reform. At policy level, the call in the 2025 State of the World's Nursing report to strengthen nursing leadership pathways [1] is given a specific operational form by these findings, and the observation that promotion speed is the weakest dimension of professional growth among young nursing talents in China [47] suggests that the problem begins well before the head-nurse appointment. Because intention to leave is already shaped by supervisor and peer support, role models and career prospects during the transition from student to staff nurse [48], career-planning support should be continuous across the career span rather than introduced only at the point of appointment.

Strengths and limitations

The study's strengths include a multi-province convenience sample of an under-studied occupational group; latent-variable modelling that disattenuates the path estimates for measurement error; bootstrapped mediation corroborated by an independent observed-score procedure; quantile and machine-learning sensitivity analyses that tested the linearity and distributional assumptions of the primary model; and an independent, unsolicited data source that situates the measured role within the public discourse that constructs it, analysed by speaking position rather than treated as a single undifferentiated voice.

Several limitations qualify the inferences. The design is cross-sectional, so the direction of the associations cannot be established: managers who perceive less stagnation may simply plan more ambitiously, and reciprocal causation is plausible. Discriminant validity was limited. The heterotrait–monotrait ratio exceeded the conservative 0.85 threshold for every career-plateau pairing (0.82–1.05) and exceeded 1.0 for career planning versus career plateau (1.05), and the hierarchical omega of the plateau scale (0.916) indicates that its three theorised facets are not separable in these data. We therefore tested whether the overlap reflects construct redundancy or item-level overlap. Collapsing career planning and career plateau into a single factor degraded fit substantially (CFI = 0.937 versus 0.989; RMSEA = 0.133 versus 0.057; ΔCFI = −0.052), whereas imposing a second-order structure did not (ΔCFI = −0.007). The two constructs are therefore empirically distinguishable at the construct level; what is not distinguishable is their measurement, most plausibly because several plateau items are reverse-worded and share method variance with the planning items. Career plateau, low career planning and low perceived support remain difficult to separate when all three are measured with a single self-report instrument, and the career-planning pathway may partly reflect a single underlying stance towards one's own career rather than a wholly distinct causal mechanism. We addressed this as far as the data allow. The constructs were modelled as latent variables, residual covariances among the mediators were freely estimated, and common-method variance proved not to be substantial (ΔCFI = 0.0059; method factor explaining 7.45% of parcel variance). Even so, item-level overlap cannot be eliminated post hoc, and the mediation estimate should be read with this caveat. The comparison subgroup (n = 76) affords limited power and its comparison should be regarded as exploratory. The analysis was exploratory in aggregate: apart from the Dunn–Bonferroni correction applied to the three-level Kruskal–Wallis post-hoc comparisons, no formal correction for multiplicity was applied across the full set of group comparisons, correlations, structural paths and quantile

estimates reported here. Findings that reach conventional significance should therefore be read as hypothesis-generating, and the null results — which are the basis of several of our conclusions — are, if anything, conservatively interpreted. Four limitations of the qualitative strand should be stated explicitly. First and most important, the corpus is not nurse managers' own speech: head nurses accounted for only 8.6% of coded units, so the strand describes a discourse field around the position rather than the views of the survey respondents. Second, the two strands do not describe the same individuals or the same time window — the survey is a 2026 cross-section of verified incumbents, the corpus spans 2017–2026 with unknown authorship — so the design is a convergent one with heterogeneous sources, and the joint display reports convergence and divergence rather than triangulation in the strict sense. Third, agreement between coders remained below conventional thresholds on both pilots even after codebook revision and retraining (κ = 0.35, 0.29 and 0.57 on the second pilot), and thematic assignment was rule-based with human verification rather than independently double-coded; the qualitative frequencies are therefore exploratory and carry no inferential weight. Fourth, the corpus carries platform and self-selection bias towards younger, more active and more dissatisfied users, is dominated by two platforms (Zhihu and Douyin, 77.3% of units), and 4.3% of units could not be dated. Finally, sampling for the survey was convenience-based and online, a response rate cannot be computed, and objective plateau indicators such as time since last promotion were not collected.

Conclusions

Career plateau among nurse managers in China is moderate-to-low but structurally patterned. Tertiary hospital affiliation confers a lower plateau, but that advantage is conveyed entirely through more active career planning rather than through organisational support or hospital level as such; perceived organisational support is a powerful correlate of plateau yet does not transmit the institutional advantage; and resilience, though protective, cannot offset a blocked promotion structure. The protective associations of career planning and organisational support held across the whole range of plateau rather than being confined to the most affected managers, so the appropriate response is a universal one: institutionalise career-planning pathways for nurse managers, with hospitals below tertiary grade A given priority. Structural remedies, not resilience training alone, are what this pattern of evidence supports.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Institutional Review Board of Tongji Hospital, Wuhan (approval number TJ-IRB20230845). Informed consent was obtained electronically from all survey participants. The social-media corpus comprised publicly accessible content from which individuals cannot be identified; in accordance with the board's

determination and with platform terms of service, no individual consent was sought, only aggregated discourse was analysed, and original posts were not redistributed.

Consent for publication

Not applicable. No individual person's data in any form (including individual details, images or videos) are reported.

Availability of data and materials

The quantitative dataset generated and analysed during the current study is not publicly available because it contains information on nurse managers employed in identifiable institutions, but it is available from the corresponding author on reasonable request. The social-media corpus cannot be redistributed under platform terms of service; aggregated coding frames and the joint display are provided in the Supplementary Material.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

KL and LX contributed equally to this work and share first authorship. RX conceived and supervised the study. KL and LX designed the instrument, coordinated data collection and drafted the manuscript. DZ performed the statistical analysis and prepared the tables. LX conducted the qualitative coding and contributed to the integration. RX critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

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Generative AI declaration

Tencent Hunyuan (Hy4) was used solely for English language polishing during manuscript drafting. It did not participate in study design, data analysis, or the writing of the intellectual content, and no artificial intelligence system is listed as an author.

Clinical trial number

Not applicable.

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References

1.World Health Organization, International Council of Nurses. State of the world's nursing 2025: investing in education, jobs, leadership and service delivery. Geneva: World Health Organization; 2025. ISBN 9789240110236. Available from: https://www.who.int/publications/i/item/9789240110236

2.National Health Commission. Statistical bulletin on the development of China's health care in 2025 [in Chinese]. Beijing: National Health Commission of the People's Republic of China; 2026. Available from: https://www.nhc.gov.cn/guihuaxxs/c100133/202608/1b45959033524f48867d90e822be5394.shtml

3.Penconek T, Tate K, Lartey SA,et al,. Factors influencing nurse manager retention, intent to stay or leave and turnover: A systematic review update. J Adv Nurs. 2024 Dec;80(12):4825-4841. doi: 10.1111/jan.16227.

4.Yang Z, Huang H, Li G. Status and influencing factors of work stress among nurse managers in western China: a cross-sectional survey study. BMC Nurs. 2024 Jan 24;23(1):68. doi: 10.1186/s12912-024-01731-4.

5. Fan S, Zhang P, Sun J. Status and influencing factors of stress and post-holding competency among head nurses [in Chinese]. Tianjin Nursing. 2023;31(4):379-383. doi:10.3969/j.issn.1006-9143.2023.04.001

6. Lessi L, de Barbieri I, Danielis M. Addressing Nursing Resignation: Insights From Qualitative Studies on Nurses Leaving Healthcare Organisations and the Profession. J Adv Nurs. 2025 May;81(5):2290-2315. doi: 10.1111/jan.16546.

7. Yang WN, Niven K, Johnson S. Career plateau: a review of 40 years of research. J Voc Behav. 2019;110(Pt B):286‑302. doi:10.1016/j.jvb.2018.11.005

8. Yang WN, Wang YH, Doden W, Wang PY. Revisiting the relationship between career plateau and job performance: a social-cognitive perspective. Appl Psychol. 2025;74:e70002. doi:10.1111/apps.70002

9. Tremblay M, Roger A. Individual, familial, and organizational determinants of career plateau: an empirical study of the determinants of objective and subjective career plateau in a population of Canadian managers. Group Organ Manag. 1993;18(4):411‑435. doi:10.1177/1059601193184003

10. Zhu H, Li M. Developing a prediction model of career plateau for nurses: a cross-sectional study. Nurs Open. 2023;10(12):7631‐7638. doi:10.1002/nop2.2002

11. Zhu H, Xu C, Jiang H, et al,. A qualitative study on the experiences and attributions for resigned nurses with career plateau. Int J Nurs Sci. 2021;8(3):325‐331. doi:10.1016/j.ijnss.2021.05.006

12. Min M, Wen X, Niu M, Wang H. Impact of career plateau and psychological capital on job burnout among nurses in some tertiary grade A hospitals in Haikou [in Chinese]. Occupation and Health. 2024;40(5):597-602.

13. Liu L, Wang L, Zhou Y, Wei Y, Zhao W, Wang H. Status and influencing factors of career plateau among senior psychiatric nurses [in Chinese]. Occupation and Health. 2026;42(7):933-937,944.

14. Liu D, Chang H, Zhou H, Guo J. Status and related factors of career plateau among head nurses in Tianjin [in Chinese]. Journal of Nursing Administration. 2011;11(9):615-617. doi:10.3969/j.issn.1671-315X.2011.09.003

15. Eisenberger R , Huntington R , Hutchison S ,et al.Perceived Organizational Support. Journal of Applied Psychology, 1986, 71(3):500-507. doi:10.1037/0021-9010.71.3.500.

16. Chen Z. Knowledge workers' perceived organizational support and its impact [in Chinese]. Beijing: China Economic Publishing House; 2006.

17. Zuo H, Yang H. Nurses' perceived organizational support and organizational commitment: a correlational study [in Chinese]. Nursing Research of China. 2009;23(15):1341-1343.

18. Zheng J, Feng S, Gao R, et al,. The relationship between organizational support, professional quality of life, decent work, and professional well-being among nurses: a cross-sectional study. BMC Nurs. 2024 Jun 25;23(1):425. doi: 10.1186/s12912-024-02114-5.

19. Gould S. An equity-exchange model of organizational involvement. Acad Manage Rev. 1979;4(1):53‐62. doi:10.2307/257403

20. Xie Z, Chen Z, Wang W, et,al,. The effect of career compromise on nurses' turnover intention: the mediating role of job satisfaction. BMC Nurs. 2024 Sep 29;23(1):700. doi: 10.1186/s12912-024-02346-5.

21. Castillo-González A, Velando-Soriano A, De La Fuente-Solana EI, et al,. Relation and effect of resilience on burnout in nurses: A literature review and meta-analysis. Int Nurs Rev. 2024 Mar;71(1):160-167. doi: 10.1111/inr.12838.

22. Pincha Baduge MSS, Mousa M, Garth B, et al,. Organisational Strategies for Women Nurses to Advance in Healthcare Leadership: A Systematic Review. J Nurs Manag. 2023 Dec 7;2023:2678916. doi: 10.1155/2023/2678916.

23. Cui Q, Jiang J, Zhong Y, et al,. The systemic roots of Chinese nurse burnout: A mixed-methods study using natural language processing of social media data. Int J Nurs Stud. 2026 Mar;175:105324. doi: 10.1016/j.ijnurstu.2025.105324.

24. Liu X, Feng X, Zhang M, et al,. Educational Advices for New-Graduate Nurse on Social Media in China: A Grounded Theory Study. J Nurs Manag. 2024 Dec 2;2024:1276010. doi: 10.1155/jonm/1276010.

25. Katz D , Kahn R L .The social psychology of organizations .Administrative Science Quarterly, 1970, 10(1):118.doi:10.1590/S0034-75901970000300011.

26. Fetters M D , Curry L A , Creswell J W .Achieving integration in mixed methods designs-principles and practices. .Health Services Research, 2013, 48(6 Pt):2134-2156. doi:10.1111/1475-6773.12117.

27. Xie B, Long L, Zhao Y. Development of the Career Plateau Questionnaire and examination of its reliability and validity [in Chinese]. Chinese Journal of Clinical Psychology. 2008;16(4):344-347.

28. Long L. The structure of career management and its relationships [in Chinese]. Wuhan: Central China Normal University Press; 2002.

29. Xu Y. Investigation and analysis of the current status of career management and planning among nursing staff [master's thesis, in Chinese]. Hengyang: University of South China; 2010.

30. Zhang Y, Zhang W, Wang M, Jia Y, Shi W, Gui L. Sinicization and validation of the Workplace Resilience Scale [in Chinese]. Occupation and Health. 2023;39(1):55-58. doi:10.13329/j.cnki.zyyjk.20221102.001

31. Zhu H, Wan J, Shi K, Li H. Structural study of resilience among healthcare workers and development of a measurement scale [in Chinese]. Statistics and Information Forum. 2016;31(2):107-112.

32. McNeish D. Thanks Coefficient Alpha, We'll Take It From Here. Psychol Methods. 2017;22(3):412-433. doi:10.1037/met0000144

33. Cheung GW, Cooper-Thomas HD, Lau RS, et al,. Reporting reliability, convergent and discriminant validity with SEM: a review and best-practice recommendations. Asia Pac J Manag. 2024;41:745-783. doi:10.1007/s10490-023-09871-y

34. Henseler J, Ringle CM, Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. J Acad Mark Sci. 2015;43(1):115‑135. doi:10.1007/s11747-014-0403-8

35.Little TD, Cunningham WA, Shahar G, et al,. To parcel or not to parcel: exploring the question, weighing the merits. Struct Equ Model. 2002;9(2):151-173. doi:10.1207/S15328007SEM0902_1

36.Hu Lt, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equ Model. 1999;6(1):1‐55. doi:10.1080/10705519909540118

37.Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J Appl Psychol. 2003;88(5):879‐903. doi:10.1037/0021-9010.88.5.879

38.Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behav Res Methods. 2008;40(3):879‐891. doi:10.3758/BRM.40.3.879

39.Koenker R, Bassett G Jr. Regression quantiles. Econometrica. 1978;46(1):33‐50. doi:10.2307/1913643

40.Breiman L. Random forests. Mach Learn. 2001;45(1):5‐32. doi:10.1023/A:1010933404324

41. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res. 2005;15(9):1277‐1288. doi:10.1177/1049732305276687

42. Nowell LS, Norris JM, White DE, et al,. Thematic analysis: Striving to meet the trustworthiness criteria. Int J Qual Methods. 2017;16(1):1-13. doi:10.1177/1609406917733847

43. O'Cathain A, Murphy E, Nicholl J. The quality of mixed methods studies in health services research. J Health Serv Res Policy. 2008;13(2):92‐98. doi:10.1258/jhsrp.2007.007074

44. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349‐357. doi:10.1093/intqhc/mzm042

45.von Elm E, Altman DG, Egger M, et al,. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370(9596):1453‐1457. doi:10.1016/S0140-6736(07)61602-X

46. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: a regression-based approach. 2nd ed. New York: Guilford Press; 2018. ISBN 9781462534654.

47. Chen X, Yue L, Li B, et al,. Status and related factors of professional growth among young nursing talents: a cross-sectional study in China. BMC Nurs. 2024;23(1):116. doi:10.1186/s12912-024-01790-7

48. Lyu X, Huang S, Ye X, et al,. What influences newly graduated registered nurses intention to leave the nursing profession? An integrative review. BMC Nurs. 2024;23(1):57. doi:10.1186/s12912-023-01685-z

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