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Research paper



Presenteeism in Nurse Anesthetists: Status and Demographic Correlates from Five Tertiary Hospitals in China

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Abstract

Presenteeism or working while ill poses risks to clinicians and patients, but remains underexplored among Chinese nurse anesthetists. This cross-sectional, quantitative, correlational study assessed the status and correlates of presenteeism among nurse anesthetists across five tertiary university-affiliated hospitals in Henan Province, China. Using stratified random sampling by hospital, 230 eligible participants completed an online survey comprising the 11-item Nurse Presenteeism Questionnaire (NPQ; 0–3 scale) and demographic/work variables. Presenteeism was high overall (NPQ mean = 2.04, SD = 0.58; equivalent to attending work 2 to 5 times while ill in the past six months). The highest means were whole-body fatigue/discomfort (2.18), gastrointestinal symptoms (2.16), and chest distress/shortness of breath/palpitations (2.13). Group comparisons showed significant associations between presenteeism and age (χ^2=19.80, df=3, p<.001; Cramér's V=0.29), professional level (χ^2=17.20, df=4, p=.002; V=0.27), and employment contract type (χ^2=12.60, df=2, p=.002; V=0.23), while gender, education, marital status, position, tenure, night-shift frequency, paid sick leave, training, occupational-injury support, and income satisfaction were not significantly related (all p>.05). Findings indicate a common, symptom-spanning pattern of presenteeism in this workforce, with higher levels observed among older, more senior, and non-permanently contracted nurses. To mitigate harmful presenteeism and enhance patient safety, we propose a Theory of Planned Behavior; an informed program targeting attitudes (risk awareness, perceived benefits/costs), subjective norms (managerial and peer expectations), and perceived/actual control (non-penalized sick-leave access, staffing buffers, ergonomic/health supports). Given the cross-sectional, self-report design, all associations should be interpreted as noncausal and potentially influenced by common-method and recall biases.

Keywords: *Presenteeism; Nurse Anesthetists; Occupational Health; China; Cross-Sectional Study; Theory of Planned Behavior.*

1. Introduction

Nurses comprise roughly 60% of the global health-care workforce and provide continuous, bedside care that is central to therapeutic relationships and service quality. (Liu et al., 2017). The nursing occupation or profession is a complex blend of physical, emotional, cognitive, and organizational labor, much of which is invisible. (Jackson et al., 2021). Given these demands, concerns about nurses' physical and mental health have grown, and scholarship on presenteeism has emerged. (Shan et al., 2021). A term coined as working while ill, which has expanded since the 1990s (Rainbow & Steege, 2017). Presenteeism is typically defined as attending work despite illness that would warrant sick leave. (Aronsson et al., 2000). It is prevalent across sectors and costly in productivity losses. (Yoshimoto et al., 2020), with particularly high rates reported in health care (Webster et al., 2019).

Among nurses, presenteeism is associated with heavy workload, time pressure, role conflict, and stress. (Shan et al., 2021), as well as reduced job satisfaction and increased burnout (Gillet et al., 2020). It also compromises safe, comprehensive patient care, raising risks for falls, medication errors, and longer stays, and generates a substantial economic burden. (Rainbow et al., 2019). Multiple determinants shape nurses' decisions to work while ill, including symptom severity, musculoskeletal pain, anxiety/depression, contagion concerns, and workplace norms. (Ali et al., 2025; Mohammadi et al., 2021). In China, structural nurse shortages persist despite growth in the workforce, and cultural factors (e.g., collectivism, Confucian values) may further normalize presenteeism. (Shan et al., 2021; Zeng et al., 2025). Yet evidence specific to Chinese nurse anesthetists, a role that has expanded only in recent decades and entails long hours and low substitutability, remains limited. To address this gap, the present study examines the status and demographic correlates of presenteeism among nurse anesthetists in tertiary, university-affiliated hospitals in Henan Province.

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1.1. Significance of the study

This study provides context-specific evidence on a critical but under-examined workforce segment in China. By quantifying the level of presenteeism and identifying demographic correlates, the findings can inform hospital policies on staffing, sick-leave access, and occupational health supports. The work contributes to occupational health psychology and nursing management by situating presenteeism within Chinese cultural and organizational contexts, and it offers a practical basis for intervention design aimed at safeguarding clinician well-being and patient safety.

1.2. Theoretical framework of the study

The current study integrates four complementary perspectives to illuminate antecedents and mechanisms of nurse anesthetists' presenteeism. The **Health Promotion Model** (HPM) posits that personal perceptions, such as susceptibility and severity, together with perceived benefits and barriers, self-efficacy, and social support, shape health behavior choices, including the decision to work while ill (Pender et al., 2011). **Effort-Recovery Theory** explains how inadequate recovery after demanding work sustains psychophysiological activation, leading to cumulative fatigue and heightened long-term strain when rest is deferred. (MacGowan et al., 2022). While the **Attendance-Absence Decision Model** situates presenteeism between full attendance and absenteeism, emphasizing the dynamic interplay of health events, personal characteristics, and situational cues in day-to-day decisions (Johns, 2010). Lastly, the **Conservation of Resources** (COR) theory suggests that high job demands and resource threats prompt workers to invest limited personal resources to maintain performance; without replenishment, this investment precipitates loss spirals, manifesting as strain and burnout. (Merino et al., 2021). Together, these lenses justify our focus on demographic and work factors associated with presenteeism and inform the design of a subsequent behavior-change program mapped to attitudes, subjective norms, and perceived/actual control.

1.3. Research objectives (RO)

Specifically, the current study seeks to accomplish the following:

- RO1. Profile the demographic and work characteristics of nurse anesthetists (age, gender, marital status, educational attainment, professional level, position, tenure, night-shift frequency, employment contract, paid sick leave, training on presenteeism, occupational-injury support, income satisfaction).
- RO2. Establish the status (overall and item-level) of presenteeism using the 11-item Nurse Presenteeism Questionnaire (NPQ).
- RO3. Test whether presenteeism differs across profile variables and quantify the strength of associations.
- RO4. Translate findings into an intervention blueprint to reduce harmful presenteeism among nurse anesthetists.

2. Literature Review

2.1. Development of the concept of presenteeism

Presenteeism is a relatively recent construct in health and productivity research. Its emergence in the United Kingdom coincided with periods of high unemployment, when employees felt pressure to continue working despite poor health (Cooper & Lu, 2018). The concept has not been standardized, and scholars have grouped definitions into three broad views. (Johns, 2010). The first emphasizes a positive attendance orientation, treating presenteeism as the opposite of absenteeism or as evidence of dedication. The second, prominent from the 1990s through the end of the 20th century, defines presenteeism as working while one should otherwise take sick leave due to individual, job, organizational, or team factors. The third, common in early 21st-century scholarship, frames presenteeism as productivity loss attributable to health problems. Importantly, presenteeism is distinct from time-wasting or malingering at work; it excludes non–non-work-related activities during work hours that are sometimes (mis)labeled as "laziness" and conflated with productivity loss.

2.2. Measurement of presenteeism behavior

Presenteeism is commonly operationalized in two ways: (a) frequency of working while ill and (b) productivity loss while at work. (Miraglia & Johns, 2016). Frequency is typically assessed through self-report instruments asking respondents how often they worked while experiencing illness over a specified recall window (e.g., 6 or 12 months) (Johns, 2011). A widely used two-item index is the Sickness Presenteeism Questionnaire (SPQ), which asks respondents to rate how often they forced themselves to work when sick or symptomatic; responses are scored on a four-point scale from "never" to "more than five times," with higher scores indicating more frequent presenteeism. (Lu et al., 2013). Reliable evidence for the SPQ has accumulated across studies. (Li et al., 2022; Shan et al., 2021). To capture productivity loss, validated tools include the Stanford Presenteeism Scale (SPS-6) and the Work Limitations Questionnaire (WLQ), both of which have demonstrated strong reliability and have Chinese versions with sound psychometrics. (Brooks et al., 2010; Schultz & Edington, 2007; Shan et al., 2021). While cross-study comparability remains challenging due to heterogeneity in recall periods, item wording, and response formats (Ruhle et al., 2020). Hence, tailoring measures specifically for nurse populations to better reflect clinical realities is important.

2.3. Demographic correlates and presenteeism behavior

Presenteeism is widespread among nurses, but not evenly distributed across groups or roles. China-wide evidence indicates higher presenteeism among women, married nurses, staff in intensive settings (e.g., Intensive Care Unit; ICU), contract employees, nurses with secondary vocational education, and those in frontline clinical posts; nurse-practitioner rank also tracks with higher scores (Zeng et al., 2025). Specialty studies echo this: among anesthesiology nurses, younger age, employment mode, position, and overtime were associated with greater presenteeism, whereas stronger perceived social support and stress resistance related to lower levels (Jianlan et al., 2024). Psychosocial processes matter, too. Emotional labor, especially surface acting and strict display rules, elevates presenteeism largely through burnout, while some "deep acting" patterns show smaller, mixed associations (Song et al., 2021). Presenteeism also links to frustration and burnout, which together mediate its association with turnover intention (He et al., 2025). Nurse and chief-nurse reports point to workload, rigid leave systems, conscientiousness, and financial need as proximal drivers (Shan et al., 2021). These patterns suggest that who nurses are

(demographic backgrounds), where they work (unit, contract), and how they must perform emotions and time (overtime, display rules) combine to shape decisions to work while ill.

2.4. Impacts of presenteeism among nurses and other health workers

Working while sick is not just attendance; it is diminished capacity with tangible costs for people and systems. Human-capital analyses estimate large productivity losses: in China, billions of Chinese Yuan annually are attributable to nurse presenteeism (Shan et al., 2021), and in earlier studies in the United States, across nurses and pharmacists, roughly 12,600 US dollars per professional per year, and tens of billions nationally are lost (Warren et al., 2011). Clinically, nurses describe cognitive dulling, impaired communication and documentation, contagion risk, and erosion of unit culture; conditions that threaten patient safety and nurse well-being. (Freeling et al., 2020; Rainbow, 2019). In addition, large cohort data further show that presenteeism correlates positively with burnout and health-related productivity loss; importantly, social support weakens both the direct and burnout-mediated effects. (Zhang et al., 2025). Physical exposures and ergonomics matter as well, such as musculoskeletal symptoms, ICU environments, and shift demands amplify functioning losses on the job. (da Silva Santos et al., 2022). Overall, presenteeism drives a cycle of lower productivity, higher strain, and greater risk of error and turnover. (He et al., 2025; Rainbow, 2019).

2.5. Presenteeism in nurses: a comparative perspective

Internationally, about one in two nurses reports presenteeism, though rates vary with recall period and measurement approach; pooled 49.2% across 14 countries (Min et al., 2022). Conceptually, the construct has evolved from a positive "*attendance orientation*" to "*working while one should be off sick*," and most recently to a productivity-loss framing that dominates health economics and safety discussions. (Cooper & Lu, 2018; Johns, 2010). Measurement follows that arc with frequency indices (e.g., Sickness Presenteeism Questionnaire) that capture how often nurses work while ill, while productivity tools (e.g., SPS-6, WLQ) quantify health-related on-the-job loss; Chinese versions show good psychometrics, but cross-study comparability is hampered by heterogeneous recall windows and item formats (as noted earlier). Comparative syntheses consistently identify multi-level antecedents, wherein individual health and finances, unit workload and staffing, organizational leave policies and culture, and professional identity pressures, and wide-ranging consequences for nurse health, patient safety, and system costs. (Freeling et al., 2020; Min et al., 2022). Chinese studies align with global patterns, but highlight pronounced roles for overtime, unit type (ICU, anesthesiology), employment arrangements, and social support as a reliable protective resource. (Jianlan et al., 2024; Zhang et al., 2025).

2.6. Synthesis

Across global and Chinese studies, three patterns are consistently observed: (a) high prevalence of nurses working while ill, (b) multilevel determinants spanning individual symptoms and resources, job characteristics, and organizational norms, and (c) clinician and system-level consequences for health, care quality, and productivity. However, inconsistent findings by gender and age, variability in measurement (frequency compared to productivity loss; differing recall windows), and limited cumulative-outcome assessments complicate cross-study comparison. These gaps justify a context-specific examination of Chinese nurse anesthetists, for whom role demands and staffing models may uniquely shape attendance decisions. Bringing these strands together, the literature depicts presenteeism as a multilevel, context-amplified self-regulation problem: under high workload, thin coverage, rigid leave, identity pressures, and financial needs, nurses often choose to work while ill, setting off productivity losses, strain, and burnout that can culminate in turnover. The evolution of the construct (from attendance to productivity loss) and the dual measurement tradition (frequency as compared to productivity) underscore that presenteeism is both a decision and an outcome.

These insights map directly to the current study. Wherein, HPM captures proximal beliefs that tilt choices, such as perceived susceptibility/severity, benefits (team continuity, pay protection) and barriers (staffing, rigid leave), self-efficacy to disclose illness and arrange coverage, and social influence from managers and peers. While Effort–Recovery Theory explains how repeated deferral of rest under overtime and high-acuity work sustains psychophysiological activation, accumulating fatigue and long-term strain, patterns that are visible in ICU and anesthesiology findings. Furthermore, the Attendance–Absence Decision Model situates the moment-to-moment choice at the intersection of health events, conscientiousness, norms, and economic pressures, which are the very cues nurses and chief nurses report. Finally, COR Theory clarifies the mechanics of harm: high demands and threatened resources (time, control, support) trigger resource investment to maintain performance, but without replenishment, this fuel loss spirals (e.g., strain → burnout → productivity loss → turnover intent); while social support operates as a replenishing buffer moderating both direct and mediated effects. Practically, the framework points to aligned levers: reshape beliefs and skills (HPM), restore recovery (Effort–Recovery), redesign situational cues at the decision point (Attendance–Absence), and fortify resources to prevent loss spirals (COR). Policy (paid sick leave, staffing buffers), supervisory norms (coverage playbooks, supportive messaging), and micro-skills (assertive communication, brief recovery routines) are therefore theoretically coherent and empirically grounded intervention targets.

More importantly, the mixed evidence aligns with the current proposed integrative theoretical stance. Wherein, the Attendance–Absence Decision Model clarifies how health events, personal factors, and situational cues combine in daily choices; Effort–Recovery accounts for the physiological costs of inadequate rest; COR theory explains resource-investment and loss spirals under high demands; and lastly, the HPM highlights how perceptions, efficacy, and social support influence behavior. Together, these frameworks anticipate demographic and work-context correlates observed in prior studies, explain why nurses may persist at work despite risk, and motivate interventions that target attitudes, subjective norms, and perceived/actual control within Chinese tertiary hospital settings. Guided by this synthesis, the present study measures the status of presenteeism among nurse anesthetists in Henan and tests its demographic correlates to inform tailored, theory-driven strategies for reduction.

3. Methodology

3.1. Research design

A quantitative, descriptive–correlational design was employed to assess the status and demographic correlates of presenteeism among nurse anesthetists in five tertiary, university-affiliated hospitals in Henan Province, China. Data were collected with the use of an online questionnaire from July 15, 2025, to August 15, 2025. The correlational approach enabled examination of associations between demographic/work characteristics and frequency of working while ill (Creswell & Poth, 2018).

3.2. Setting and participants

The five participating hospitals were tertiary care and university-affiliated institutions, each with more than 3,000 beds and full-time nurse anesthetists assigned to operating rooms, post-anesthesia care units, analgesia centers, and related wards. Eligibility criteria included a registered nurse license, at least 1 year of clinical experience, current appointment as a nurse anesthetist, age 18–59 years, and voluntary participation. Exclusion criteria were more than 6 months of leave in the prior year for any reason and current status as retired, intern, or advanced-training nurse.

3.3. Sampling and sample size

Stratified random sampling was implemented with hospitals as strata (Buddhakulsomsiri & Parthanadee, 2008). Anesthesia nursing administrators provided updated rosters of eligible personnel. Proportional allocations were computed for each hospital, and participants were selected by random-number table within a stratum. An a priori power analysis using G*Power (Faul et al., 2009) Chi-square tests of independence (medium effect size, $\alpha = .05$, power = .80, df = 12; up to five categories per profile variable and four presenteeism levels) indicated a minimum sample of N = 193. To accommodate potential nonresponse, 232 nurses were invited. A total of 230 valid responses were obtained and analyzed, meeting the target. Hospital-level allocations and yields are presented in Table 1 (Distribution of Participants Across Hospitals).

Table 1: Distribution of Participants Across Hospitals (Stratified Sampling)

Hospital	Anesthesia nurses, N	% of frame	Selected, n	Valid responses, n
A	102	22.62	52	51
B	95	21.06	49	49
C	82	18.18	42	42
D	80	17.74	41	41
E	92	20.40	47	46
Total	451	100.00	232	230

3.4. Measures

Demographic and Work Profile - Participants reported age, gender, marital status, educational attainment, professional title/level, position, length of experience, night-shift frequency, employment contract type, paid sick-leave availability, training on presenteeism, occupational-injury support, and income satisfaction.

Presenteeism - Presenteeism was measured using the 11-item Nurse Presenteeism Questionnaire (NPQ), validated for Chinese nurse populations (Shan et al., 2021). Items assess how often respondents worked while ill in the past six months on a 4-point Likert. (1932) type scale (0 = never, 1 = once, 2 = 2–5 times, 3 = more than five times). The NPQ score was computed as the item mean (higher values indicate more frequent presenteeism). Consistent with prior research, means were categorized as very low (0 – 0.49), low (0.50 – 1.49), high (1.50 – 2.49), and very high (2.50 – 3.00) for descriptive comparisons. Prior studies have reported strong internal consistency and external criterion validity for the NPQ in nurses. In the present sample, internal consistency and item statistics were estimated and are reported in the Results. Permission to use the NPQ was obtained from the original authors. An English translation accompanied the Chinese instrument used for data collection.

3.5. Procedures

- The complete survey (profile items + NPQ) was pilot-tested with 50 nurse anesthetists to evaluate clarity, flow, and preliminary reliability; no substantive wording changes were required.
- Hospital engagement and stratification - Department administrators were briefed by telephone and email regarding study aims and procedures, and provided written permission and eligibility rosters. Hospitals were anonymized and coded (A through E; as shown in Table 1) for analysis and reporting.
- Participants' selection and invitation - Within each stratum, randomly selected nurses received a secure Sojump (Wenjuanxing) link by email or mobile message. The survey landing page described the study and presented the online informed consent.
- Survey administration and data quality - Completion required approximately 10–20 minutes. Built-in quality controls included forced completion of required items, one submission per device, a 5-day completion window per hospital batch, flagging responses with completion time < 200s and uniform response patterns, and a soft 20-minute submission limit. Data were exported from the online system to encrypted files for analysis.

3.6. Data management

Survey data were exported to Microsoft Excel and analyzed in Jamovi. Password-protected files were stored on Google Drive with restricted access (research team only). De-identified datasets will be retained for two years after study completion and then permanently deleted. A Sojump data summary report was used to cross-check the analytical dataset.

3.7. Statistical analysis

Analyses addressed the pre-specified objectives:

- RO1 (Profile) - Frequencies and percentages summarized demographic and work characteristics.
- RO2 (Status of presenteeism) - Means (M) and standard deviations (SD) summarized NPQ total (item mean) and item-level scores; NPQ category distributions (very low/low/high/very high) were reported.
- RO3 (Associations) - Chi-square tests of independence compared NPQ categorical levels across profile variables; Cramér's (1946) V indexed effect size. All tests were two-tailed with $\alpha = .05$. Values are interpret with thresholds: ~.10 small, ~.30 medium, and ~.50 large (Cohen, 1988).
- Internal consistency of the NPQ was evaluated with Cronbach's (1951) α. Assumptions for Chi-square tests (e.g., expected cell counts) were checked; where sparse cells occurred, adjacent categories were collapsed on substantive grounds.

To clarify, for the primary group-difference tests (RO3), the authors dichotomized the NPQ frequency indicator into "2–5 times" versus ">5 times" in the past six months for two reasons. First, the NPQ response anchors represent clinically interpretable bands of attendance while ill, and ">5 times" is frequently treated as a high-frequency/risk marker in the attendance literature, distinguishing typical from heavy presenteeism exposure within a six-month window (e.g., Johns, 2011; Rainbow & Steege, 2017). Second, several profile factors contained small subgroups (e.g., chief nurses n=5; permanent contracts n=11). Using a two-level NPQ outcome helped meet χ^2 expected-cell assumptions and preserve power across multi-level factors without excessive category collapsing. As a transparency check, we specified sensitivity analyses treating NPQ as (a) a continuous item mean (one-way ANOVA with Welch correction when variances were unequal; parallel Kruskal–Wallis tests), and (b) an ordinal outcome (proportional-odds logistic regression with partial proportional-odds checks). These alternative specifications assess whether results depend on the chosen cut-point.

3.8. Ethical considerations

All procedures adhered to the Declaration of Helsinki. Ethical approval was granted by the University of St. La Salle Research Ethics Review Committee (STUD-YIBU-002.24-25.T1.Grad). Before participation, respondents viewed the information sheet and completed online informed consent. Participation was voluntary with the option to withdraw at any time before submission. Hospitals and participants were not identifiable in any dataset or report; only anonymized, aggregate results are presented. Electronic records and consent logs were encrypted during transfer and storage. Upon study completion, a results brief was shared with participating hospitals; individual hard copies were provided upon request.

4. Results and Discussions

4.1. RO1: participant profile

The analytic sample comprised N = 230 nurse anesthetists. Most were 31–40 years (53.5%), followed by < 30 (21.7%) and 41–50 (17.8%); 7.0% were > 50 years. The sample was predominantly female (82.6%). Married participants constituted 61.7%, with 36.1% single and 2.2% separated. Educational attainment was largely bachelor's degree (82.6%), with 13.0% college, 3.5% master's, and 0.9% doctorate. Regarding *professional level*, the supervisor nurse was the largest group (75.7%), followed by the nurse in charge (10.4%), student nurse (6.5%), deputy chief nurse (5.2%), and chief nurse (2.2%). By *position of work*, staff nurses comprised 83.9%, charge nurses 14.3%, and head nurses 1.7%. *Length of working experience* clustered in 5–10 years (34.8%), 11–15 years (21.7%), 16–20 years (21.7%), with 13.0% < 5 years and 8.7% > 21 years. *Night-shift frequency* most commonly was once a week (42.2%), followed by once a month (20.0%), once every 2 weeks (19.6%), twice a week (13.9%), and once every six months (4.3%). *For paid sick leave per year*, most reported 11–15 days (43.5%) or 16–20 days (34.8%); 13.0% reported 5–10 days, and 4.3% each reported < 5 days or > 21 days. *Employment type* was primarily short-term contract (65.7%), with long-term contract (29.6%) and permanent (4.8%). *Income satisfaction* was largely average (65.2%), with 21.7% satisfied and 13.0% not satisfied. *Training related to presenteeism* was uncommon: none (87.0%), once a month (4.3%), once every six months (4.3%), and once a year (4.3%). *Support related to occupational injury prevention* was reported once every six months (34.8%), once a month (26.1%), once a year (14.3%), with no support at 24.8%.

Age. The concentration in the 31–40 group mirrors Chinese nursing workforce demographics and aligns with reports that mid-career nurses often shoulder higher caseloads and role demands, conditions linked to presenteeism via workload and time pressure. (Shan et al., 2021). Some studies note higher presenteeism among younger staff in anesthesia settings due to overtime and role socialization. (Jianlan et al., 2024)Others identify elevated presenteeism with seniority due to role indispensability. (Zeng et al., 2025). RO3 will clarify which age pattern holds in this cohort.

Gender. The predominance of women (82.6%) is typical for nursing in China. While gender effects on presenteeism are mixed, several Chinese datasets report higher rates among women, potentially reflecting caregiving norms and employment arrangements. (Zeng et al., 2025). Any gender-presenteeism gradient in this sample will be evaluated in RO3.

Marital status. With 61.7% married, role accumulation (work–family demands) could heighten presenteeism through time constraints or financial commitments, consistent with models where subjective norms and perceived control shape attendance decisions.

Educational attainment. The bachelor s-heavy profile (82.6%) is consistent with tertiary centers. Prior work suggests education may proxy for role complexity or mobility, but shows inconsistent direct associations with presenteeism. (Miraglia & Johns, 2016). RO3 will test for differences.

Professional level and position. Although most are staff nurses (83.9%), the professional-level distribution is weighted to supervisor nurses (75.7%) by the title schema used locally. Higher rank can increase indispensability and normative pressure to attend when ill, but senior roles may also have more schedule control. These countervailing forces map to perceived behavioral control in attendance decisions.

Experience. The modal experience bands (5 to 10 and 11 to 20 years) indicate a seasoned workforce. Experience can reduce presenteeism through coping resources, yet sustained high demands without recovery may accumulate fatigue (Effort–Recovery theory), raising the risk of working while ill.

Night-shift frequency. With ~75% reporting at least monthly nights and 42.2% weekly, circadian disruption and recovery debt are salient. Shift work predicts fatigue and on-the-job performance limitations, key pathways to presenteeism. (da Silva Santos et al., 2022; Rainbow, 2019).

Paid sick leave. Most report 11 to 20 days annually, but actual perceived access (non-penalized use, coverage) often constrains utilization and is more predictive of presenteeism than nominal days. (Rainbow & Steege, 2017). This distinction will be important for interpreting RO3.

Employment type. The majority of short-term contracts (65.7%) is notable. Contract status in China has been repeatedly associated with higher presenteeism, such as through job insecurity, evaluation pressures, and weaker benefits. (Jianlan et al., 2024; Zeng et al., 2025). This variable is a plausible risk indicator a priori.

Income satisfaction. With 13.0% not satisfied and 65.2% average, financial strain may contribute to attendance while ill. (Miraglia & Johns, 2016), fitting COR accounts in which resource threat prompts continued labor investment despite health costs (Merino et al., 2021).

Training on presenteeism. The 87% absence of training indicates limited formal risk awareness or skills for managing illness disclosure and coverage-targetable through attitude and efficacy components. (Pender et al., 2011).

Occupational-injury prevention support. Although 75.2% report at least annual or semiannual support, a quarter report none. Regular supports function as resource buffers (COR) and may lower presenteeism by improving perceived control and recovery opportunities. (Zhang et al., 2025).

The Table 2 profile depicts a workforce characterized by substantial shift burden, a high proportion of short-term contracts, and minimal training on presenteeism, with features that align with theorized antecedents of working while ill. From a HPM perspective, sparse training highlights opportunities to reshape attitudes (risk awareness; perceived benefits as compared to barriers) and bolster self-efficacy for illness disclosure and coverage planning. (Pender et al., 2011). Effort–Recovery Theory further suggests that frequent night shifts and sustained demands impede recuperation, producing cumulative fatigue that increases the likelihood of attendance while ill. (MacGowan et al., 2022). Within the Attendance-Absence Decision Model, contract status, workload norms, and unit expectations function as situational cues at the daily decision point, nudging choices toward presenteeism (Johns, 2010). Consistent with COR theory, job insecurity and income pressure can trigger resource-protection strategies, such as manifesting as working while sick, whereas injury-prevention supports operate as buffers that may disrupt loss spirals (Merino et al., 2021; Zhang et al., 2025).

Taken together, RO1 outlines a context in which norms, recovery constraints, and resource pressures plausibly converge to elevate presenteeism risk, related to later hypotheses tested in RO3, and points toward a proposed Theory of Planned Behavior (TPB) (Ajzen, 1991) - aligned interventions that target attitudes (accurate risk/benefit appraisal), subjective norms (managerial and peer messaging), and perceived/actual control (non-penalized sick-leave access, staffing buffers, ergonomic and health supports).

Table 2: Profile of the Participants

Profile variable	Group	Frequency n (N=230)	Percentage (%)
Age	< 30 years	50	21.7
	31-40 years	123	53.5
	41-50 years	41	17.8
	> 50 years	16	7.0
Gender	Male	40	17.4
	Female	190	82.6
Marital status	Single	83	36.1
	Married	142	61.7
	Separated	5	2.2
Educational attainment	College degree	30	13.0
	Bachelor's degree	190	82.6
	Master's degree	8	3.5
	Doctorate	2	0.9
Professional level	Student nurse	15	6.5
	Nurse in charge	24	10.4
	Supervisor nurse	174	75.7
	Deputy chief nurse	12	5.2
	Chief nurse	5	2.2
Position of work	Staff nurse	193	83.9
	Charge nurse	33	14.3
	Head nurse	4	1.7
Length of working experience	< 5 years	30	13.0
	5-10 years	80	34.8
	11-15 years	50	21.7
	16-20 years	50	21.7
	> 21 years	20	8.7
Night shift frequency	Twice a week	32	13.9
	Once a week	97	42.2
	Once every 2 weeks	45	19.6
	Once a month	46	20.0
	Once every six months	10	4.3
Duration of paid sick leave in one year	< 5 days	10	4.3
	5-10 days	30	13.0
	11-15 days	100	43.5
	16-20 days	80	34.8
	> 21 days	10	4.3
Type of employment	Short-term contract	151	65.7
	Long-term contract	68	29.6
	Permanent contract	11	4.8
Income satisfaction	Not satisfied	30	13.0
	Average	150	65.2
	Satisfied	50	21.7
Frequency of training related to presenteeism	None	200	87.0
	Once a month	10	4.3
	Once every six months	10	4.3
	Once a year	10	4.3
Frequency of support related to occupational injury prevention	None	57	24.8

	Once a month	60	26.1
	Once every six months	80	34.8
	Once a year	33	14.3

4.2. RO2: status of presenteeism

Table 3 shows the mean scores of the NPQ, indicating a moderate-to-high frequency of working while ill over the prior six months. The overall NPQ item mean was M = 2.04 (SD = 0.58), corresponding to 2 to 5 episodes of presenteeism in the recall window. Item means were tightly clustered (range = 1.92–2.18), with all items falling in the "2–5 times" band. The most frequently endorsed symptoms under which participants continued to work were whole-body fatigue/discomfort (M = 2.18, SD = 0.83), gastrointestinal upset (e.g., stomachache/flatulence; M = 2.16, SD = 0.81), and cardiorespiratory complaints (chest distress/shortness of breath/palpitations; M = 2.13, SD = 0.83). Upper-respiratory and neurologic symptoms were also common: dizziness/headache (M = 2.09, SD = 0.83) and colds (M = 2.06, SD = 0.89). Musculoskeletal presentations were frequent: lower-back discomfort (M = 2.06, SD = 0.90) and limb/joint pain or swelling (M = 2.03, SD = 0.86). The lowest, yet still moderate, means were fever (M = 1.92, SD = 0.84) and abdominal pain/menstrual pain (M = 1.92, SD = 0.87), with nausea/vomiting (M = 1.95, SD = 0.84) and other symptoms (M = 1.97, SD = 0.80) intermediate. The narrow dispersion across items suggests a generalized pattern of working while symptomatic, rather than restriction to a few isolated conditions.

The prominence of fatigue and musculoskeletal complaints aligns with evidence that shift work, high physical/mental load, and inadequate recovery are salient drivers of on-the-job strain in perioperative settings. (da Silva Santos et al., 2022; Rainbow & Steege, 2017). Frequent gastrointestinal and upper-respiratory symptoms are consistent with stress-related dysregulation and seasonal/infectious exposures in hospitals, while the notable endorsement of cardiorespiratory symptoms (chest distress/shortness of breath/palpitations) raises patient-safety concerns when acuity and vigilance demands are high. (Webster et al., 2019). The across-the-board "2–5 times" pattern indicates that presenteeism is not symptom-specific in this cohort; rather, it appears normative across multiple clinical presentations.

Mapped to the study's theoretical lens, the NPQ profile is coherent with several complementary frameworks. Under Effort–Recovery Theory, recurrent fatigue and musculoskeletal strain signal incomplete recovery; repeated deferral of rest amid shift burden sustains psychophysiological activation and heightens the likelihood of attending while ill. From a COR standpoint, continued attendance across diverse symptoms reflects resource protection under perceived threat (e.g., workload coverage, evaluation pressures), risking loss spirals from strain to burnout and performance limitation. The Attendance-Absence Decision Model further suggests that the consistency of "persevering" across symptom types reflects situational cues and norms at the daily decision point, such as coverage scarcity and unit expectations, that bias choices toward attendance despite illness. Within the HPM, item-level frequencies point to modifiable levers: shifting attitudes via risk appraisal for fatigue/infection, strengthening self-efficacy for illness disclosure and coverage planning, and lowering barriers through non-penalized sick leave and ergonomic supports. Collectively, these patterns underscore the need for TPB-aligned interventions targeting (a) attitudes-accurate risk/benefit framing for working while fatigued or symptomatic; (b) subjective norms-explicit managerial and peer messaging that normalizes appropriate sick-leave use; and (c) perceived/actual control-reliable coverage protocols, staffing buffers, and micro-recovery options. These mechanisms are testable in RO3 through associations with contract type, seniority, shift frequency, and support availability.

Table 3: Participants' Level of Presenteeism

Items	Mean	SD	Interpretation
1. Although you had a fever, you still persevered in going to work	1.92	0.84	2-5 times
2. Although you felt dizzy or had a headache, you still persevered in going to work	2.09	0.83	2-5 times
3. Although you felt abdominal pain (including menstrual pain), you still persevered in going to work	1.92	0.87	2-5 times
4. Although you had a cold (e.g., stuffy nose or cough), you still persevered in going to work	2.06	0.89	2-5 times
5. Although you felt chest distress, shortness of breath, or palpitations, you still persevered in going to work	2.13	0.83	2-5 times
6. Although you felt discomfort in your lower back, you still persevered in going to work	2.06	0.90	2-5 times
7. Although you felt pain or swelling in limbs (and joints), you still persevered in going to work	2.03	0.86	2-5 times
8. Although you had an upset stomach (e.g., stomachache, flatulence), you still persevered in going to work	2.16	0.81	2-5 times
9. Although you felt whole-body fatigue or discomfort, you still persevered in going to work	2.18	0.83	2-5 times
10. Although you experienced nausea and felt like vomiting, you still persevered in going to work	1.95	0.84	2-5 times
11. Although you had other physical symptoms, you still persevered in going to work	1.97	0.80	2-5 times
Overall	2.04	0.58	2-5 times

Notes. SD = standard deviation. N = 230.

4.3. RO3: group differences in presenteeism

Presenteeism (NPQ level; 2–5 times versus > 5 times over 6 months) differed significantly by age, professional level, and type of employment (Table 4), but not by the remaining profile variables (Table 5). Importantly, the authors prioritized a two-level NPQ (2–5 versus >5 times) to align with the instrument's frequency bands and to avoid sparse cells given small strata for some roles/contracts. This choice supports stable χ^2 estimates and an easily interpretable contrast (typical versus high-frequency presenteeism). Furthermore, to enhance methodological transparency, the authors also prespecified analyses that use the full NPQ scale: (1) comparing the NPQ item mean across groups using ANOVA (with Welch correction) and Kruskal-Wallis where appropriate; and (2) modeling NPQ as ordinal via proportional-odds logistic regression, relaxing the proportional-odds assumption if violated. These alternatives probe robustness to the dichotomization choice and allow effect-size reporting (η^2/ω^2 for ANOVA; odds ratios for ordinal models).

Age. A significant association emerged, $\chi^2(3, N = 230) = 19.80$, $p < .001$, Cramér's V = .294 (medium). The > 50 years group showed the highest proportion in the > 5 times category (6/16 = 37.5%), whereas the 31–40 years group showed the lowest (5/123 = 4.1%). The < 30 and 41–50 groups were intermediate (10.0% and 12.2%, respectively).

Professional level. Presenteeism differed across levels, $\chi^2(4, N = 230) = 17.20$, $p = .002$, Cramér's V = .273 (small–medium). The chief nurse group exhibited the highest proportion with > 5 times (3/5 = 60.0%), followed by supervisor nurses (15/174 = 8.6%) and nurse in charge (2/24 = 8.3%), while student nurses had 0/15 in the > 5 category.

Type of employment. Results indicated a significant association, $\chi^2(2, N = 230) = 12.60$, $p = .002$, Cramér's V = .234 (small–medium). Short-term contracts showed a higher proportion of > 5 times (18/151 = 11.9%) versus long-term contracts (0/68 = 0%). Permanent contracts showed 3/11 (27.3%), though that subgroup was small.

Non-significant variables. No significant associations were observed for gender, educational attainment, marital status, position of work, length of experience, night-shift frequency (trend level, $p = .063$), training related to presenteeism, paid sick leave duration, occupational-injury prevention support, or income satisfaction (all $ps \geq .063$; Table 5).

Table 4: Relationship between Presenteeism and Participants' Age, Professional Level, and Type of Employment

Profile variable / Group	NPQ level 2-5 times	> 5 times	Total	χ^2	df	*p*
Age				19.80	3	< .001
< 30 years of age	45	5	50			Cramer's V = 0.294
31-40 years of age	118	5	123			
41-50 years of age	36	5	41			
> 50 years	10	6	16			
Total	209	21	230			
Professional level				17.20	4	.002
Student nurse	15	0	15			Cramer's V = 0.273
Nurse in charge	22	2	24			
Supervisor nurse	159	15	174			
Deputy chief nurse	11	1	12			
Chief nurse	2	3	5			
Total	209	21	230			
Type of employment				12.60	2	.002
Short-term contract	133	18	151			Cramer's V = 0.234
Long-term contract	68	0	68			
Permanent contract	8	3	11			
Total	209	21	230			

Notes on estimation. Several subgroups had small counts (e.g., chief nurse, permanent contract), which may inflate instability in proportions and reduce power for post hoc contrasts. Where sparse cells occurred, results should be interpreted cautiously. In addition, results are correlational from cross-sectional, self-report data; χ^2 tests indicate association only and should not be interpreted as causal. NPQ coded as 2–5 versus >5 episodes in the prior six months to reflect a clinically meaningful threshold for higher-frequency presenteeism and to satisfy χ^2 expected-cell assumptions in small subgroups (cf. Johns, 2011; Rainbow & Steege, 2017). Sensitivity analyses using the full NPQ scale (ANOVA/Kruskal–Wallis; ordinal logistic regression) were prespecified.

Table 5: Relationship between Presenteeism and the Remaining Profile Variables

Profile variable	χ^2	df	*p*
Gender	0.16	1	.694
Educational attainment	0.35	3	.951
Marital status	1.33	2	.513
Position of work	1.60	2	.450
Length of working experience	2.59	4	.628
Night shift frequency	8.92	4	.063
Frequency of training related to presenteeism	2.44	3	.486
Duration of paid sick leave in one year	1.28	4	.865
Frequency of support related to occupational injury prevention	1.12	3	.773
Income satisfaction	0.76	2	.686

Notes on estimation. Results are correlational from cross-sectional, self-report data; χ^2 tests indicate association only and should not be interpreted as causal.

Tables 4 and 5 show that three profile features were associated with higher presenteeism frequency, such as older age, more senior professional level, and short-term employment, and these patterns align with the study's proposed mechanisms and prior literature. Elevated rates among the > 50 group and chief/supervisor nurses are consistent with greater role indispensability, decision load, and coverage difficulty in tertiary settings, factors that can normalize attendance despite illness. (Rainbow & Steege, 2017), while senior roles may also experience chronic recovery debt in line with Effort–Recovery accounts of cumulative fatigue (MacGowan et al., 2022). The higher prevalence among short-term contracts accords with job insecurity and evaluation pressures that encourage resource-protection behavior-working while ill, to avoid perceived penalties (as what COR proposed); conversely, the 0% rate in the > 5 times category for long-term contracts suggests that actual control (security, benefits, clearer procedures) can constrain harmful attendance, although the elevated proportion observed in the small permanent group should be interpreted cautiously due to limited cell size.

Null findings for nominal sick-leave days, training exposure, and injury-prevention support echo evidence that perceived/actual ease of using leave and unit norms often matter more than nominal entitlements or sporadic training (Rainbow & Steege, 2017). While the night-shift trend ($p = .063$) is directionally consistent with recovery constraints and might emerge more clearly with a finer-grained fatigue index or cumulative night-duty measure. Mechanistically, the RO3 pattern is coherent with the TPB and the integrated lens: seniority and contract status likely shape subjective norms ("leaders are expected to show up") and perceived behavioral control (limited coverage; fear of repercussions), while age-related recovery debt reflects Effort–Recovery dynamics that increase the pull of attendance; under COR, perceived threats to valued resources (evaluation, income, status) can tip intentions toward working while ill, particularly where actual control is low. Finally, HPM highlights modifiable attitudes and self-efficacy (risk literacy, disclosure skills) targeted by the proposed program. Practically, a targeted roll-out for higher-risk strata (older, senior titles, short-term contracts) paired with unit-wide norm resetting and procedural control (coverage playbook; streamlined sick-leave) is indicated. Methodologically, reporting standardized residuals or post hoc pairwise tests (with false-discovery-rate control) would identify groups driving omnibus χ^2 effects, and category collapsing or exact tests are advisable where expected counts fall below five.

Importantly, because the data are cross-sectional and derived from a single self-report survey, the observed group differences are correlational. The authors cannot determine whether age, professional level, or contract type causes higher presenteeism, or whether unmeasured factors (e.g., unit staffing ratios, case acuity, comorbidity burden, local leave culture) jointly influence both role characteristics and the tendency to work while ill. Reverse or reciprocal processes are also plausible (e.g., sustained presenteeism contributing to perceived indispensability and subsequent promotion). Accordingly, the authors avoid causal language and frame these patterns as risk markers that warrant prospective evaluation.

4.4. RO4: translating findings into an intervention blueprint to reduce presenteeism

Grounded in the study's profile (high NPQ levels; 87% without training; frequent night shifts; high short-term contract share) and item pattern (generalized "2–5 times" across symptoms, with peaks for fatigue, gastrointestinal, and cardiorespiratory complaints), a multicomponent program was specified using the TPB targeting attitudes, subjective norms, and perceived behavioral control (PBC). The program is designed for tertiary hospital nurse anesthetists and managers, with anonymized hospital implementation. Some program objectives are: (1) Reduce harmful presenteeism (NPQ mean) through attitude and norm change; (2) Increase intention not to work while ill when safety is compromised; and (3) Improve PBC and actual control via clearer sick-leave pathways, coverage protocols, and recovery supports.

From findings to levers. The cohort's high and generalized NPQ scores, especially for fatigue, indicate a normative tendency to "persevere" across conditions that can impair vigilance and safety. The absence of prior training (87%), substantial night-shift load, and high prevalence of short-term contracts collectively signal modifiable levers at the levels of attitudes, norms, and control. The observed differences by age, gender, contract type, and professional level further justify risk-targeted engagement, while keeping unit-wide messaging to reset shared expectations.

To visualize, Figure 1 depicts the TPB pathway used to frame nurse anesthetists' attendance decisions when ill. Attitudes toward the behavior (risk/benefit appraisal of working while symptomatic), subjective norm (perceived expectations from managers/peers), and perceived behavioral control (PBC; ease/difficulty of taking sick leave or arranging coverage) are specified as determinants of behavioral intention, which in turn determines actual behavior (presenteeism frequency). Consistent with TPB, PBC is modeled to influence behavior both indirectly (through intention) and directly when actual control constraints are salient. In this study, intention is conceptualized as intention to avoid working while ill; therefore, more negative attitudes toward presenteeism, norms supportive of appropriate sick leave, and higher PBC for taking sick leave are expected to predict lower NPQ scores (i.e., reduced presenteeism), while low PBC and norms favoring attendance are expected to sustain higher NPQ means.

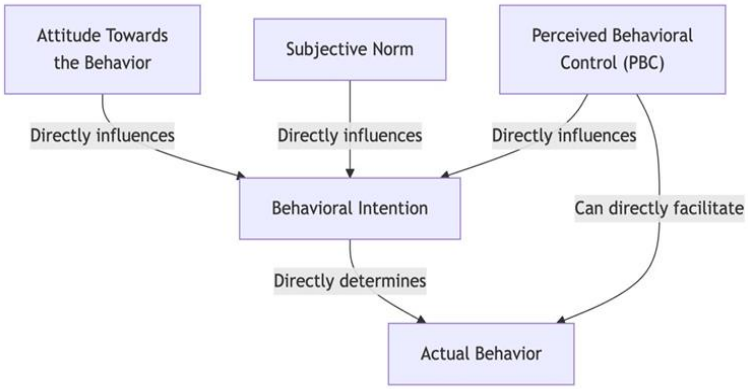


Fig. 1: Diagram for the Proposed Conceptual Framework of the Theory of Planned Behavior.

Figure Note. Rectangles represent TPB constructs: Attitude toward the behavior = personal evaluation of working while ill (e.g., risk to patient safety versus perceived benefit of "not falling behind"); Subjective norm = perceived social pressure/expectations from supervisors and peers; Perceived behavioral control (PBC) = perceived and actual ease/difficulty of taking sick leave and arranging coverage; Behavioral intention = intention not to work while ill; Actual behavior = presenteeism (NPQ item mean over 6 months). Arrows indicate hypothesized directional effects: attitudes, subjective norm, and PBC → intention; intention → behavior; and PBC → behavior (direct). In the proposed program, modules map to these levers: (a) Attitudes-risk literacy micro-lessons and peer sharing; (b) Subjective norms—manager training, stigma reduction, and a coverage playbook; (c) PBC/actual control-simplified sick-leave procedures, staffing buffers, micro-recovery, and ergonomics supports. Adapted from the Theory of Planned Behavior (Ajzen, 1991). Abbreviation: PBC = perceived behavioral control.

Finally, the current estimates reflect associations at a single point in time and from a common source (participants). Such designs are vulnerable to (a) common-method variance - shared measurement context that can inflate correlations among variables reported by the same respondent; (b) recall bias - the NPQ's six-month window may misclassify frequency, particularly for frequent, low-salience symptoms; and (c) social-desirability and justification biases - norms around "persevering" could either suppress or rationalize reports of working while ill. These features mean that statistically significant χ^2 tests should not be interpreted as evidence of directionality or mechanism. Where feasible, future studies should pair self-report with objective or independent indicators (e.g., administrative sick-leave utilization, supervisor/peer ratings of coverage ease, incident/near-miss proxies, ergonomic assessments) and adopt longitudinal or clustered rollout designs to better identify temporal ordering and rule out selection effects.

5. Conclusions

Findings indicate a high and generalized prevalence of presenteeism among nurse anesthetists in five tertiary hospitals in Henan, with an overall NPQ item mean of 2.04 (≈2 to 5 episodes in six months) and consistently elevated item scores across symptom types; with the most frequent issues being centered on fatigue, gastrointestinal, and cardiopulmonary complaints. Group differences showed higher frequencies among older staff, more senior professional levels, and short-term contracts, while most other profile variables were not differentially associated. Taken together, the profile (frequent night work, limited prior training) and the NPQ pattern portray a workforce operating under strong normative, recovery, and resource pressures that favor attendance while ill. These results are coherent with the integrated theoretical lens (TPB, Effort–Recovery, COR, Attendance–Absence models) and support a targeted, theory-informed program to reduce harmful presenteeism.

Practical implications. At the hospital level, policies may need to increase both perceived and actual control over appropriate sick leave, given the observed associations. Priority actions include (a) a clear, streamlined sick-leave standard operating procedure (SOP) with a unit-specific coverage playbook; (b) explicit managerial and peer messaging that normalizes staying home when ill (norm resetting within huddles and performance dialogues); and (c) micro-recovery and ergonomic supports to reduce fatigue and musculoskeletal load between

cases. Targeting is warranted for higher-risk strata identified in the data (older age, senior titles, short-term contracts), while keeping unit-wide interventions to shift norms. Education should focus on risk literacy (patient-safety implications of fatigue/infection), disclosure skills, and implementation intentions for arranging coverage. Monitoring should pair NPQ trends with practical indicators, such as sick-leave utilization, near-miss/self-reported performance limitations, and perceived stigma, reviewed quarterly by nursing leadership. Embedding brief modules into existing education time and aligning coverage SOPs with staffing systems will improve feasibility and sustainability.

Several *limitations* qualify interpretation. First, the study is cross-sectional; therefore, correlations between profile variables and presenteeism cannot be interpreted causally, and reverse or bidirectional pathways remain possible. Second, all variables were obtained through self-report in a single survey session, raising the possibility of common-method inflation, mood-state effects, and recall error for the six-month NPQ window. Third, some analytic categories were coarse (e.g., night-shift bands) and several subgroups were small (e.g., chief nurses, permanent contracts), which can produce unstable cell proportions and limit post-hoc contrasts. Fourth, the sampling frame was limited to tertiary, university-affiliated hospitals in one province, which may limit generalizability to secondary/private or rural facilities. Also, the NPQ indexes frequency of working while ill, but not on-the-job productivity loss or safety outcomes; thus, we cannot link frequency to clinical performance. Future work should (a) incorporate multi-informant and administrative data (e.g., sick-leave records, backfill logs), (b) directly measure TPB constructs (attitudes, norms, perceived/actual control) to test mediation, (c) use prospective or pragmatic cluster designs to strengthen causal inference, and (d) include fatigue and workload metrics (e.g., cumulative night duty, staffing ratios). Finally, the primary χ^2 tests relied on a dichotomized NPQ for stability in small subgroups; although sensitivity analyses with the full scale were prespecified to assess robustness, any residual dependence on cut-points should be considered when interpreting group differences.

Future directions. Future work should evaluate the TPB-aligned intervention using longitudinal or pragmatic cluster designs (e.g., unit-level rollout with wait-list controls), measure TPB constructs alongside NPQ to test mediation, and include objective outcomes (administrative sick-leave use, staffing backfill data, near-miss/error proxies). More sensitive fatigue metrics (cumulative night-duty exposure, validated fatigue scales, or wearable-based recovery indices) and detailed contract/benefit data would clarify recovery and resource mechanisms. Multi-site replication across provinces and hospital types, with multilevel models that incorporate unit culture and staffing ratios, will strengthen external validity. Mixed-methods studies, especially qualitative work with managers and staff, can refine normative levers and improve the coverage playbook. Finally, economic evaluation (cost of backfill versus cost of presenteeism-related performance loss) will inform adoption and scaling decisions by hospital administrators.

AI USE Declaration

An AI-based writing assistant (Grammarly) was used solely for grammar, spelling, and style checks. No generative text, data analysis, or content creation was performed by the tool. All substantive content, data interpretation, and conclusions are the author's own. The authors reviewed and approved the final manuscript and accept full responsibility for its accuracy and integrity.

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