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Research paper

Perceived Pressure, Job Stress, and Self-Efficacy Among Full-Time Hospital Caregivers in Shandong, China: A Cross-Sectional Study with Qualitative Triangulation

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Abstract

This study examined perceived pressure, job stress, and self-efficacy among full-time hospital caregivers in a Class III Grade A tertiary hospital in Shandong Province, China. Using a cross-sectional descriptive design with qualitative triangulation, 130 caregivers (family and employed) completed validated measures of perceived pressure, job stress, and general self-efficacy; an eight-member focus group of supervising nurses provided contextual insights. Overall, caregivers reported average perceived pressure and job stress, but low self-efficacy. Correlational analyses indicated that higher perceived pressure and job stress were strongly associated with lower self-efficacy. One-way MANOVAs showed no significant differences in perceived pressure, job stress, or self-efficacy by age, gender, education level, or caregiver-patient relationship, suggesting broadly shared stress experiences across subgroups. Qualitative findings echoed these patterns, highlighting system-level pressures, such as unrealistic family expectations, limited training access, and suboptimal shift policies, as primary stressors, with supervising nurses noting that confidence improves when structured training is available. Grounded in Roy's Adaptation Model and Bandura's Self-Efficacy Theory, the results underscore self-efficacy as a modifiable buffer and point to the need for institutional interventions: competency-based skills training, Cognitive Behavior Therapy-informed stress-management supports, and scheduling reforms (e.g., limits on consecutive night shifts). The study contributes evidence to guide hospital administrators in designing targeted, scalable programs that strengthen caregiver well-being and, in turn, patient care quality; future research should expand sampling and assess longitudinal impacts of these interventions.

Keywords: *Perceived Pressure; Job Stress; Self-Efficacy; Full-Time Hospital Caregivers; Mixed-Methods Triangulation; China; Stress-Management.*

1. Introduction

China's rapidly aging population, rising burden of chronic illness, and tightening hospital resources have intensified the demand for continuous bedside support in tertiary facilities. (Xu et al., 2025). In this context, full-time hospital caregivers, whether hired attendants or family members assuming quasi-professional roles (LaBarca, 2025), which perform essential yet often invisible labor that spans basic care, emotional support, and coordination with clinical teams (Abraham et al., 2021). Their work occurs under persistent time pressure, fluctuating patient acuity, and scrutiny from families and administrators. (Alqhtani et al., 2021; Alyafei et al., 2021). These conditions create fertile ground for heightened perceived pressure and job stress, which in turn can impair both caregiver well-being and the consistency in patient care. (Kristinsson et al., 2024).

While caregiver stress has been widely examined among family caregivers and licensed nursing staff, full-time hospital caregivers as a distinct group remain comparatively understudied. Existing evidence suggests that stress experiences in hospitals are shaped not only by task load and patient complexity, but also by confidence in one's ability to cope. (Vaz et al., 2022); which is similar to self-efficacy, which influences appraisal of demands, problem-solving, and help-seeking (Arenella & Steffen, 2020). Yet the contours of perceived pressure, job stress, and self-efficacy among full-time caregivers embedded in inpatient wards, and the ways these constructs interrelate across demographic subgroups (age, gender, education, and caregiver-patient relationship), are not well described. (Nwoke et al., 2017). Moreover,

system-level factors, such as training access, shift policies, and expectations from patients' families, would likely amplify stress beyond individual characteristics. (Kuyler et al., 2023).

Responding to these gaps, this study investigates perceived pressure, job stress, and self-efficacy among full-time hospital caregivers in a Class III Grade A (tertiary) hospital in Shandong Province. A cross-sectional descriptive approach using validated scales is complemented by a focus group discussion (FGD) with supervising nurses to contextualize quantitative patterns. By integrating numerical estimates with frontline narratives, the study seeks to clarify the relationships among perceived pressure, job stress, and self-efficacy and to surface practical leverage points for program design within hospital systems.

The study is anchored in Roy's (1988) **Adaptation Model** (RAM) and Bandura's (1997) **Self-Efficacy Theory**. RAM conceptualizes individuals as adaptive systems responding to internal and external stimuli through cognitive-physiological processes; in inpatient settings, caregivers continuously appraise demands (e.g., patient acuity, family expectations) and generate coping responses (Callis, 2020; Roy, 1988). Bandura's Self-Efficacy Theory posits that beliefs about one's capabilities shape appraisal of stressors, choice of strategies, persistence, and affective states. (Bandura, 1995, 1997, 2006). Integrating these lenses, perceived pressure and job stress reflect stimulus appraisal and environmental demands (such as the likes of RAM), while self-efficacy functions as a modifiable personal resource that can buffer stress, enabling more adaptive problem-solving and help-seeking in the ward context.

Guided by these frameworks, the present study set out to describe how full-time hospital caregivers experience perceived pressure and job stress in everyday ward work, and how confident they feel (self-efficacy) in managing these demands. It sought to illuminate patterns across common demographic situations (age, gender, educational background, and whether caregivers are family members or employed attendants) without presuming that any one subgroup is inherently more vulnerable. The study also aimed to clarify the interrelationships among perceived pressure, job stress, and self-efficacy, examining how rising pressure and job demands may erode confidence and, conversely, how confidence may enable more adaptive responses. Finally, through an FGD with supervising nurses, the study sought to surface concrete, system-level contributors to stress (e.g., training access, shift practices, family expectations) and to generate grounded recommendations for institutional programs that reduce pressure and strengthen caregiver self-efficacy within the hospital setting.

2. Literature Review

2.1. Demographic profile of participants and care demand

With population aging, chronic disease prevalence, and rising expectations for inpatient care, hospitals increasingly rely on full-time caregivers to supplement nursing services. (Wang et al., 2022). Comparative discussions of caregiving models suggest that in the United States, Europe, and parts of Asia, hospitals rely primarily on professional nursing staff for bedside care, whereas in China, the "caregiver rate" in hospitals remains high, with some facilities reporting rates exceeding 80% (Yang et al., 2025). Socioeconomic and household characteristics shape who becomes a full-time caregiver (Fukuda et al., 2022). For instance, families with higher incomes or limited household labor are more likely to hire paid caregivers. (Feinberg, 2019), whereas families with fewer resources or more available kin often rely on relatives (Osborne & Leon, 2024). Beyond availability, patients' age, mobility, and self-care capacity increase the likelihood of needing full-time support. These demographic and structural factors also condition caregivers' perceived pressure, as economic status, education, age, and health affect both the intensity of care needs and the resources available to meet them. (Choi et al., 2024).

2.2. Emerging artificial intelligence (AI) supports in caregiving

AI tools are rapidly entering long-term care (LTC) and caregiving ecosystems with applications ranging from social robots and ambient sensors to decision support and remote monitoring. Two recent systematic reviews showcased both the promise and the concerns of this field. One review found AI-enhanced interventions, which primarily focus on social robots, environmental sensors, and wearables, were somewhat acceptable to older users in LTC, but evidence for effectiveness across health outcomes remained mixed, with many studies at high risk of bias and concentrated in high-income countries. (Loveys et al., 2022). While a broader review of AI supports for informal caregivers likewise reported promising, but heterogeneous results, with most studies using machine learning and reporting high accuracies on narrow tasks, yet limited external validation and variable performance metrics. (Borna et al., 2024).

Beyond efficacy, responsibility and context emerge as critical determinants of value. A scoping review on responsible AI in LTC synthesized three cross-cutting themes, namely: user-oriented innovation, problem framing, and context-sensitivity. They concluded that responsible innovation is often asserted, but rarely evidenced in local, real-world deployment; more empirical work is needed at the level of specific AI tools embedded in particular care settings. (Lukkien et al., 2021). Topic-modeling of AI-and-demographics literature further shows a post-COVID acceleration of studies intersecting AI with issues like quality of life and smartphone use, offering a data-driven foundation for ethical guidelines tailored to specific communities (e.g., African American dementia caregiving) (Yoon et al., 2023). Together, these strands point to a dual imperative: design with caregivers and care recipients, and evaluate AI in situ with transparent governance.

Technologically, AI can augment caregiving tasks and bolster self-efficacy when well-matched to needs. (Czaja & Ceruso, 2022). For example, an AI-enabled walking stick integrates energy harvesting, deep-learning-based sensing, and Internet of Things (IoT) connectivity to support identity recognition, mobility assessment, and real-time monitoring, such as illustrating how AI can translate into actionable feedback loops for safety and independence. (Guo et al., 2021). Systematic reviews of AI/assistive technologies also highlight Ambient Assisted Living (AAL) through home sensors that facilitate remote monitoring and care coordination between formal and informal caregivers, with calls to target specific caregiver groups and needs. (Milella & Bandini, 2024). However, gaps persist around robots and mobile health apps, equitable access, and integration into routine workflows. (Loveys et al., 2022; Milella & Bandini, 2024).

For full-time hospital caregivers, the implications are twofold. First, responsibly implemented AI (e.g., patient-status dashboards, escalation prompts, automated vital-sign triage, family-communication aids) could reduce perceived pressure by clarifying priorities and distributing cognitive load, while structured micro-training embedded in AI tools could build self-efficacy (e.g., just-in-time checklists, scenario rehearsals). Second, absent careful design and governance, AI can add to job stress (alert fatigue, opaque algorithms, workflow misfit) or erode confidence if framed as surveillance rather than support. Thus, consistent with Roy's Adaptation Model, AI constitutes a contextual stimulus that can either heighten or relieve stress depending on how caregivers appraise and integrate it; aligned with Bandura's Self-Efficacy Theory, AI-mediated feedback and skill-building can strengthen efficacy beliefs if caregivers experience successful mastery and supportive social persuasion during use.

Overall, the recent AI-caregiving literature signals genuine potential to reduce burden and improve coordination, but currently rests on uneven evidence, limited deployment in low to middle-income contexts, and under-specified responsibility practices. For hospital-based, full-time caregivers in China, these findings suggest that AI should be pursued as a targeted, context-sensitive adjunct and not a generic add-on that can be co-designed with nursing leadership and caregivers to ensure fit with ward routines, family expectations, and training pathways. In theoretical terms, responsibly deployed AI could function as a buffering resource that enhances adaptive responses (aligned with RAM) by increasing perceived control and competence (self-efficacy), thereby mitigating perceived pressure and job stress. Empirically, the present study's focus on stress and efficacy dynamics provides a baseline against which future AI-enabled training or workflow supports can be evaluated, clarifying whether and for whom such tools translate into measurable improvements in caregiver well-being and care quality.

2.3. Psychological status of caregivers and long-term caregivers

Psychological stress reflects the mismatch between environmental demands and coping resources, producing physiological arousal and affective responses (Demerouti & Bakker, 2022). Moderate stress can be motivating, but prolonged or excessive stress is linked to anxiety, depression, sleep disturbance, and diminished functioning. (Ovsiannikova et al., 2024). Transitional life phases and role changes, common among caregivers assuming sustained bedside responsibilities, can exacerbate vulnerability to negative affect, including loneliness, doubt, and depressive symptoms. (Mora-Lopez et al., 2022). In hospital wards, stressors cluster around time pressure, emotional labor with families, uncertain patient trajectories, and variable team expectations, such as conditions that can heighten perceived pressure and downstream job stress. (Subramaniam & Mehta, 2024).

Research on caregivers of long-term bedridden patients shows elevated psychological symptomatology when caregivers face social isolation, limited emotional support, and sustained exposure to demanding routines. (Sun et al., 2024). Care tasks for incontinent or highly dependent patients are prolonged and repetitive, increasing fatigue and risk of burnout. (Talley et al., 2021). Studies comparing relatives and hired caregivers report differences in physical and psychological perceived pressure, with influential factors including gender, age, employment, marital status, household income, and education. Interventions that incorporate psychological nursing (e.g., counseling, psychoeducation, supportive supervision) have been associated with reductions in anxiety and depression among long-term caregivers and improvements in perceived job satisfaction from both caregiver and patient sides. (Liu et al., 2022). Evidence from intensive care units' settings similarly identifies generally high perceived pressure among full-time caregivers, with marital status and level of patient care as salient correlates. (Robinson-Lane et al., 2024).

Caregiver mental health also has implications for patient outcomes. Among stroke dyads, caregiver depression during the acute phase predicts lower patient health-related quality of life and reduced social participation, underscoring the need for early screening and intervention.. (Lin et al., 2025). Recommended strategies include cognitive-behavioral supports and structured counseling to address depressive symptoms and enhance coping skills. (González-Fraile et al., 2025). Educational attainment appears to operate differently across populations, while some clinical samples show education as a significant factor in perceived pressure (e.g., among elderly myocardial infarction patients), patterns may not generalize straightforwardly to full-time hospital caregivers, reflecting contextual differences in role demands and support structures noted in recent qualitative and quantitative studies. (Nissen et al., 2025; Qin et al., 2022; Wang et al., 2024).

2.4. Perceived pressure, job stress, and self-efficacy

Across occupational health research, self-efficacy, which is defined as the confidence in one's capability to organize and execute actions, emerges as a central psychological resource. Prior studies report a negative association between perceived pressure and self-efficacy: lower efficacy is linked to higher stress appraisal and poorer coping (Raudenbush & Bryk, 2002). In stressful hospital contexts, self-efficacy can buffer the impact of stressors by promoting adaptive strategies (e.g., help-seeking, problem-solving, calm communication with families) (Taherkhani et al., 2024). Conversely, sustained job stress may erode efficacy, creating a feedback loop of heightened perceived pressure, avoidance, and diminished performance. (Kristinsson et al., 2024). Although some work finds that self-efficacy moderates links between stressors and physical stress, evidence for buffering effects on job satisfaction is mixed, suggesting construct-specific pathways and the need for setting-specific analyses.

2.5. Management and system factors

Beyond individual differences, structural conditions such as training access, supervision quality, staffing models, and shift policies are repeatedly implicated in caregiver strain. Reports from ward settings point to uneven quality among full-time caregivers, limited formal preparation, and variable oversight mechanisms. (Cha et al., 2023; Xiang et al., 2022). When institutions provide targeted training and supportive supervision ("psychological nursing"), caregivers' anxiety and depressive symptoms decrease, and satisfaction improves. These system levers are particularly salient in tertiary hospitals where care intensity and family expectations are high. (Noguchi et al., 2025).

2.6. Synthesis

The reviewed evidence converges on three points. First, perceived pressure among full-time caregivers is shaped by intersecting structural and individual factors, such as patient acuity and family expectations (system level), socioeconomic and educational resources (household level), and coping resources (individual level). Second, self-efficacy consistently shows an inverse relationship with perceived pressure and job stress, but the strength and locus of buffering vary by outcome (e.g., physical stress vs. job satisfaction) and context, indicating construct-specific and setting-dependent mechanisms. Third, institutional supports, including competency-based training, clear supervision, and psychologically informed programs, can reduce symptoms and improve job satisfaction, highlighting modifiable levers beyond demographics. These themes align closely with the study's theoretical scaffolding. In Roy's Adaptation Model, caregivers continually appraise and respond to stimuli in the ward environment; persistent overload elevates perceived pressure and job stress. Within Bandura's Self-Efficacy Theory, efficacy beliefs shape this appraisal-response cycle by influencing strategy selection, persistence, and affective regulation. Positioning self-efficacy as a modifiable resource clarifies why training and supportive supervision improve outcomes: they recalibrate appraisals and expand effective coping repertoires. Consequently, the present study focuses on describing perceived pressure, job stress, and self-efficacy among full-time hospital caregivers; examining how these constructs interrelate across demographic contexts; and identifying system-level pressure points (training access, shift practices, family expectations) that can inform targeted, institutionally feasible interventions to strengthen caregiver well-being and care quality.

3. Method

3.1. Study design

This study adopted a mixed-methods explanatory-sequential design (Cohen et al., 2007). The primary strand was a cross-sectional quantitative descriptive survey administered to full-time hospital caregivers. A secondary qualitative focus group discussion (FGD) with supervising nurses was conducted to triangulate and contextualize the quantitative patterns. (Natow, 2019), particularly around system-level stressors (e.g., shift policies, training access) and perceived levers for improving self-efficacy. This design allows numeric estimates of perceived pressure, job stress, and general self-efficacy to be interpreted alongside frontline narratives from nurse leaders who regularly coordinate with full-time caregivers.

3.2. Setting and participants

The study was conducted at a Class III Grade A tertiary general hospital in Binzhou, Shandong Province, China (≈2,852 beds; ~1.9 million inpatients/year). A priori power analysis (G*Power, MANOVA: global effects) indicated that N = 130 provides 95% power to detect a small effect ($f^2(V) = .063$) at $\alpha = .05$, with three dependent variables (perceived stress, job stress, self-efficacy) and four grouping factors considered in omnibus tests (age, sex, education, caregiver-patient relationship) (Faul et al., 2009). The quantitative sample comprised 130 full-time caregivers of long-term hospitalized patients (length of stay ≥ 30 days). Caregivers included both family members assuming continuous bedside responsibilities and paid/contract caregivers. Inclusion criteria: required age ≥ 18, ability to complete the questionnaire, and informed consent. To avoid confounding by short readmissions for the same condition (restricted by local insurance rules), cases involving brief discharge-readmission cycles for the same illness were excluded.

For the qualitative strand, one FGD was held with eight supervising nurses (registered or licensed practical nurses) who met these criteria: ≥1 year of direct inpatient experience; routine collaboration with full-time caregivers (delegation, coordination, or oversight); and involvement in long-term/geriatric/chronic/rehabilitation units. The project lead served as moderator; one observer and one recorder supported field notes and documentation.

Table 1 shows the profile of the participants. The study included 130 full-time hospital caregivers. Most were 18-59 years old (64%; n=83), with 36% (n=47) aged 60 years and above. Participants were predominantly female (58%; n=75), with males comprising 42% (n=55). In terms of education, over half had junior high school education (53%; n=69), followed by primary school and below (30%; n=39), and high school (17%; n=22). Regarding caregiving role, two-thirds were employed/paid caregivers (66%; n=86), while one-third were family caregivers (34%; n=44). Overall, the sample reflects a largely female, working-age caregiver population with lower-to-middle formal education, and a majority engaged in paid caregiving roles.

Table 1: Profile of Participants

Category/Group	Frequency (f)	Percentage (%)
Age		
18-59 years old	83	64
60 years old and above	47	36
Gender		
Male	55	42
Female	75	58
Education level		
Primary school and below	39	30
Junior high school	69	53
High school	22	17
Employment relationships		
Family members	44	34
Employed	86	66

3.3. Measures

All questionnaires were self-administered in a quiet area of the hospital and used standardized instructions after a brief, unified orientation. Three instruments assessed the main constructs: perceived pressure, job stress, and self-efficacy. The scales were adaptations of widely used scales. All instruments underwent forward-back translation. (Ozolins et al., 2020), expert review (Rincón et al., 2024), formatting to a common Likert (1932) Response style and cognitive pretesting for clarity with caregivers not included in the final sample. Content validity of the scale was established by a 10-member expert panel (nurse managers/educators, clinical nurses with ≥5 years' inpatient experience, and two research methodologists) (Cohen et al., 2007). Experts rated the relevance, clarity, and cultural appropriateness of each item and suggested wording refinements. The team reconciled feedback and finalized wording before data collection.

Perceived pressure - Perceived pressure (or stress) was measured using an adapted 14-item Perceived Stress Scale (PSS-14) (Cohen et al., 1983; Cohen & Williamson, 1988), which was later validated into a Chinese version (Liu et al., 2025). Items capture unpredictability, lack of control, and overload over the past few weeks. Responses used a 5-point frequency scale (1 = Never, 2 = Once in a while, 3 = At times, 4 = Now and then, 5 = Always). Following the canonical key, items 4, 5, 6, 7, 9, 10, and 13 are reverse-scored; higher totals reflect greater perceived stress. For interpretability, total scores (sum across 14 items) were read with the following descriptive bands: 0-28 low, 29-42 average, 43-56 high, 57-70 extremely high perceived stress. Sample items included: "I felt upset because of something unexpected"; "I felt nervous and stressed"; (reverse) "I felt confident about my ability to handle personal problems." Reliability from original literature: α typically .84-.91 in community and health samples (Cohen & Williamson, 1988). Alpha for the current sample is computed at .84, denoting adequate internal consistency. (Cohen et al., 2007).

Job Stress - Job stress was assessed with a 35-item inventory compiled/adapted from prior nursing-stress frameworks; most notably the Nursing Stress Scale and the Expanded Nursing Stress Scale (Gray-Toft & Anderson, 1981), and Chinese-language ward literature, then contextualized for full-time caregiver roles. Items span five domains: professional/work issues (items 1-7), time/workload allocation (8-12), environment/equipment (13-15), patient-care demands (16-26), and management/interpersonal issues (27-35). The common 5-point frequency scale (1 = Never … 5 = Always) was used; higher scores indicate greater job stress. Domain totals follow the number of items in each domain (e.g., 7-35 for professional/work issues), and a total reflects overall job stress. Sample items included: "Too much work";

"Worry about mistakes at work"; "Patient/family demands are too high"; "Understanding and support from nursing managers are insufficient." Reliability of the scale was computed at .96. Prior ENSS-style measures commonly report domain α in the .70-.90 range; exact values depend on item selection and context (Gray-Toft & Anderson, 1981).

Self-efficacy - This was measured with the use of a Chinese version of the 10-item General Self-Efficacy Scale (GSE-10) (Schwarzer & Jerusalem, 1995), which was later validated into a Chinese version (Ou et al., 2025). Items assess broad confidence in handling challenges. Responses followed a 4-point format harmonized to local usage (1 = exactly right, 2 = majority correct, 3 = kind of right, 4 = completely incorrect) and were scored so that higher totals indicate higher self-efficacy (reverse-coded where necessary to align with the standard direction). Total scores range 10-40, read descriptively as 10-20 low, 21-30 average, 31-40 high self-efficacy. Sample items included: "I can always solve problems if I try my best"; "When faced with a difficult problem, I can usually find several solutions."

Reliability from original literature: α typically .82-.90 across translations and settings (Schwarzer & Jerusalem, 1995). Alpha for the current sample is computed at .92.

Demographics - Demographic and role variables included age, gender, education, caregiver type (family versus paid), distance from home to hospital, years in role, prior training (yes/no, duration), qualifications, income, and patient insurance type. Note that not all demographics are reported in the current paper.

3.4. Data collection procedures

After institutional approvals, eligible caregivers were approached during non-work periods. Trained research assistants explained the study purpose, confidentiality, and voluntary participation, and obtained written informed consent before survey completion (~15-30 minutes). Questionnaires with missing consent, patterned responding, or major missingness were deemed invalid and excluded. The FGD was scheduled separately, held in a private meeting room, and audio-recorded with consent. The moderator used a semi-structured guide covering observed caregiver stressors, training gaps, shift/scheduling constraints, family expectations, teamwork, and perceived avenues to enhance caregiver self-efficacy. Field notes documented non-verbal cues and context.

3.5. Statistical analysis

All quantitative data were analyzed in SPSS version 26. Descriptives (frequency, percentage) summarized participant characteristics. Means and standard deviations (SD) described perceived pressure, job stress, and self-efficacy overall and by subgroups (age, gender, education, caregiver-patient relationship). For interpretability, each scale's score ranges (perceived pressure: 0-28 low, 29-42 average, 43-56 high, 57-70 extremely high; self-efficacy: 10-20 low, 21-30 average, 31-40 high), and note that higher job stress scores represent greater burden. Pearson's correlations examined associations among perceived pressure, job stress, and self-efficacy. Lastly, one-way MANOVAs tested subgroup differences across the three outcomes by age group, gender, education level, and caregiver-patient relationship. Multivariate significance was set at $\alpha = .05$; assumptions (multivariate normality, homogeneity of covariance) were checked, and follow-ups (univariate ANOVAs with adjusted α) were conducted when warranted. For the interpretive bands (Likert scale of 1–5 scale), these descriptive labels are applied as such: 1.00–2.49 = Low; 2.50–3.49 = Average; 3.50–5.00 = High.

Qualitative Analysis and Integration - FGD audio was transcribed verbatim. Using reflexive thematic analysis (Braun & Clarke, 2006)Two analysts independently coded transcripts, then met to reconcile codes and refine themes (e.g., system-level pressures, training as efficacy-building, shift policy constraints, family-communication burdens). Credibility was enhanced through investigator triangulation (moderator, observer, analyst) and an audit trail (codebook iterations, decision memos). Integration occurred at the interpretation stage: qualitative themes were used to explain quantitative patterns (e.g., why subgroups may not differ despite uniformly high environmental demands; how targeted training may strengthen self-efficacy and reduce perceived stress).

3.6. Ethical considerations

The study received ethics approval from the University Research Ethics Review Committee (STUD-YIBY-002.24-25.T1.GRAD) and the participating hospital. Participation was voluntary, with written informed consent. Surveys were anonymous; data were de-identified, encrypted, and stored for two years before secure destruction. Participants could withdraw at any time without consequence.

4. Results and Discussions

4.1. Perceived pressure, job stress, and self-efficacy across demographic subgroups

Table 2 shows that across the full sample (N = 130), caregivers reported average perceived pressure (M = 3.39, SD = 0.94) and average job stress (M = 2.72, SD = 0.90), alongside low self-efficacy (M = 2.37, SD = 0.88). By *age*, caregivers aged 60+ showed slightly higher perceived pressure (M = 3.52, SD = 0.91; high) than those aged 18–59 (M = 3.32, SD = 0.95; average), while job stress remained average for both groups (60+: M = 2.81, SD = 0.83; 18–59: M = 2.67, SD = 0.94). Self-efficacy was low in both age groups, with a lower mean among older caregivers (60+: M = 2.24, SD = 0.81; 18–59: M = 2.45, SD = 0.91). By *gender*, females reported slightly higher perceived pressure (M = 3.49, SD = 0.96) and job stress (M = 2.82, SD = 0.91) than males (pressure: M = 3.26, SD = 0.90; job stress: M = 2.59, SD = 0.89). Self-efficacy was low for both groups, with a marginally higher mean among males (M = 2.46, SD = 0.87) than females (M = 2.31, SD = 0.89). By *education level*, perceived pressure and job stress were average across categories, with a gentle downward gradient from primary-and-below (pressure: M = 3.49; job stress: M = 2.82) to high school (pressure: M = 3.22; job stress: M = 2.59). Self-efficacy rose with schooling, from low among primary-and-below (M = 2.29, SD = 0.86) and junior high (M = 2.36, SD = 0.87) to high among high school (M = 2.55, SD = 0.97; per instrument interpretive band). Finally, family and employed caregivers displayed highly similar profiles: average perceived pressure (family: M = 3.41, SD = 0.91; employed: M = 3.38, SD = 0.95), average job stress (family: M = 2.73, SD = 0.93; employed: M = 2.72, SD = 0.90), and low self-efficacy (family: M = 2.36, SD = 0.91; employed: M = 2.38, SD = 0.87).

Table 2: Level of Perceived Pressure, Job Stress, and Self-Efficacy According to Demographics

Category/Group	Perceived pressure			Job stress			Self-efficacy		
	Mean	SD	Interpretation	Mean	SD	Interpretation	Mean	SD	Interpretation
Overall	3.39	0.94	Average	2.72	0.90	Average	2.37	0.88	Low
Age									
18-59 years old	3.32	0.95	Average	2.67	0.94	Average	2.45	0.91	Low
60 years old and above	3.52	0.91	High	2.81	0.83	Average	2.24	0.81	Low
Gender									
Male	3.26	0.90	Average	2.59	0.89	Average	2.46	0.87	Low
Female	3.49	0.96	Average	2.82	0.91	Average	2.31	0.89	Low
Education level									
Primary school and below	3.49	0.94	Average	2.82	0.95	Average	2.29	0.86	Low
Junior high school	3.39	0.96	Average	2.71	0.90	Average	2.36	0.87	Low
High school	3.22	0.85	Average	2.59	0.86	Average	2.55	0.97	High
Employment relationships									
Family members	3.41	0.91	Average	2.73	0.93	Average	2.36	0.91	Low
Employed	3.38	0.95	Average	2.72	0.90	Average	2.38	0.87	Low

Note. Labels follow fixed bands on the 1–5 metric: 1.00–2.49 = Low; 2.50–3.49 = Average; 3.50–5.00 = High.

A uniformly stressed context with uniformly low efficacy - Table 2 shows that the average perceived pressure and job stress coupled with low self-efficacy across groups, point to a ward environment wherein contextual demands are consistently high and personal coping resources feel insufficient. This is consistent with the job demands-resources logic during sustained strain. (Demerouti & Bakker, 2022) And echoes the FGD, wherein supervising nurses repeatedly described "invisible pressure" from families' 24/7 expectations and administrators' scrutiny, and "double stress" for hired caregivers blamed for systemic shortfalls.

Why subgroup differences are small (and largely non-significant) - Although older caregivers and women showed slightly higher means on pressure/stress (and lower efficacy), the lack of significant differences suggests that system-level stimuli such as family expectations, staffing limits, and shift practices may saturate the environment, overshadowing individual-difference effects. The FGD directly supports this reading, wherein nurses cited unrealistic family demands (e.g., "staying awake all night for constant vitals monitoring") and "policy/coverage gaps that caregivers cannot personally resolve". Prior work similarly ties caregiver distress to structural features (e.g., workload, coordination burdens, unclear boundaries) rather than actual demographic background. (Cha et al., 2023; Vaz et al., 2022; Xiang et al., 2022)

Education and the efficacy gradient – For the education-efficacy gradient, results align with FGD observations ("high-school-educated caregivers ask more questions and adapt faster"; "low-educated caregivers panic during emergencies") and with theory/literature that mastery opportunities and cognitive tools bolster efficacy and stress coping. (Bandura, 1995, 1997, 2006; Noguchi et al., 2025). Even without significant omnibus effects, the descriptive pattern is practically meaningful, wherein tailored skills training and just-in-time supports may be particularly impactful for caregivers with less formal schooling. (Liu et al., 2022; Taherkhani et al., 2024).

Gendered communication norms around help-seeking - FGD nurses noted that "male caregivers avoid asking for help; females are more open but more self-critical." This maps to the small gender differences observed (slightly higher stress/lower efficacy among females, wherein slightly higher efficacy among males), and to mixed evidence on gendered stress appraisal and help-seeking. Rather than treating gender as a fixed risk factor, the implication is to engineer help-seeking into workflow (e.g., required briefings, escalation checklists), reducing reliance on individual initiative and normalizing timely consultation.

Within Roy's Adaptation Model, Family demands, scheduling constraints, and oversight pressures are focal and contextual stimuli that elevate perceived pressure and job stress; caregivers' coping responses are constrained when appraisal tilts toward overload. Within Bandura's Self-Efficacy Theory, low efficacy undercuts problem-solving, persistence, and affect regulation, which actually is an amplifying the stress cycles. The FGD's practical levers show that competency-based training, structured supervision or psychological nursing, and shift reforms are precisely the efficacy-building and stimulus-modulating interventions these frameworks predict will help. (Callis, 2020).

Program implications – Several programs are suggested:

- Competency-based micro-training (simulation of common deteriorations; scenario walk-throughs for night shifts; rapid-response role cards) to raise mastery experiences and shared mental models (Bandura, 2006).
- Embedded help-seeking protocols (e.g., mandatory "if-then" escalation checklists; two-minute huddles at handover) to lower the interpersonal cost of asking for help and to standardize responses.
- Family-communication scripts and expectation-setting at admission (what caregivers can/cannot do; when nurses must be called) to reduce misaligned demands (an FGD-identified stressor also noted in the literature) (Vaz et al., 2022).
- Scheduling safeguards (caps on consecutive night shifts; micro-breaks with coverage) to reduce chronic overload that blunts adaptive responding (Demerouti & Bakker, 2022).
- Targeted supports for lower-education caregivers (more guided practice; pictorial/stepwise job aids) to close the efficacy gap (which were flagged both by Table 2 and the FGD).

Together, these align with the study's theoretical scaffold: reduce noxious stimuli (Roy) and build efficacy (Bandura) to bend the curve on perceived pressure and job stress.

Alignment with public health policy and accreditation - These recommendations also map onto broader policy directions in China that emphasize healthy aging, quality and safety in hospitals, and workforce development. Embedding expectation-setting, micro-training, and scheduling safeguards into routine ward governance supports the national focus on relieving caregiver burden in tertiary hospitals and improving continuity of care for older adults. In practice, hospitals could incorporate caregiver-support checkpoints (orientation, skills verification, night-shift caps) into internal audits and quality indicators used for accreditation. Doing so creates an implementation pathway that is policy-congruent, measurable, and scalable across units with different resource profiles.

4.2. Interrelations among perceived pressure, job stress, and self-efficacy

Table 3 shows the bivariate correlations which indicated very strong positive association between perceived pressure and job stress ($r = .965$, $p < .01$) and strong negative associations of self-efficacy with both perceived pressure ($r = -.862$, $p < .01$) and job stress ($r = -.849$, $p < .01$). These coefficients suggest that as caregivers' perceptions of pressure and job demands rise, self-efficacy declines in tandem, while higher self-efficacy co-occurs with lower stress appraisals.

Table 3: Correlations among the Variables

Correlations	Job stress	Self-efficacy
Perceived pressure	.965**	-.862**
Job Stress		-.849**

Note. **Correlation is significant at the 0.01 level (2-tailed).

A tightly coupled stress-efficacy system - The correlation pattern supports a reinforcing cycle whereby escalating perceived pressure and job demands erode caregivers' confidence to cope, and lower self-efficacy in turn heightens stress appraisal, which is consistent with prior occupational health evidence that efficacy is inversely related to stress and strain (Demerouti & Bakker, 2022; Taherkhani et al., 2024). This dynamic was echoed in the FGD, wherein nurses emphasized that "self-efficacy plays a very important role in dealing with work stress," and observed that low-educated or less trained caregivers "freeze when a patient's condition changes suddenly," mapping directly onto the negative stress-efficacy links.

Why the coefficients are so large - The very strong correlation between perceived and job stress ($r \approx .97$) likely reflects (a) genuine co-movement under a saturated, high-demand ward context (FGD: "double stress" from families and administrators), and (b) measurement adjacency (overlapping content domains and a common rater, time frame, and response format). While substantively meaningful, such magnitudes counsel caution against over-attributing unique explanatory power to either stress construct in multivariable models; variance inflation and redundancy are plausible. The very high correlation between perceived pressure and job stress may partly reflect common-method variance and shared item content (same rater, timeframe, and response format). Hence, future work should include multi-method validation (e.g., supervisor or peer ratings, incident logs) and objective or physiological indicators (e.g., heart-rate variability) to reduce same-source bias and separate overlapping constructs.

Theoretical connections - Within RAM, family expectations, shift policies, and staffing constraints function as focal/contextual stimuli elevating both perceived and job stress; low efficacy constrains adaptive responses. (Callis, 2020). While Bandura's Self-Efficacy Theory shapes stress appraisal, persistence, and help-seeking, mastery experiences and supportive persuasion build efficacy and attenuate stress cycles. Empirically, similar stress-efficacy couplings and the value of psychoeducational/skills interventions are reported across caregiving contexts. (Liu et al., 2022; Noguchi et al., 2025; Vaz et al., 2022).

Program implications - Integrate stress reduction and efficacy-building. Given the intertwined nature of these variables, single-track programs (only reducing workload or only boosting skills) may underperform. The data and FGD jointly support integrated packages that:

- Reduce stimuli (RAM): set family-care boundaries at admission; align expectations about caregiver scope; implement scheduling safeguards (e.g., caps on consecutive nights).
- Build efficacy (Bandura): competency-based micro-trainings for common deteriorations; job aids and escalation checklists; brief supervised debriefs to convert near-misses into mastery experiences.
- Normalize help-seeking: scripted "if–then" escalation, mandatory huddles; especially helpful where gender norms or low confidence inhibit timely consultation (from the FGD insight).

4.3. Age differences among perceived pressure, job stress, and self-efficacy

Table 4 shows the one-way MANOVA tested whether age (18–59 versus ≥60) was associated with the combined outcomes of perceived pressure, job stress, and self-efficacy. The multivariate effect of age was not significant, Wilks' $\Lambda = .975$, $F(3, 126) = 1.09$, $p = .356$, $\eta p^2 = .025$. Follow-up univariate tests were likewise nonsignificant with small effects: perceived pressure, $F(1, 128) = 1.44$, $p = .233$, $\eta p^2 = .011$; job stress, $F(1, 128) = 0.72$, $p = .399$, $\eta p^2 = .006$; self-efficacy, $F(1, 128) = 1.66$, $p = .200$, $\eta p^2 = .013$.

Table 4: Multivariate Test of Difference According to Age

Effect		Value	df		F	Significant	Partial Eta Squared
Intercept	Wilks' Lambda	0.007	3	126	5664.321	< .001	0.993
Age	Wilks' Lambda	0.975	3	126	1.090	.356	0.025
Source	Dependent Variable	Type III SS	df	Mean Square	F	Significant	Partial Eta Squared
Intercept	Perceived pressure	1405.76	1	1405.76	1612.214	< .001	0.926
	Job stress	902.72	1	902.72	1104.278	< .001	0.896
	Self-efficacy	659.32	1	659.32	855.051	< .001	0.870
Age	Perceived pressure	1.25	1	1.25	1.435	.233	0.011
	Job stress	0.58	1	0.58	0.715	.399	0.006
	Self-efficacy	1.28	1	1.28	1.660	.200	0.013
Error	Perceived pressure	111.61	128	0.87			
	Job stress	104.64	128	0.82			
	Self-efficacy	98.70	128	0.77			
Total	Perceived pressure	1610.32	130				
	Job stress	1069.19	130				
	Self-efficacy	831.60	130				

A context that flattens age differences - The age-invariant multivariate profile suggests that ward-level demands are sufficiently pervasive that they overwhelm individual age effects. This aligns with nurses' FGD accounts of "double stress" (families and administrators) and unrealistic expectations (e.g., staying awake all night to monitor vitals), which likely raise the baseline stress for all caregivers regardless of age. In job demands-resources terms, a saturated demand environment can compress between-group variability. (Demerouti & Bakker, 2022). Similar patterns are noted in hospital caregiving literature, where structural load (workload, boundary blurring, coordination with families) dominates demographic differences.. (Xiang et al., 2022).

Interpreting the small effects - Effect sizes were small ($\eta p^2 \approx .006$–$.013$ univariate; .025 multivariate), indicating that even if larger samples detected significance, practical impacts would likely be modest. The descriptive tendency (older caregivers reporting slightly higher pressure and lower efficacy) mirrors FGD comments about confidence under emergency and the role of training and guided practice; however, statistically, age does not emerge as a primary lever.

Theoretically, according to RAM, age may shape physiological reserves, but the focal/contextual stimuli (family demands, shift policies, staffing) appear to drive appraisal and strain across the board. In Bandura's Self-Efficacy framework, mastery opportunities, social persuasion, and structured feedback and not just age that are the actionable determinants of efficacy and coping. The FGDs also emphasize training access and clear escalation routines that directly target these mechanisms.

4.4. Gender differences among perceived pressure, job stress, and self-efficacy

Table 5 shows the one-way MANOVA tested whether gender was associated with the combined outcomes of perceived pressure, job stress, and self-efficacy. The multivariate effect was not significant, Wilks' $\Lambda = .981$, $F(3, 126) = 0.823$, $p = .484$, $\eta p^2 = .019$. Follow-up univariate ANOVAs were also nonsignificant with small effects: perceived pressure, $F(1, 128) = 1.901$, $p = .170$, $\eta p^2 = .015$; job stress, $F(1, 128) = 2.184$, $p = .142$, $\eta p^2 = .017$; self-efficacy, $F(1, 128) = 0.906$, $p = .343$, $\eta p^2 = .007$.

Table 5: Multivariate Test of Difference According to Gender

Effect		Value	df		F	Significant	Partial Eta Squared
Intercept	Wilks' Lambda	0.007	3	126	6012.308	< .001	0.993
Age	Wilks' Lambda	0.981	3	126	0.823	.484	0.019
Source	Dependent Variable	Type III SS	df	Mean Square	F	Significant	Partial Eta Squared
Intercept	Perceived pressure	1446.94	1	1446.94	1665.421	< .001	0.929
	Job stress	928.66	1	928.66	1148.969	< .001	0.900
	Self-efficacy	721.22	1	721.22	929.876	< .001	0.879
Age	Perceived pressure	1.65	1	1.65	1.901	.170	0.015
	Job stress	1.77	1	1.77	2.184	.142	0.017
	Self-efficacy	0.70	1	0.70	0.906	.343	0.007
Error	Perceived pressure	111.21	128	0.87			
	Job stress	103.46	128	0.81			
	Self-efficacy	99.28	128	0.78			
Total	Perceived pressure	1610.32	130				
	Job stress	1069.19	130				
	Self-efficacy	831.60	130				

Gender signals are subtle in a high-demand context - The absence of significant gender effects suggests that ward-level demands (e.g., family expectations, staffing/scheduling pressures) likely set a uniformly high baseline of strain that dampens between-group contrasts. This is consistent with the focus-group accounts of "double stress" from families and administrators that applies to all caregivers. Interpreting the descriptive tilt with FGD nuance - Although nonsignificant, the small descriptive tilt (women: increasing pressure/stress, while decreasing efficacy) resonates with nurses' observations that female caregivers are more openly self-critical, whereas male caregivers may avoid asking for help. Rather than treating gender as a fixed risk, the practical lever is to bake help-seeking into the workflow so it doesn't depend on personal disposition.

Theoretically, RAM identified that the family-demand scripts, shift rules, and workload are focal/contextual stimuli elevating stress across genders; modifying these stimuli should reduce perceived pressure and job stress generally. While Bandura's Self-Efficacy noted that efficacy grows through mastery and social persuasion. Structured practice, clear escalation pathways, and brief coached debriefs should raise efficacy for all, reducing stress appraisals irrespective of gender.

4.5. Education level differences among perceived pressure, job stress, and self-efficacy

A one-way MANOVA examined whether education level (primary or below, junior high, high school) was associated with the combined outcomes of perceived pressure, job stress, and self-efficacy. The multivariate effect was not significant, Wilks' $\Lambda = .984$, $F(6, 250) = 0.346$, $p = .912$, $\eta p^2 = .008$. Follow-up univariate ANOVAs were likewise nonsignificant with small effects, such as perceived pressure $F(2, 127) = 0.599$, $p = .551$, $\eta p^2 = .009$, job stress $F(2, 127) = 0.462$, $p = .631$, $\eta p^2 = .007$, and self-efficacy $F(2, 127) = 0.645$, $p = .526$, $\eta p^2 = .010$.

Table 6: Multivariate Test of Difference According to Education Level

Effect		Value	df		F	Significant	Partial Eta Squared
Intercept	Wilks' Lambda	0.008	3	125	4937.085	< .001	0.992
Age	Wilks' Lambda	0.984	6	250	0.346	.912	0.008
Source	Dependent Variable	Type III SS	df	Mean Square	F	Significant	Partial Eta Squared
Intercept	Perceived pressure	1193.67	1	1193.67	1355.892	< .001	0.914
	Job stress	770.83	1	770.83	937.145	< .001	0.881
	Self-efficacy	606.56	1	606.56	778.308	< .001	0.860
Age	Perceived pressure	1.05	2	0.53	0.599	.551	0.009
	Job stress	0.76	2	0.38	0.462	.631	0.007
	Self-efficacy	1.01	2	0.5	0.645	.526	0.010
Error	Perceived pressure	111.81	127	0.88			
	Job stress	104.46	127	0.82			
	Self-efficacy	98.98	127	0.78			
Total	Perceived pressure	1610.32	130				
	Job stress	1069.19	130				
	Self-efficacy	831.60	130				

Structural load eclipses schooling effects - The absence of significant education effects suggests that contextual demands, wherein unrealistic family expectations, scheduling/coverage limits, and administrative scrutiny, create a uniformly high-strain environment that flattens between-group differences. This mirrors FGD accounts (e.g., "double stress" from families and administrators; overnight monitoring requests), and aligns with reports that structural factors often outweigh demographics in hospital caregiving stress (e.g., workload, boundary blurring, coordination with families).

Practical signal, an efficacy gradient worth targeting - Despite nonsignificant tests, the descriptive efficacy gradient (higher education towards higher efficacy) dovetails with nurses' observations: "high-school-educated caregivers ask more questions and adapt faster," whereas "low-educated caregivers panic during emergencies." Consistent with Bandura, opportunities for mastery and guided practice likely accumulate with schooling, supporting more confident appraisals and coping; this is even if effects are modest in this saturated context.

Theoretically, somewhat similar notions can be noted. Family demands and shift policies function as focal/contextual stimuli elevating perceived and job stress across schooling levels; reducing these stimuli should benefit all. While efficacy is trainable through mastery

experiences, vicarious learning, and supportive feedback, mechanisms are directly addressable through the design of training and supervision.

4.6. Employment relationship differences among perceived pressure, job stress, and self-efficacy

Table 7 shows the one-way MANOVA tested whether employment relationship (family versus employed/paid caregiver) was associated with the combined outcomes of perceived pressure, job stress, and self-efficacy. The multivariate effect was not significant, Wilks' $\Lambda = .998$, $F(3, 126) = 0.081$, $p = .970$, $\eta p^2 = .002$. Follow-up univariate tests were likewise nonsignificant and trivially small in effect size, such as perceived pressure $F(1, 128) = 0.025$, $p = .873$, $\eta p^2 < .001$, job stress $F(1, 128) = 0.001$, $p = .975$, $\eta p^2 < .001$, and self-efficacy $F(1, 128) = 0.010$, $p = .920$, $\eta p^2 < .001$

Table 7: Multivariate Test of Difference According to Employment Relationship

Effect		Value	df		F	Significant	Partial Eta Squared
Intercept	Wilks' Lambda	0.008	3	126	5500.31	< .001	0.992
Age	Wilks' Lambda	0.998	3	126	0.081	.970	0.002
Source	Dependent Variable	Type III SS	df	Mean Square	F	Significant	Partial Eta Squared
Intercept	Perceived pressure	1344.71	1	1344.71	1525.409	< .001	0.923
	Job stress	863.90	1	863.90	1050.933	< .001	0.891
	Self-efficacy	653.78	1	653.78	837.068	< .001	0.867
Age	Perceived pressure	0.02	1	0.02	0.025	.873	-
	Job stress	-	1	-	0.001	.975	-
	Self-efficacy	0.01	1	0.01	0.010	.920	-
Error	Perceived pressure	112.84	128	0.88			
	Job stress	105.22	128	0.82			
	Self-efficacy	99.97	128	0.78			
Total	Perceived pressure	1610.32	130				
	Job stress	1069.19	130				
	Self-efficacy	831.60	130				

Same ward, same strain: Role type doesn't buffer stress - Despite different contractual/relational ties, role type did not differentiate stress or efficacy. This dovetails with the FGD narrative that structural stimuli, unrealistic family expectations, administrator scrutiny, and shift coverage constraints drive a uniformly high baseline of strain for all caregivers. Nurses did note "double stress" for hired caregivers (blamed by both families and administrators), but in aggregate, this did not translate into statistical differences, which are likely because the contextual load is already high for both groups.

Theoretically, the employment relationship is secondary to focal/contextual stimuli (family-demand scripts, staffing/scheduling) that elevate perceived and job stress across roles; modifying these stimuli should benefit everyone. While, as noted earlier, efficacy is shaped by mastery, modeling, and social persuasion, not contract type. Targeted practice, clear escalation pathways, and supportive feedback can lift efficacy and thereby reduce stress appraisals for both family and employed caregivers.

5. Conclusions

This mixed-methods study showed a consistent pattern of average perceived pressure and job stress alongside low self-efficacy among full-time hospital caregivers in a large Class III Grade A hospital in Shandong. Very strong correlations linked higher perceived pressure with higher job stress and lower self-efficacy, suggesting a mutually reinforcing stress-efficacy cycle. Multivariate tests revealed no significant differences by age, gender, education, or employment relationship, indicating that contextual, ward-level demands likely dominate over individual demographics. Focus-group insights from supervising nurses converged with these findings, emphasizing pervasive stressors such as unrealistic family expectations, limited training access, and taxing shift policies, which tend to underscore self-efficacy as a modifiable resource. Framed by RAM and Bandura's Self-Efficacy Theory, the results point to the value of simultaneously reducing environmental stressors and building efficacy to improve caregiver well-being and, by extension, the reliability of patient care.

Implications for Practice - Practically, hospitals should pair stimulus-reducing measures with efficacy-building supports. First, implement expectation-setting at admission (clear scope of caregiver tasks, rest needs, and nurse-escalation thresholds) to align families and reduce "invisible pressure." Second, introduce competency-based micro-training and simulations (common deteriorations, night-shift scenarios), supported by if-then escalation checklists, brief handover huddles, and coached debriefs—all designed to convert routine exposure into mastery experiences and normalize help-seeking. Third, adopt scheduling safeguards (limits on consecutive night shifts; micro-break coverage) to curb chronic overload. Fourth, provide education-sensitive scaffolds—pictorial job aids, paced/repeated practice, buddy systems—so caregivers with less formal schooling can rapidly gain confidence without stigmatization. Finally, consider responsibly designed digital supports (e.g., just-in-time video refreshers, simple dashboards for escalation cues) as adjuncts to training and communication—implemented with attention to workflow fit to avoid alert fatigue or surveillance concerns. These actions align with RAM (modifying focal/contextual stimuli) and with Bandura (enhancing mastery and supportive persuasion), directly targeting the stress–efficacy loop observed here.

Limitations - Findings should be interpreted in light of several limitations. The design was cross-sectional and relied on self-report measures, raising concerns about common-method bias and precluding causal inference; the very high correlation between perceived and job stress suggests potential construct overlap. The study was conducted at a single tertiary hospital in Shandong, which may limit generalizability to other settings or regions. Group sizes across education categories were uneven, and employment-relationship comparisons may have unmeasured confounding (e.g., unit type, tenure, night-shift load). The qualitative component consisted of one focus group with supervising nurses; it did not include caregivers' own narratives, and thus may emphasize managerial perspectives. Although instruments were adapted and showed acceptable internal consistency, cultural/translation nuances may still affect the precision of score interpretation. Additionally, common-method variance and shared item wording may have inflated associations among stress measures; multi-informant and physiological indicators are warranted in future studies.

Future Directions – Future research should move beyond description to causal tests of integrated programs that combine stimulus reduction with efficacy building. Priority directions include: (a) longitudinal designs and randomized or stepped-wedge trials of micro-training, escalation checklists, expectation-setting, and scheduling safeguards; (b) latent variable modeling (SEM) to separate shared vs. unique

variance among stress constructs and to test self-efficacy as a mediator between contextual demands and outcomes; (c) multi-site studies spanning different hospital levels and specialties to assess external validity; (d) inclusion of objective indicators (e.g., incident reports, response times, turnover/absenteeism) and multi-informant data (supervisors, families); (e) expanded qualitative work with caregivers themselves to capture lived experience and co-design interventions; and (f) careful piloting of context-sensitive digital/JIT tools with usability, equity, and workflow-fit evaluations. Analytically, model age and education continuously examine tenure, unit type, and psychological safety/help-seeking norms as moderators, and conduct cost-effectiveness analyses to support scale-up decisions. Lastly, given the resource constraints, the study recommends early economic evaluation alongside effectiveness trials. A pragmatic micro-costing plus budget-impact analysis could compare "training + escalation checklists + shift safeguards" versus usual practice, quantifying program costs (training time, materials, backfill) and potential offsets (reduced incident reports, fewer unplanned escalations, lower turnover/absenteeism). Where feasible, pair with cost-utility (e.g., caregiver well-being–adjusted outcomes) to inform scale-up decisions. Together, these steps can test whether bending the stress–efficacy curve produces durable gains in caregiver well-being and patient care quality.

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