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# Relationship of Job Demands and Perceived Usefulness of Virtual Nursing Technology among Bedside Nurses in Acute Care Settings

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## Abstract

**Purpose:** The purpose of the study was to examine the relationship between job demands, years of nursing experience, and perceived usefulness of virtual nursing technology among bedside nurses in acute care settings.

**Methodology:** This quantitative, non-experimental correlational study used a cross-sectional online survey of bedside registered nurses (N = 102) working on acute care units currently using virtual nursing technology. Measures included the Intensification of Job Demands Scale (IDS) and the Perceived Usefulness subscale of the Technology Acceptance among Nurses Questionnaire (TANQ). Multiple linear regression tested whether job intensification and years of experience (<5 years; >15 years; reference = 5–15 years) predicted the perceived usefulness of virtual nursing technology. Bivariate linear regression tested whether job intensification alone related to the perceived usefulness of virtual nursing.

**Findings:** Data analysis indicated that the multiple regression was not statistically significant, $F(3,91)=1.56$, $p=.205$, $R^2=.049$, and the bivariate linear regression with job intensification and perceived usefulness was also not statistically significant, $F(1,93)=0.70$, $p=.405$, $R^2=.007$. The results showed that the perceived usefulness of virtual nursing technology may depend less on job demand levels or years of nursing experience and more on contextual factors such as workflow fit, role clarity, and implementation processes.

**Unique Contribution to Theory, Practice and Policy:** In this acute care nursing sample, the perceived usefulness of virtual nursing technology was not explained by job intensification or years of experience. Findings suggest that contextual and implementation factors such as workflow fit, role clarity, technology reliability may be more salient determinants of the perceived usefulness of virtual nursing technology than job demand levels alone. Healthcare leaders should pair VNT adoption with strategic workflow integration, shared role definitions, bedside nurses' input, and available support to improve the perceived usefulness of virtual nursing technology and enhance quality patient care.

**Keywords:** *Virtual Nursing, Job Demands in Nursing, Perceived Usefulness, Virtual Nursing Technology*

## INTRODUCTION

Acute care nursing continues to operate under escalating pressures marked by staffing shortages, rising patient acuity, complex care coordination, and an expanding documentation burden. These conditions intensify job demands at the bedside thereby accelerating the pace of work, increasing cognitive load, and amplifying the need for continuous learning which are factors that have been linked to stress, burnout, and turnover in hospital settings (Heikkilä et al., 2021; Muir et al., 2022; Wenderott et al., 2023). In response, health systems are introducing virtual nursing technology (VNT) to support registered nurses to provide inpatient care remotely via audiovisual platforms integrated with electronic health records to redistribute work, streamline documentation, and improve education and discharge coordination (Schuelke et al., 2019; Roberson et al., 2023; Khairat et al., 2025). Whether VNT is embraced depends on nurses' perceived usefulness, a core determinant of acceptance as clinicians are more likely to adopt tools that clearly enhance performance and reduce burden (Venkatesh & Davis, 2000; Tubaishat, 2018).

This study addresses the gap by examining the relationship between intensified job demands and the perceived usefulness of virtual nursing technology among bedside nurses in acute care settings, and by exploring whether years of nursing experience further explains perceived usefulness. Grounded in JD-R, job intensification was measured with the Intensification of Job Demands Scale (Kubicek et al., 2015) and perceived usefulness using the Perceived Usefulness subscale of the Technology Acceptance Among Nurses Questionnaire (Tubaishat, 2018). The research design examined whether job intensification and experience predict perceived usefulness of virtual nursing technology and the direct association between job intensification and usefulness, among bedside nurses in units actively using VNT. This study contributes to the empirical knowledge necessary for nurse and healthcare leaders seeking to implement, optimize, and sustain virtual nursing models.

The Job Demands–Resources (JD-R) theory provides a useful lens for this problem by articulating two core processes: a health-impairment pathway in which excessive job demands deplete energy and foster strain, and a motivational pathway in which sufficient job resources enhance engagement and performance (Demerouti et al., 2001; Bakker & Demerouti, 2007, 2017). In this framing, VNT could function as a job resource that reduce workload, supports task completion, and facilitate professional efficacy if the technology is well designed and embedded in care delivery. Conversely, if VNT increases coordination overhead, lacks role clarity, or suffers reliability issues, nurses may perceive it as an added demand rather than a resource, undermining acceptance.

## REVIEW OF LITERATURE

Acute care nursing has undergone marked intensification of work characterized by rising patient acuity, rapid throughput, expanding documentation and coordination tasks. This acceleration manifests as cognitive load, time pressure, and patient acuity complexity that elevate stress and heighten risks for burnout and turnover (Heikkilä et al., 2021; Wenderott et al., 2023). Within the Job Demands–Resources (JD-R) theory, such conditions are conceptualized as job demands that deplete energy and precipitate the health-impairment process unless offset by sufficient resources (Bakker & Demerouti, 2007, 2017; Demerouti et al., 2001). Intensification is not merely "more of the same work," but a structural shift toward faster pace, continual knowledge updating, and higher decision complexity, which has distinct implications for workforce sustainability. Kubicek et al. (2015) validated the Intensification of Job Demands Scale (IDS) to capture these modern pressures such as planning/decision, work intensity, knowledge processing, and career learning thereby providing a precise lens for quantifying contemporary demand profiles in nursing and other complex settings.

Virtual nursing technology (VNT) which involves nurses delivering defined nursing functions remotely via secure audiovisual and EHR-integrated platforms has emerged to support bedside nurses' workload and enhance care quality. Early implementations demonstrate support across admission documentation, medication reconciliation, patient education, discharge readiness, clinical surveillance, and real-time coaching for bedside teams (Schuelke et al., 2019; Roberson et al., 2023). Health-system evaluations report neutral to positive safety outcomes and improvements in documentation completeness, interruptions, and throughput, suggesting VNT can supplement care without compromising core outcomes (Savitz et al., 2023; Khairat et al., 2025). Organizational case reports outline frameworks and operational guardrails for launching and scaling VNT such as role delineation, reliable connectivity, standardized workflows, and bidirectional communication to ensure the remote nurse operates as an integrated team member rather than an added handoff (Gregory, 2023; Tudorache et al., 2022).

Successful adoption, however, depends on the perception among nurses using the virtual nursing technology. Technology acceptance studies consistently identify perceived usefulness as the belief that a system enhances job performance which is a primary determinant of willingness to use and sustain engagement (Venkatesh & Davis, 2000; Tubaishat, 2018). In nursing contexts, usefulness perceptions increase when digital tools demonstrably reduce administrative burden, clarify work roles, and improve patient communication, and they diminish when tools introduce coordination overhead or workflow friction (Roberson et al., 2025; Tudorache et al., 2022).

Notably, several virtual nurse evaluations show that perceived usefulness strengthens when remote tasks are tightly mapped to local pain points (e.g., admission/discharge surges, education for high-risk conditions) and when technical reliability and support pathways are mature (Savitz et al., 2023; Khairat et al., 2025). These findings align with JD-R's motivational pathway: resources that are salient, accessible, and well-designed can buffer demands and foster engagement, whereas poorly aligned tools may be experienced as additional demands (Bakker & Demerouti, 2017).

Evidence specific to nursing job intensification and digital resources is growing but remains mixed. Studies in acute care demonstrate robust links between heightened demands and burnout, stress of conscience, and turnover intentions (Heikkilä et al., 2021; Wenderott et al., 2023), yet the extent to which elevated job demands translate into stronger perceived usefulness of supportive technologies is unknown. Some implementation reports suggest that under high pressure, nurses positively evaluate virtual support that reliably removes tasks and interruptions (Schuelke et al., 2019; Khairat et al., 2025), while other accounts note neutrality or skepticism when role boundaries are ambiguous or benefits are not visible at the point of care (Roberson et al., 2023). Years of experience may further shape technology appraisals: experienced nurses often excel in virtual roles and mentoring, but their acceptance as bedside users varies with training, digital self-efficacy, and perceived fit with professional judgment (Sanford et al., 2023; Gregory, 2023). Collectively, the literature suggests that perceived usefulness is not a simple function of demand level; rather, it is contingent on the alignment between specific demand types and the design or implementation of the virtual intervention.

Within JD-R, VNT can be conceptualized as an organizational resource intended to reduce administrative load, expand access to expertise, and restore time for direct care. Whether it functions as a true resource depends on nurses' perceived usefulness in their local context. If VNT streamlines documentation, anticipates surges (admissions/discharges), and strengthens patient education, it is likely to support the motivational process (Bakker & Demerouti, 2017). Conversely, if it fragments communication or duplicates work, it may be experienced as an added demand, undercutting the intended buffering effects (Demerouti et al., 2001). This theoretical framing highlights an empirical gap despite growing implementation literature; no quantitative study has examined whether higher job intensification and years of experience are associated with higher (or lower) perceived usefulness of VNT among bedside nurses.

**Purpose/Objectives:** This study aimed to determine if there is a relationship between intensified job demands, years of nursing experience, and the perceived usefulness of virtual nursing technology among bedside nurses in acute care settings.

## METHODS

### Research Design

An observational, non-experimental, quantitative correlational research design to explore the relationship between intensified job demands (independent variable), years of nursing experience (covariate variable), and the perceived usefulness of virtual nursing technology (dependent variable) among bedside nurses in acute care settings. The use of a correlational design was appropriate for examining whether statistically significant associations exist between job demands, years of nursing experience, and perceived usefulness of virtual nursing technology without manipulating any variables. The relationship was analyzed between variables using multiple linear regression analysis to determine the relationship of intensified job demands and years of experience on the perceived usefulness of virtual nursing technology. A simple linear regression analysis approach was used to determine the extent to which intensified job demands predict the perceived usefulness of virtual nursing technology.

A survey-based, cross-sectional methodology was performed. Demographic data such as years of experience, hospital type, and current use of virtual nursing technology was collected. Two valid instruments were also used to measure the key variables:

- Intensification of job demands scale (Kubicek et al., 2015). Measures the extent of increased workload, time pressure, and role complexity.
- Perceived usefulness subscale of the Technology Acceptance Among Nurses Questionnaire (Tubaishat, 2018). Evaluates the perceived usefulness of virtual nursing technology in mitigating workload burdens.

### Sample

Data was collected at a single point in time from a sample of bedside nurses ($N$=102) working in acute care settings. The participants were recruited from multiple hospital sites within a hospital system using virtual nursing technology. The target population were RNs working at the bedside in an acute care hospital setting, currently using virtual nursing technology, and willing to participate voluntarily in the study and complete the survey. Participants were recruited using convenient random sampling and email invitations sent via email and unit leadership announcements. A convenience sampling approach was used, with recruitment through internal email and unit leadership announcements. A G*Power analysis (fixed-model, $R^2$ increase) suggested a minimum sample size of 68 participants. 102 participants were recruited for this study to ensure the minimum sample size calculated in the power analysis was achieved. Nurses in

outpatient, procedural, administrative, or non-clinical roles were excluded from the study.

**Ethical Considerations**

Institutional Review Board (IRB) approval was obtained from the participating institution prior to data collection. Participation was voluntary, and informed consent was presented on the survey landing page; proceeding to the screening question (Is virtual nursing technology used in your unit?) and to the survey questions. No personal identification information was collected. The data was stored on a secure, password-protected platform and accessible only to the researcher. No incentives were provided. Participants could exit the survey at any time without penalty.

**Measures**

**Intensification of Job Demands**

Intensified job demands were measured with the Intensification of Job Demands Scale (IDS) (Kubicek et al., 2015). The IDS assesses acceleration and complexity in work, including intensified work pace, planning/decision-making demands, knowledge-processing, and career learning demands. Items are rated on Likert-type scales, and higher scores indicate greater intensification. Kubicek et al. (2015) reported Cronbach's alpha values ranging from 0.79 to 0.91 across the IDS subscales, demonstrating strong internal consistency. The scale is valid as evidenced by a series of studies involving professionals in healthcare (Heikkilä et al., 2022; Huhtala et al., 2021) and other cognitively demanding fields (Kubicek et al., 2015), thus supporting its psychometric suitability for bedside nursing populations

**Perceived Usefulness of Virtual Nursing Technology**

Perceived usefulness (PU) was assessed using the Technology Acceptance Among Nurses Questionnaire (TANQ) Perceived Usefulness subscale (Tubaishat, 2018), adapted to "virtual nursing technology" terminology for this study. PU reflects the degree to which nurses believe virtual nursing technology enhances work performance; a core determinant of technology adoption (Venkatesh & Davis, 2000). Prior work reports high reliability (PU $\alpha$=.95) and evidence of construct validity in nursing samples (Tubaishat, 2018). The perceived usefulness construct was operationalized through responses to Likert-scale items ranging from strongly disagree (1) to strongly agree (5). Higher scores indicate greater perceived usefulness of virtual nursing technology.

**Years of Nursing Experience (Covariate)**

Years of RN experience were self-reported and dummy coded for inferential modeling as <5 years

(1=yes), 5–15 years (reference), and >15 years (1=yes), to reflect the years of experience categories among the workforce in this study.

**Demographics**

Demographic variables (e.g., age, gender, ethnic background, level of education, and years of nursing experience) were collected to describe the sample and based on literature indicating that technology adoption and perceptions of usefulness may vary across generational cohorts, levels of experience, and clinical environments (Gilmour et al., 2020; Wilson et al., 2021). Other questions asked were the number of years the nurses have used virtual nursing technology in their practice and if nursing was their second degree.

**Statistical Analysis**

Data analyses were conducted in SPSS (version 29). Descriptive statistics (means, standard deviations, skewness, kurtosis), Kolmogorov-Smirnov test, scatterplots, and boxplots were analyzed to assess univariate normality. Assumptions of multiple linear regression (linearity, independence of errors, absence of multicollinearity, and homoscedasticity) were tested using the Durbin-Watson statistics, variance inflation factor (VIF), and residual plots, respectively. For **Research Question 1**, a multiple linear regression tested whether job intensification (continuous IDS score) and years of experience (dummy-coded: <5, >15; reference 5–15) predicted perceived usefulness of virtual nursing technology. For **Research Question 2**, a simple linear regression examined the bivariate association between job intensification and perceived usefulness of virtual nursing technology.

**RESULTS**

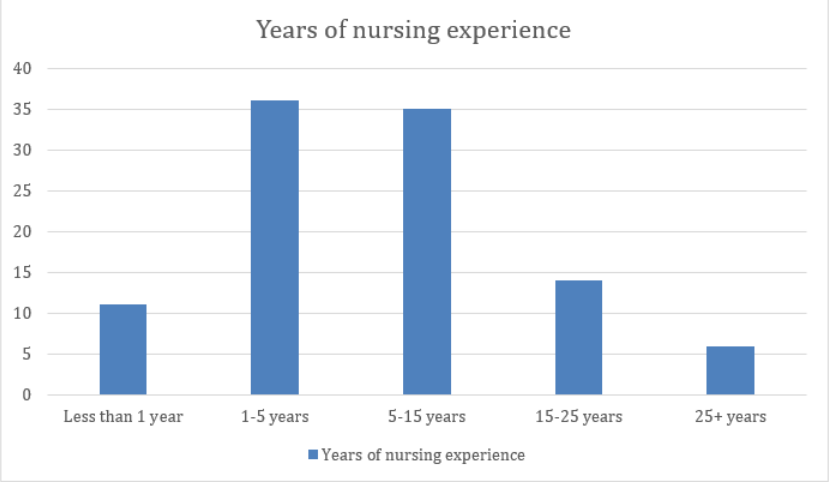
Data was collected over four weeks using Qualtrics online survey distributed via the health system's internal email communication channel. A total of 102 participants completed the survey, which exceeded the minimum sample size of 68 determined by the G*Power 3.1 analysis (effect size = 0.15, $\alpha = .05$, power = .80). The informed consent was obtained electronically before survey initiation. No major discrepancies occurred between the proposed data collection plan and actual implementation.

The demographic and descriptive characteristics of the sample indicated that participants were predominantly female (93.1%; $n = 95$) and were primarily White/Caucasian (93.1%; $n = 95$). Highest nursing education was distributed across diploma/ADN (29.4%; $n = 30$), baccalaureate (33.3%; $n = 34$), and graduate degree (37.3%; $n = 38$). The age distribution of participants ($N = 102$) demonstrated representation across a wide span of early- to late-career nurses, with the

sample ranging from 21 to 63 years of age ($M$ = 35.62, $SD$ = 11.42). The largest concentrations were observed among nurses in their twenties and early thirties, with 8.8% ($n$ = 9) aged 24, 7.8% ($n$ = 8) aged 27, and 6.9% ($n$ = 7) aged 23. One-quarter of participants (25.5%, $n$ = 26) reported that nursing was their second degree, whereas the majority (74.5%, $n$ = 76) indicated that it was their first degree. The educational preparation of participants indicated that majority had a Bachelor of Science in Nursing (BSN) degree (60.8%, $n$ = 62). In terms of years of professional nursing experience, the largest groups of respondents reported between 1–5 years (35.3%, $n$ = 36) and 5–15 years (34.3%, $n$ = 35) of practice.

**Figure 1**

*Years of Nursing Experience*




Overall, the demographic findings showed that the study sample was representative of an acute care nursing population that was largely female, White/Caucasian, and BSN-prepared, with professional experience concentrated between one and fifteen years. Furthermore, most respondents reported at least one year of engagement with virtual nursing technology, suggesting that participants were appropriate to evaluate the role of virtual nursing technology in supporting nursing practice.

Prior to regression analysis, data cleaning was performed on the dataset. Data was screened for missing values, outliers, and duplicate responses. For job intensification, a small number of outliers were detected indicating atypical responses relative to the broader distribution of scores. Consistent with recommendations for regression data screening, the outliers were filtered out (7 cases, N=95) before conducting the linear regression analysis to mitigate any influence or bias on the model results.

**Research Question 1**

The multiple linear regression analysis was conducted to evaluate whether intensified job demands and years of nursing experience (<5 years, >15 years; reference = 5–15 years) predicted perceived usefulness of virtual nursing technology among bedside nurses in acute care settings. Assumption testing confirmed that linearity, independence of errors, homoscedasticity, multivariate normality, absence of undue influence, and no multicollinearity were satisfied. The overall regression model was not statistically significant, $F(3, 91) = 1.560$, $p = .205$, indicating that the predictors collectively did not explain a significant proportion of variance in perceived usefulness of virtual nursing technology. The model accounted for less than 1% of the variance in the outcome variable, $R^2 = .049$, Adjusted $R^2 = –.018$, which reflects a negligible effect size.

Analysis of the individual predictors revealed that job intensification did not significantly predict perceived usefulness, $B = –0.076$, $SE = 0.143$, $\beta = –0.055$, $t(91) = –0.528$, $p = .599$, with a 95% confidence interval of [–0.360, 0.209]. Similarly, years of nursing experience categorized as more than 15 years did not significantly predict perceived usefulness, $B = 0.141$, $SE = 0.228$, $\beta = .072$, $t(91) = 0.619$, $p = .538$, 95% CI [–0.312, 0.594]. Nurses with less than five years of experience showed a positive but nonsignificant trend toward higher perceived usefulness of virtual nursing technology, $B = 0.361$, $SE = 0.184$, $\beta = .231$, $t(91) = 1.959$, $p = .053$, 95% CI [–0.005, 0.727], suggesting a possible practical, though not statistically significant, effect.

**Table 1**

*Relationship Between Intensified Job Demands, Years of Nursing Experience, and Perceived Usefulness of Virtual Nursing Technology*

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 3.629 | .516 | | 7.026 | <.001 | 2.603 | 4.655 | | | | | |
| | JobIntensification | -.076 | .143 | -.055 | -.528 | .599 | -.360 | .209 | -.086 | -.055 | -.054 | .969 | 1.032 |
| | Experience3Groups=Less than 5 years | .361 | .184 | .231 | 1.959 | .053 | -.005 | .727 | .205 | .201 | .200 | .751 | 1.331 |
| | Experience3Groups=More than 15 years | .141 | .228 | .072 | .619 | .538 | -.312 | .594 | -.046 | .065 | .063 | .764 | 1.308 |

a. Dependent Variable: PerceivedUsefulnessVNT

Based on these results, the null hypothesis ($H_0$), which states that intensified job demands and years of nursing experience do not predict perceived usefulness of virtual nursing technology, could not be rejected. The alternative hypothesis ($H_1$), which stated that these predictors would significantly predict perceived usefulness, was not supported.

Overall, these findings indicate that in this sample of bedside nurses, neither job demands

nor years of experience emerged as significant predictors of perceived usefulness of virtual nursing technology. While nurses with less than 5 years of experience displayed a trend toward higher perceived usefulness of virtual nursing technology compared with those with 5–15 years of experience, the effect was not strong enough to reach statistical significance. These results suggest that other contextual or organizational factors, rather than job demands or years of experience alone, may play a more meaningful role in shaping nurses' perceptions of virtual nursing technology.

**Research Question 2**

Research Question 2 examined the relationship between intensified job demands and the perceived usefulness of virtual nursing technology among bedside nurses in acute care settings. To address this research question, a bivariate linear regression was conducted with perceived usefulness of virtual nursing technology as the dependent variable and intensified job demands as the independent variable. Preliminary univariate test of normality confirmed that the model met normality for regression analysis, allowing for accurate interpretation of the findings.

The Pearson correlation analysis indicated a weak, negative and nonsignificant relationship between intensified job demands and perceived usefulness of virtual nursing technology, $r(95) = –.086$, $p = .202$ (one-tailed). This result suggested that as job demands increased, nurses' perceptions of the usefulness of virtual nursing technology tended to decrease slightly, although the association was weak and not statistically meaningful.

The regression model itself was not significant, $F(1, 93) = 0.701$, $p = .405$, indicating that intensified job demands did not significantly predict perceived usefulness of virtual nursing technology. The model accounted for less than 1% of the variance in perceived usefulness, $R^2 = .007$, Adjusted $R^2 = –.003$, reflecting a negligible effect size. Examination of the regression coefficients confirmed this finding. The unstandardized regression coefficient was $B = –0.119$, $SE = 0.143$, with a standardized coefficient $\beta = –.086$, $t(93) = –0.337$, $p = .405$. These values suggest that for every one-unit increase in job intensification, the perceived usefulness of virtual nursing technology decreased by 0.12 units; however, this change was not statistically significant. Based on these results, the null hypothesis ($H_{02}$), which states that there is no relationship between intensified job demands and the perceived usefulness of virtual nursing technology among bedside nurses in acute care settings, was retained. In this sample of acute care nurses, job intensification did not significantly impact perceptions of the usefulness of virtual nursing technology.

Overall, the results of this study indicate that neither intensified job demands nor years of nursing experience are strong predictors of perceived usefulness of virtual nursing technology.

While previous literature has highlighted the role of job demands in shaping nurse stress, burnout, and receptivity to new tools, this study suggests that other organizational or contextual factors (such as training, leadership support, or system design) may play a more critical role in determining how nurses perceive and adopt virtual nursing innovations.

**Discussion**

The findings of this study both confirm and challenge existing knowledge on the relationship between job demands, nursing experience, and the perceived usefulness of virtual nursing technology among bedside nurses in acute care settings. The absence of a statistically significant relationship between job demands and perceived usefulness of virtual nursing technology contradicts earlier findings (Tubaishat, 2018; Tudorache et al., 2022) that increased nursing workload often drives greater openness to supportive technologies. For instance, Tubaishat (2018) applied the TAM to conclude that nurses are more likely to appreciate technology when it demonstrably reduces their burden. Similarly, Tudorache et al. (2022) highlighted how redesigning workflows with digital support improved nurse satisfaction and performance in high-demand environments, which differed from the findings of this study that intensified job demands were not predictive of perceived usefulness of virtual nursing technology, implying that the presence of workload pressure may not automatically translate into greater appreciation for technological support. Additionally, Khairat et al. (2025) observed that while virtual nurse models are often justified as solutions to staffing strain, bedside nurses may not necessarily perceive them as effective unless they are integrated meaningfully into workflows. In their study Khairat et al. (2025), nurses did not feel that the virtual nurse reduced their workload due to overlapping responsibilities and a lack of clarity in role delineation. This confirms the findings of this study that intensified job demands alone are insufficient to drive favorable perceptions of virtual nursing technology; other organizational, contextual, or individual factors may be more influential in determining how nurses perceive the value of virtual nursing technologies.

The finding that nurses with < 5 years of experience reported a marginally higher perceived usefulness of virtual nursing technology, though statistically nonsignificant, points to an important extension of current knowledge. Some studies suggest that professional experience can shape how nurses interact with or evaluate new technologies, such as newer nurses being more receptive to digital tools due to greater familiarity and comfort with technology (Kleib et al., 2024; Sanford et al., 2023; Woods, 2024). This may reflect generational differences in digital literacy or exposure to telehealth tools during academic preparation. While the findings from this study showed that nurses with less than 5 years of experience may perceive virtual nursing technology more

positively, this marginal result suggests that generational familiarity with technology may influence usefulness, but not to the degree that overrides other organizational factors.

The JD-R model provided a useful theoretical lens through which to interpret these findings (Demerouti et al., 2001; Bakker & Demerouti, 2007, 2017). The JD-R model posits that job resources (such as virtual nursing technologies) are effective in decreasing the effects of job demands (such as workload, time pressure) and contribute to enhanced performance and engagement (Demerouti et al., 2001). However, the findings suggest a potential disconnect between what is theoretically designated as a "resource" and how that resource is perceived in practice. In this study, virtual nursing technology was not perceived as a resource that mitigates job demands, despite the intended function. This discrepancy implies that for a technology to operate as a job resource under the JD-R model, it must be both functionally and perceptually integrated into daily workflow.

Although the result was not statistically significant in this study, the findings extend knowledge by highlighting a potential generational effect, making years of experience a variable worth further investigation in future studies. Understanding how perceptions of virtual nursing technology differ by experience level could inform targeted onboarding strategies, mentorship pairings, and task allocations among nursing teams.

**Strengths and Limitations**

This study is theory-driven and explicitly grounded in the Job Demands–Resources (JD-R) framework (Bakker & Demerouti, 2017), allowing a structured test of how a job resource (virtual nursing technology) relates to job demands in acute care nursing. Two valid instruments with documented psychometrics, the Intensification of Job Demands Scale (IDS) to measure job intensification characteristics (Kubicek et al., 2015) and the Technology Acceptance Among Nurses Questionnaire (Perceived Usefulness subscale) to capture the perceived usefulness of virtual nursing technology among bedside nurses (Tubaishat, 2018). The data analysis addressed the research questions, incorporated assumption checks (linearity, normality of residuals, homoscedasticity, multicollinearity, and influence diagnostics), and reported effect sizes and confidence intervals to support the findings. The current study contributes to the evolving body of knowledge on virtual nursing technology and the specific understanding of how virtual nursing technology is perceived by bedside nurses. Specifically, it challenges the oversimplified assumption that higher job demands directly correspond to higher appreciation of technological support. Building on the job demands–resources perspective, the findings suggest that virtual nursing is perceived as a true resource to increased job demands when it tangibly reduces specific

pressures through role clarity, reliable infrastructure, and seamless workflow integration. Therefore, the findings from this study point to the critical importance of organizational readiness, shared governance, and contextual fit in shaping perceptions of usefulness.

**Limitations**

The use of non-probability purposive sampling limits the generalizability of the study results to the broader population of bedside nurses in acute care settings. The sample was drawn from a specific group of nurses currently utilizing virtual nursing technology in select acute care units of a health system. Consequently, nurses in facilities without virtual nursing implementation or those in different geographical regions or care settings (such as long-term care, rehabilitation) may hold different perceptions that are not reflected in this dataset. Additionally, the cross-sectional, non-experimental design of the study cannot establish causality between job demands and perceived usefulness; unmeasured confounding variables (e.g., unit culture, leadership support, or implementation maturity of the virtual nursing technology) may have attenuated associations.

The relatively small sample size ($N$ = 102) reduces statistical power and may have contributed to the non-significance of the findings. A larger sample may have yielded stronger or more reliable relationships between the predictors (intensified job demands and years of nursing experience) and the outcome variable (perceived usefulness of virtual nursing technology). The near significance of the association between nurses with <5 years of experience and perceived usefulness ($p$ = .053) suggests that with a larger, more diverse sample, the result might have achieved statistical significance. Notably, the sample was overwhelmingly female and White; these distributions limit demographic representativeness and should be considered when generalizing findings to more diverse nurse populations or different geographical locations.

**Recommendations**

Future investigations should broaden scope and rigor by recruiting larger, more diverse samples across community, academic, and rural hospitals and using probability-based strategies (e.g., stratified random sampling) to strengthen generalizability; extend the JD-R lens (Demerouti et al., 2001) by modeling a wider set of demands (workload, emotional strain) and resources (autonomy, digital literacy, perceived organizational support, team collaboration, workflow/technology fit) to determine conditions under which virtual nursing is perceived as useful; adopt longitudinal research designs to track how perceptions change with exposure, usability improvements, and evolving virtual nursing care protocols; examine group effects by analyzing experience and generational differences to tailor training and change management

approaches; and consider linking perceived usefulness to objective organizational outcomes (such as retention, patient experience, safety, throughput, missed care, and documentation efficiency) to determine whether higher perceived usefulness translates into measurable clinical and nursing workforce benefits.

**Implications for Positive Social Change**

At the organizational level, the findings contribute to efforts to improve nurse engagement with virtual nursing care models. While intensified job demands and years of nursing experience were not significant predictors of perceived usefulness, the observation that newer nurses (<5 years of experience) exhibited a near significant trend toward higher perceived usefulness suggests that newer nurses of the workforce may be more amenable to virtual care integration. This finding has important implications for the design and implementation of virtual nursing technologies in health systems seeking to reduce the burden on bedside nurses while ensuring effective technology adoption. By tailoring orientation, training, and support systems to accommodate generational and experiential differences, healthcare institutions can foster environments that support technology acceptance and innovation.

The findings of this study extend the Job Demands–Resources (JD-R) model (Demerouti et al., 2001) by providing a deeper understanding of how certain demands (such as intensified workload) and personal factors (such as years of experience) interact with nurses' perceptions of technology in practice. Although job intensification did not significantly predict perceived usefulness, the model remains a valuable lens for understanding technology adoption in nursing. This suggests that job demands alone may be insufficient predictors unless balanced by adequate resources, such as technological support, team collaboration, or opportunities for professional development. Nurse educators should also embed virtual care competencies into continuing education and fellowship programs to prepare nurses for evolving care models.

At the societal and policy level, this study highlights the need for thoughtful integration of technology in ways that do not exacerbate nurse stress or workload. While virtual nursing technology is promoted as one of the solutions to the nursing shortage and staff burnout, its success depends on contextual factors that extend beyond workload intensification. Policymakers and healthcare leaders should therefore focus not only on digital innovation but also on building supportive infrastructures (including adequate nurse staffing, training, and governance frameworks) that safeguard nurses' well-being while promoting high-quality patient care.

Overall, the integration of virtual nursing technology must go hand in hand with thoughtful human-centered design, staff engagement, and workforce development initiatives. Such efforts can

improve not only technology adoption but also nurse satisfaction, retention, and patient outcomes, contributing to sustainable changes in the healthcare delivery landscape.

## CONCLUSION

The purpose of this study was to understand the relationship between job demands, years of nursing experience, and the perceived usefulness of virtual nursing technology among bedside nurses in acute care settings. Although neither intensified job demands nor years of nursing experience emerged as statistically significant predictors of perceived usefulness, the findings reveal valuable insights into how different segments of the nursing workforce may respond to emerging technological models. This study reaffirms that the successful implementation of virtual nursing technology cannot be attributed to singular factors such as workload intensification alone. Instead, the findings highlight the need for a more holistic approach, one that integrates organizational support, individual readiness, and human-centered design principles.

Anchored in the job demands–resources (JD-R) theoretical model, the findings emphasize the importance of balancing increased job demands with adequate resources to facilitate meaningful technology adoption. The trend among nurses with fewer years of experience toward perceiving greater usefulness in virtual nursing technology suggests opportunities for targeted engagement strategies tailored to the needs and expectations of newer nurses. This insight, while not statistically significant, provides a meaningful direction for healthcare leaders and policymakers to consider when designing and deploying virtual nursing solutions.

Overall, this study contributes to the growing discussion on how digital transformation in healthcare must be contextualized within the lived experiences of healthcare professionals. As health systems continue to grapple with workforce shortages, burnout, and escalating care complexity, evidence-based strategies for integrating virtual nursing models must be informed by rigorous empirical inquiry and the perspectives of nurses. By advancing the understanding of the conditions that shape perceptions of virtual nursing technologies, this study lays the groundwork for future research, practice innovation, and organizational change that together will improve nurse satisfaction, retention, and the quality of patient care.

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