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WORK ENGAGEMENT AND WORKLOAD AS PREDICTORS OF NURSE BURNOUT: EVIDENCE FROM A NATIONAL HOSPITAL SURVEY IN SLOVAKIA

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Abstract

Hospital nurses are exposed to sustained cognitive, emotional, and organizational demands that elevate the risk of burnout. This study tests whether work engagement functions as a protective factor, whereas workload constitutes a risk factor for nurse burnout in hospital settings. We conducted a national cross-sectional survey of registered hospital nurses in Slovakia across public and private hospitals between September and October 2024. Given a finite population of 31,395 registered nurses in 2024, the minimum required sample at 95% confidence and a 5% margin of error was approximately 380; we analyzed 500 valid responses. Data collection was conducted using a standardized questionnaire, distributed online via Google Forms and in paper form upon request. Standardized scales captured work engagement (A1–A17), workload (Z1–Z6), and self-reported burnout; data were analyzed using multiple linear regression. Participation was voluntary and anonymous, and all respondents provided informed consent. The model was statistically significant and explained 39.3% of the variance in burnout ($F = 64.09$; $p < 0.001$). Higher engagement predicted lower burnout ($\beta = -0.591$; $p < 0.001$), whereas higher workload predicted higher burnout ($\beta = +0.945$; $p < 0.001$). These findings indicate that strengthening work engagement and managing workload represent complementary, actionable levers to mitigate nurse burnout in hospitals. The study provides effect-size estimates from a national sample, clarifies the protective role of engagement while controlling for workload, and offers direct targets for hospital HR policy (e.g., autonomy, recognition, staffing, and process optimization).

Keywords burnout, engagement, workload, nursing, Slovakia

JEL Classification J28, I18, M12

INTRODUCTION

Burnout among hospital nurses poses a persistent risk to workforce sustainability, quality of care, and organizational performance. Enduring cognitive, emotional, and organizational demands – amplified by irregular schedules and responsibility for patient safety – create conditions for the accumulation of strain that undermines staff well-being, patient outcomes, and operational stability. From a hospital management perspective, burnout translates into higher absenteeism and turnover, longer recruitment cycles, increased onboarding costs, reduced engagement, and deterioration in key quality indicators such as patient satisfaction, safety incidents, and readmissions.

Despite a considerable body of research on nurse burnout, two constraints continue to limit decision-useful evidence for hospital practice. First, empirical studies frequently examine either workload or work engagement in isolation, obscuring their joint and potentially countervailing effects on burnout within a single, parsimonious specification. Second, contemporary effect size estimates that are informa-

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tive for hospital workforce policy in Central European settings remain scarce, which impedes cross-institutional comparability and the prioritization of interventions with the greatest expected impact.

These needs have been intensified by recent trends: post-pandemic backlogs in deferred care, population aging, and a concurrent shortage of nursing personnel, accentuated in Central Europe by migration flows and uneven distribution of specializations. At the same time, the gap is widening between clinical and non-clinical demands (administration, coordination, IT), which increases perceived workload without directly contributing to the meaningfulness of work. Managers, therefore, require evidence that not only identifies the direction of relationships but also provides quantitative estimates of effect sizes that can be applied in intervention design.

The scientific interest is the lack of contemporary, context-relevant evidence that quantifies how workload and work engagement jointly relate to nurse burnout in hospital settings, in a manner that is actionable for guiding policy and managerial priorities in systems with comparable workforce conditions.

1. LITERATURE REVIEW AND HYPOTHESES

A sustainable and motivated nursing workforce is foundational to hospital performance and the delivery of people-centered care. Beyond recruitment, it is equally critical to retain the workforce and cultivate an environment that supports well-being, engagement, and consistent performance. Drawing on the job demands–resources (JD–R) framework (Bakker & Demerouti, 2023), we examine how workload and work engagement are related to nurse burnout in hospitals to provide decision-relevant effect size estimates to inform workforce policy.

Burnout is a work-related syndrome arising from unmanaged chronic occupational stress; it manifests as emotional exhaustion, depersonalization (cynicism), and reduced personal accomplishment. Although not a clinical diagnosis, it is consistently associated with adverse health outcomes and diminished professional functioning (Bakker et al., 2004; Ridge, 2024; Forcelini et al., 2022; Luna et al., 2023; Ahmad et al., 2023; Németh & Papp, 2024). Conversely, in nursing, better work functioning and a lower risk of burnout are associated with work engagement: a positive, fulfilling work-related state comprising vigor, dedication, and absorption (Holmberg et al., 2020; Mazzetti et al., 2023; Quesada-Puga et al., 2024; Nagendrappa & Arjunan, 2024). Within the JD–R model, job demands such as workload, cognitive and emotional demands, and organizational burden increase strain and deplete energy, whereas job resources such as supervisory support, autonomy, feedback, and development opportunities enhance motivation and strengthen engagement; the net effect on burnout depends on their balance. Accordingly, it is analytically important to assess the joint effects of demands and engagement – rather than each in isolation – and to quantify their relative contributions to nurse burnout (Forster & Koob, 2023; Kohnen et al., 2024; Luna et al., 2023; Yuan et al., 2024).

Empirical evidence consistently corroborates these concepts. Higher work engagement is associated with lower burnout, whereas cumulative job demands increase the risk of burnout and, in turn, translate into decrements in performance, care quality, and patient safety (Mazzetti et al., 2023; Cabrera-Aguilar et al., 2023; Wang et al., 2021; Aiken et al., 2023; Quesada-Puga et al., 2024). Within the JD–R logic (Bakker & Demerouti, 2023; Mazzetti et al., 2023), this reflects two parallel processes: a strain process (energy depletion leading to emotional exhaustion) when demands prevail, and a motivational process (vigor, meaningfulness, persistence) when resources are sufficient (Kohnen et al., 2024; Ren et al., 2024; Vargas-Benítez et al., 2023; Wang et al., 2021; Finnerty et al., 2022). Chronic and excessive workload manifests as sustained mental fatigue and weakens attention, memory, and decision-making (Garzaro et al., 2021); cognitive demands require continuous mental effort and, under time pressure, accelerate exhaustion (Luna et al., 2023), while emotional demands – including exposure to suffering, patient loss, and role conflict – fur-

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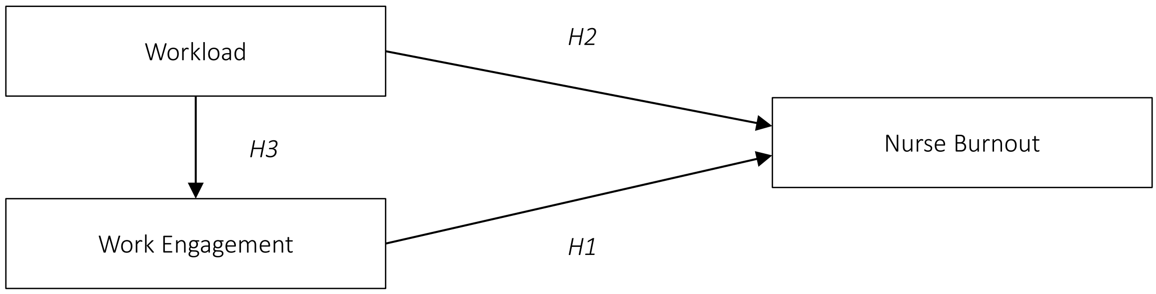

Figure 1. Research model

ther heighten risk (Kovacs et al., 2010; Garzaro et al., 2021). Adverse structural conditions, such as understaffing, irregular shifts, low remuneration, and weak managerial support, compound these demands and increase the likelihood of stress and burnout, and are associated with worse patient outcomes (Dall'Ora et al., 2022; Aiken et al., 2023; Kohnen, 2024; Zaid & Ahmad, 2022; Yuan et al., 2024). Beyond individual factors, the balance between demands and resources is shaped by managerial and organizational determinants. Supportive leadership, adequate staffing levels, and development-oriented HRM practices – targeted training, high-quality supervision, and clear career trajectories – expand access to resources (time, competencies, social support) while simultaneously reducing non-value-adding demands, notably administrative burden, unplanned redeployments, and incoherent requirements. These interventions are associated with higher work engagement and lower strain (Athamneh, 2024; Zhu et al., 2025). Conversely, understaffing and weak supervision sustain an imbalance to the detriment of resources and predict greater exhaustion with concomitant performance declines (Aiken et al., 2023). The implications for workforce sustainability are direct: higher engagement consistently correlates with lower intention to leave and better work functioning, which supports retention, reduces recruitment and onboarding costs, and positively affects indicators of care quality and safety (Nagendrappa & Arjunan, 2024; Dall'Ora et al., 2022; Wang et al., 2021; Holmberg et al., 2020).

Although the evidence base is growing, analyses that assess the simultaneous effects of workload and work engagement within a single model remain scarce. Examining these factors separately reduces cross-study comparability and limits the development of clear, transferable effect size estimates for decision-making in hospitals, particularly where workforce conditions resemble those in Central Europe. Given the mixed evidence on sociodemographic correlates, we explicitly control for age, specialization, and marital status in our models (Luna et al., 2023; Holas et al., 2023; Quesada-Puga et al., 2024; Németh & Papp, 2024). Building on this gap, the study aims to quantify the joint associations among workload (cognitive, emotional, and organizational demands), work engagement, and nurse burnout in hospital settings. The research aim is operationalized through the proposed model, which is presented in Figure 1.

The following hypotheses were formulated (Figure 1):

H1: *Work engagement is negatively associated with nurse burnout.*

H2: *Workload is positively associated with nurse burnout.*

H3: *Workload is negatively associated with work engagement.*

2. METHOD

The study employed a questionnaire-based cross-sectional design conducted in public and private hospitals across the Slovak Republic. Participant recruitment was coordinated through the Slovak Chamber of Nurses and Midwives, which disseminated email invitations to all registered nurses nationwide (approximately 31,000). The minimum required sample size for a finite population was calculated at a 95% confidence level, 5% margin of error, and $p = 0.50$ with finite-population correction, yielding a target of at least $n = 384$. A total of

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500 fully completed questionnaires were included in the analysis, thus exceeding the threshold. Data collection took place from September to October 2024. Participation in the research was voluntary and anonymous. The study was conducted in accordance with institutional ethical standards.

The study was conducted as part of the research project ESG No. D12_2024, "The Impact of Human Resource Practices on the Sustainability of the Nursing Workforce in Hospitals." To examine the relationships among the variables, we employed a structured questionnaire composed of selected sections from standardized instruments adapted to the hospital nursing context; these sections have not previously been used or reported in other scholarly outputs. All data collected are original and unique. The analytical component focused exclusively on three constructs: work engagement (A1–A17; UWES 17: Sugawara et al., 2023), workload (Z1–Z6; Workload: Payne et al., 2020; Spector, 2022), and burnout (Zhao et al., 2023; Szczerbińska et al., 2024).

Internal consistency (Cronbach's alpha) was α = 0.888 for work engagement, α = 0.860 for workload, and α = 0.902 for burnout, indicating acceptable to high reliability. Prior to estimating the regression models, we conducted a standard battery of diagnostic checks: independence of residuals (Durbin–Watson test: 1.75), normality of residuals (Shapiro–Wilk test: $p > 0.05$ and Q–Q plots), homoskedasticity (Koenker–Bassett test: $p > 0.05$), multicollinearity among predictors (Variance Inflation Factor, VIF < 5), as well as inspections of residual variance versus fitted values and linearity of relationships. Based on these results, all key assumptions for applying multiple linear regression (OLS) were met, and the model estimates are therefore methodologically justified.

Descriptive characteristics (Table 1) were examined for sex, specialization, and marital status. The mean age was 49.8 years (SD = 12.5), and the mean length of service in healthcare was 22.9 years (SD = 12.5). According to job classification, 160 nurses (32%) had no specialization, and 340 (68%) had a specialization. Regarding hospital ownership, 373 (74.6%) respondents worked in public hospitals and 127 (25.4%) in private hospitals.

3. RESULTS

Multiple linear regression analysis was used to identify predictors of burnout among nurses working in hospitals. The dependent variable was a composite, self-reported burnout score (1–5; higher = more burnout). Given the current state of knowledge in the field, the following independent variables were selected: work engagement (items A1–A17), workload (items Z1–Z6), age, specialization, and marital status. Items were rated on a 1–5 Likert scale; scale scores were computed as means and treated as approximately continuous for OLS.

Table 1. Sample characteristics

Category			Count (N)		% of total	
Female			471		94.2%	
Male			29		5.8%	
Marital status						
Category	**Women, N**	**Women, %**	**Men, N**	**Men, %**	**Total, N**	**% of total**
Married	283	60.1%	16	55.2%	299	59.8%
Single	81	17.2%	6	20.7%	87	17.4%
Divorced	52	11.0%	4	13.8%	56	11.2%
Widowed	12	2.5%	0	0.0%	12	2.4%
Partner	43	9.2%	3	10.3%	46	9.2%
Ownership status of hospital						
Public hospital	354	75.2%	19	65.5%	373	74.6%
Private hospital	117	24.8%	10	34.5%	127	25.4%
Job classification (specialization)						
Without specialization	149	31.60%	11	38.0%	160	32.0%
With specialization	322	68.40%	18	62.0%	340	68.0%

Note: N = 500.

Table 2. Regression coefficients

Variable	Coef	Std Err	t	P> |t|	Lower 95%	Upper 95%
Const	1.8448	0.555	3.324	0.001	0.754	2.935
Work engagement	–0.5915	0.084	–7.003	0.000	–0.757	–0.426
Workload	0.9445	0.064	14.825	0.000	0.819	1.070
Age	0.0015	0.006	0.258	0.796	–0.010	0.013
Specialization	–0.2866	0.128	–2.240	0.026	–0.538	–0.035
Marital status	0.0056	0.041	0.137	0.891	–0.075	0.086

In the initial phase, the assumptions underlying the implementation of multiple linear regression were examined. Linearity between the predictors and burnout was inspected using scatter/residual-fitted plots with a regression line. The Breusch-Pagan test (p = 0.821) was conducted to confirm the assumption of equality of variance, and the scatter plot of residuals revealed no indications of heteroscedasticity. Multicollinearity among independent variables was assessed using VIF; all VIFs were less than 2. Normality was assessed on the model residuals using Q–Q plots and the Shapiro–Wilk test at $\alpha = 0.05$.

The applied regression model is statistically significant ($F = 64.09$; $p < 0.001$) and explains 39.3% of the variability in the perception of burnout (Adjusted $R^2 = 0.393$). The regression coefficients and statistical significance of the variables are presented in Table 2.

The statistical significance of the proposed model's variables is as follows: work engagement ($p < 0.001$), workload ($p < 0.001$), and specialization ($p = 0.026$, two-tailed). Age and marital status were not statistically significant ($p \geq 0.79$).

The regression model equation is

$$\begin{aligned} Burnout &= 1.845 - 0.591 \cdot Engagement \\ &+ 0.945 \cdot Workload + 0.001 \cdot Age \\ &- 0.287 \cdot Specialization \\ &+ 0.006 \cdot Marital\ status. \end{aligned} \tag{1}$$

The findings of the regression model demonstrate that the independent variable of work engagement is negatively associated with nurses' burnout. A one-point increase in engagement on the 1–5 scale is associated with a 0.59-point decrease in the predicted burnout score. Another statistically significant variable is workload, where a one-point increase is associated with a 0.95 point increase in the predicted burnout score. The specialization of nurses shows a smaller, negative association with burnout (B = –0.287, p = 0.026). Given the coding, specialists report lower predicted burnout than non-specialists. The findings indicate that age and marital status exert a negligible impact on the model, and these variables are not statistically significant.

The accuracy of the model was verified using the mean absolute error (MAE) and the root mean square error (RMSE). The results indicate in-sample prediction errors of MAE = 0.93 and RMSE = 1.14 on a 1–5 burnout scale; out-of-sample validation (e.g., k-fold cross-validation) would provide a stricter assessment.

In consideration of the identified research gap, the relationship between work engagement and workload was examined. Subsequent to the verification of assumptions, Spearman's coefficient was employed to assess the relationship. The value of Spearman's correlation coefficient is –0.264 at the selected significance level ($p < 0.001$), which indicates that work engagement is negatively associated with workload. While the result is statistically significant, the relationship is small. This finding aligns with the conclusions of other studies (Liu et al., 2024; Wei et al., 2024), which have demonstrated that the nursing profession is generally perceived as a helping profession that fosters personal fulfillment.

4. DISCUSSION

The results indicate that work engagement operates as a protective factor, whereas workload functions as a risk factor for nurse burnout, consistent with the JD–R framework's dual pathways (strain vs. motivation). Accordingly, H1 (higher engage-

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ment – lower burnout) and H2 (higher workload – higher burnout) were supported. We also observed a negative association between workload and engagement (H3), suggesting that excessive demands not only activate the strain process but also erode engagement, weakening the system's motivational buffer against burnout.

These findings align with prior research. The inverse engagement–burnout relationship is well documented in primary studies and reviews in nursing (Szczerbińska et al., 2024; Luna et al., 2023; Athamneh, 2024; Wang et al., 2021), and meta-analytic papers within the JD–R tradition highlighting engagement's motivational role (Mazzetti et al., 2023). The positive association between job demands and burnout is likewise consistent with evidence on cumulative cognitive, emotional, and organizational demands (Forster & Koob, 2023; Garzaro et al., 2021; Quesada-Puga et al., 2024). European longitudinal and multilevel studies link staffing adequacy and scheduling stability to both patient safety and workforce well-being (Aiken et al., 2023; Dall'Ora et al., 2022; Yuan et al., 2024; Kaur, 2025). Our results are also coherent with broader psychosocial findings showing that nurse burnout relates to anxiety and depression (Ramirez-Baena et al., 2019) and that supporting engagement while reducing secondary traumatic stress should be a priority (Wei et al., 2024). In the same vein, Liu et al. (2024) document connections between engagement, safety behaviors, and self-efficacy, whereas Labrague (2024) reports that higher burnout is associated with lower quality of care and diminished motivation, effectively the reverse pattern of H1.

With respect to sociodemographic covariates, age and marital status were not statistically significant in our models, consistent with mixed evidence in the literature (Sawalma et al., 2024; Luna et al., 2023; Quesada-Puga et al., 2024). Specialization showed a small negative association with burnout, which may reflect improved access to resources (competencies, supervision); heterogeneity across studies may be tied to differences in units and roles (Lin et al., 2019; Kaya & İşler Dalgiç, 2020; Zhao et al., 2023). Overall, the pattern reinforces that structural and managerial determinants (staffing, leadership quality, administrative burden) shape the demands–resources balance more strongly than demographics alone.

Managerial implications follow directly. Interventions that focus only on boosting engagement may have a limited impact if non-value-adding demands are not reduced in parallel. The highest returns are likely from combined strategies: managing workload (staffing standards, more stable scheduling, administrative streamlining) and strengthening resources (supportive leadership, actionable feedback, development opportunities). Evidence from European settings indicates that such system-level levers measurably affect patient safety, staff well-being, and workforce sustainability (Aiken et al., 2023; Dall'Ora et al., 2022).

CONCLUSION

This study quantified the joint associations between workload, work engagement, and nurse burnout in Slovak hospitals using a cross-sectional survey of registered nurses (n = 500). The OLS model was significant ($F = 64.09$; $p < 0.001$; $R^2 = 0.393$), and all hypotheses were supported: higher engagement predicted lower burnout (H1; $\beta = -0.591$; $p < 0.001$), higher workload predicted higher burnout (H2; $\beta = +0.945$; $p < 0.001$), and workload was negatively associated with engagement (H3). These findings are consistent with the JD–R model's dual pathways, indicating that excessive demands activate strain and simultaneously erode engagement, weakening the motivational buffer against burnout.

For hospital workforce policy, dual-track strategies are indicated: (i) manage demands (staffing standards, more stable scheduling, and administrative streamlining) and (ii) strengthen resources (supportive leadership, actionable feedback, autonomy, and development opportunities). Because both levers operate concurrently on burnout, combined interventions will yield the greatest benefits for care quality, patient safety, and workforce sustainability.

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The cross-sectional, self-report design precludes causal inference and may involve common-method variance and social desirability. The sample is country-specific (Slovakia), which may constrain generalizability; nonetheless, the workforce conditions examined are characteristic of many Central European hospital systems, and the patterns observed here may be informative for those contexts. The model prioritized core variables and may omit organizational and contextual factors. Future work should employ longitudinal and multilevel designs, include measurement invariance tests, and pursue external validation across multiple countries to strengthen robustness and support the development of decision-relevant effect size estimates for workforce policy.

AUTHOR CONTRIBUTIONS

Conceptualization: Magdaléna Tupá.
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Formal analysis: Marcel Kordoš.
Funding acquisition: Veronika Mozolová.
Investigation: Veronika Mozolová.
Methodology: Magdaléna Tupá.
Project administration: Marcel Kordoš.
Resources: Veronika Mozolová.
Software: Veronika Mozolová.
Supervision: Magdaléna Tupá.
Validation: Magdaléna Tupá.
Visualization: Marcel Kordoš.
Writing – original draft: Veronika Mozolová, Magdaléna Tupá.
Writing – review & editing: Magdaléna Tupá.

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