Predictors of Nurses Work Engagement at General Hospitals in Kedah: The Roles of Workload, Autonomy, Supervisor Support, and Resilience

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ABSTRACT

Nurses' work engagement is fundamental to safe and consistent care in Malaysia's public hospitals, particularly where heavy workloads and resource constraints are routine. Drawing on the Job Demands–Resources (JD–R) model and Conservation of Resources (COR) theory, this study examines how one key demand (workload), two job resources (autonomy, supervisor support), and one personal resource (resilience) shape nurses' work engagement in Kedah. A cross-sectional design was employed using validated instruments for all constructs. Analyses included psychometric checks, correlations, multiple regression, and single mediation modelling of the pathway from workload to resilience to nurses work engagement. Overall, nurses reported high engagement despite challenging demands. Supervisor support emerged as a consistent positive driver, whereas autonomy alone did not significantly enhance engagement in this context. Workload showed a nuanced pattern: when combined with resilience, it demonstrated a moderate "challenge" effect, yet simultaneously undermined engagement indirectly by eroding resilience. Mediation testing confirmed resilience as the mechanism explaining how workload lowers engagement, producing a "competitive" pattern where a small positive direct link coexists with a negative indirect pathway. Theoretically, these findings refine JD–R by showing that resilience mediates the effects of demands more strongly than resources, while from a COR perspective, they demonstrate a resource-loss pathway from workload to reduced engagement. Practically, hospital management should regulate workload surges, strengthen supervisory support, and mainstream shift-sensitive resilience training; autonomy initiatives will yield greater impact when supported by enabling leadership and adequate structural scaffolding.

Keywords: nurses work engagement; workload; supervisor support; autonomy; resilience

INTRODUCTION

Employee engagement is widely regarded as a cornerstone of organisational performance, enhancing effort, persistence, and discretionary contributions (Bakker, 2011). In healthcare, nurses, the largest professional group and first point of patient contact play a decisive role in care quality, safety, and efficiency (Othman, Ghazali, & Ahmad, 2017). Since COVID-19, engagement has become increasingly critical, as staff shortages, rising costs, and heightened risks of error intensify workforce pressures (Schaufeli & Bakker, 2004; Freeney & Fellenz, 2013). Yet, global engagement remains stagnant, with Gallup (2024) estimating billions in productivity losses, underscoring the urgency of effective strategies.

Work engagement, defined as vigor, dedication, and absorption, consistently predicts higher performance, lower burnout, and improved patient outcomes (Schaufeli & Bakker, 2004; Bakker & Demerouti, 2014). Within the Job Demands–Resources (JD–R) model, engagement rises when resources such as autonomy, supervisory support, and resilience enable employees to manage demands, but declines when excessive workloads are unsupported (Xanthopoulou et al., 2007; Bakker & Demerouti, 2014).

In Malaysia's public hospitals, particularly in high-demand states like Kedah, these dynamics are acute (Ministry of Health, 2025). The Ministry of Health (2024, 2025) acknowledges severe nurse shortages and escalating workloads, initiating a 15-year workforce strategy. Evidence highlights why such measures matter: international studies (2021–2025) link engagement to reduced burnout and continuity of care, whereas heavy workloads and poor support drive disengagement and attrition (Aungsuroch et al., 2024; Cabrera-Aguilar et al., 2023; Pressley et al., 2023). Malaysian data reflect these trends, with higher burnout among shift nurses working over six monthly night shifts (27.1%) compared to non-shift nurses (22.4%), and Perak primary care nurses identifying workload and role stress as major contributors (Pressley et al., 2023). Conversely, resilience and psychosocial resources were shown to buffer stress during and after the pandemic (Marzo, ElSherif, Abdullah, Thew, Chong, Soh, Siau, Chauhan, & Lin, 2022; Marzo, Khalid, ElSherif, Abdullah, Hui, Chong, Soh, Siau, Chauhan, & Lin, 2022).

Globally, engagement underpins retention and system resilience. Despite a nursing workforce of 29.8 million in 2023, shortages persist, prompting WHO (2025) to recommend improved working conditions, career development, and mental health supports. Malaysian projections anticipate shortfalls by 2030, necessitating flexible scheduling, career pathways, and psychosocial interventions (Khor, Chua, & Fried, 2024; World Economic Forum, 2024; Galen Centre, 2024).

Overall, workload remains the central demand, while autonomy, supervisory support, and resilience act as critical resources. With adequate resources, workload may serve as a motivating challenge; without them, it becomes a strain leading to disengagement (Crawford, LePine, & Rich, 2010; Bakker & Demerouti, 2014). Recent reviews reaffirm these mechanisms across nursing contexts and emphasise the need for targeted organisational and unit-level interventions (Tsuchihashi, Yamaguchi, Yamada, Koyama, & Matsunari, 2024; Aungsuroch, Gunawan, Juanamasta, & Montayre, 2024).

Background of Study

Work engagement is a persistent motivational state that enhances performance and mitigates strain (Bakker & Schaufeli, 2013; Othman & Nasurdin, 2011). During and after COVID-19, engaged nurses sustained resilient care delivery despite shortages, with multi-country evidence confirming its protective role against burnout and intent to leave, particularly when resilience mediates engagement under high pressure (Cabrera-Aguilar, Zevallos-Francia, Morales-García, Ramírez-Coronel, Morales-García, Sairitupa-Sanchez, & Morales-García, 2023).

In Malaysia, system reviews highlight persistent under-investment and human resource imbalances between public and private sectors, urban and rural areas, and skill distribution. Workforce reform is therefore centred on recruitment, deployment, training, and retention (Ministry of Health Malaysia, 2025). These realities align with the Job Demands–Resources (JD–R) model, which posits that resources such as autonomy and supervisory support enhance engagement, while unmanaged demands like heavy workload accelerate strain and disengagement (Bakker & Demerouti, 2014). The model explains engagement both at the organisational level and in workforce challenges at the national scale before, during, and after the pandemic.

Empirical studies reinforce these dynamics. A national cross-sectional study found night-shift intensity predicted burnout, while primary care research reported high burnout linked to workload and role stress, identifying systemic pressure points where resources such as staffing adequacy, schedule design, and structured debriefing are vital (Kun, Zakaria, & Zakaria, 2024; Yee, Hui, Hadi, Mohd Shaffari, Ismail, & Che Ismail, 2024). Global surveys similarly show stagnant engagement, underscoring the need for psychosocial and managerial support such as effective leadership (Gallup, 2024).

Resilience has emerged as a critical predictor of engagement. As a component of psychological capital (PsyCap), resilience consistently correlates with higher engagement. Recent studies confirm that resilience and self-efficacy jointly strengthen engagement under stress, while resilience-building initiatives and supportive supervision can reduce attrition, especially among early-career nurses (Cabrera-Aguilar et al., 2023; Lee, Chiang, Chang, Chang, Lee, Wu, Liu, & Fetzer, 2024).

Given these findings, examining work engagement in Kedah's public hospitals is timely and policy-relevant, aligning with Malaysia's workforce and mental health priorities during the recovery period (World Health Organization, 2024).

Problem Statement

Malaysia's public hospitals face sustained demand growth and uneven workforce distribution, resulting in manpower shortages, maldistribution, and retention challenges. At the ward level, nurses continue to report heavy workloads and shift intensities that heighten burnout risk conditions that suppress work engagement unless buffered by resources such as autonomy, supervisor support, and resilience (Ministry of Health Malaysia, 2024; Kun, Zakaria, & Zakaria, 2024).

Although studies on nurses' engagement exist, empirical research applying the JD–R model in Malaysia remains limited, particularly in testing workload, autonomy, supervisor support, and resilience simultaneously as predictors of engagement within highly stressful public-sector settings. State-level contexts such as Kedah are especially underexplored, despite facing acute staffing pressures. Furthermore, resilience has rarely been examined as a mediating mechanism that may enable nurses to sustain engagement under high workload (Bakker & Demerouti, 2014; Freeney & Fellenz, 2013; Othman, Ghazali, & Ahmad, 2017). Mixed findings on workload as either a hindrance or challenge demand and variable results on supervisor support across contexts reinforce the need for a localized, integrated model to inform targeted interventions (Bakker & Demerouti, 2014; Freeney & Fellenz, 2013; Kun, Zakaria, & Zakaria, 2024). This study therefore addresses three research questions:

i. What is the current level of nurses' work engagement, workload, autonomy, supervisor support, and resilience in Kedah public hospitals?

ii. Do workload, autonomy, and supervisor support significantly influence work engagement in this setting?

iii. Does resilience mediate the relationship between workload and work engagement among nurses in Kedah public hospitals?

By testing job demands (workload), job resources (autonomy and supervisor support), and a personal resource (resilience) together, this study extends JD–R and Positive Organizational Behavior within Malaysia's healthcare context. It contributes specifically to understanding how engagement can be sustained in Kedah's public hospitals, where resource constraints are pressing. Findings are expected to provide both theoretical and practical value. Theoretically, the study enriches JD–R by clarifying the mediating role of resilience. Practically, it offers evidence to guide hospital leaders in: (a) optimizing workload and shift design (e.g., limiting excessive night shifts), (b) increasing autonomy in clinical decision-making, (c) strengthening supervisory support and debriefing practices, and (d) embedding resilience-building initiatives for unit teams and early-career nurses. These recommendations align with Malaysia's Health White Paper and national priorities to retain and strengthen the health workforce (Lee, Zakaria, & Zakaria, 2024; MOH, 2024; WHO, 2025).

LITERATURE REVIEW

This section reviews relevant literature concerning the variables under study work engagement, workload, autonomy, supervisor support, and resilience in the context of nurses in public healthcare. It begins by defining and conceptualizing each construct, followed by a synthesis of empirical studies both globally and within Malaysia. Post-pandemic findings are also integrated to capture contemporary developments in workforce challenges. This section then develops the hypotheses aligned with the research questions, grounded in two underpinning theoretical perspectives: the Job Demands-Resources (JD-R) model and the Conservation of Resources (COR) theory. Finally, a conceptual framework is proposed to guide empirical study.

Concept and Definition of Study Variables

Nurses' Work Engagement (Dependent Variable)

Work engagement has emerged as one of the most influential constructs in organizational behavior and occupational health psychology. Schaufeli et al. (2002) define it as a "positive, fulfilling, work-related state of mind" characterized by vigor (energy and resilience), dedication (commitment and enthusiasm), and absorption (deep concentration in work tasks). This tripartite model is widely accepted in contemporary literature. Earlier, Kahn (1990) conceptualized engagement as the harnessing of employees' selves to work roles, while Maslach and Leiter (1997) positioned it as the opposite of burnout, highlighting its role in sustaining well-being. More recent perspectives view engagement as both a driver and outcome of employee well-being, strongly tied to motivation and organizational success (Bakker et al., 2014). For nurses in public hospitals in Kedah, work engagement is more than a psychological state, it is a necessity for maintaining patient safety and healthcare quality under resource-constrained conditions. With nurses-to-patient ratios still below WHO recommendations (Haruna & Marthandan, 2016), engaged nurses are better positioned to sustain motivation, cope with stressors, and ensure resilience in Malaysia's public healthcare system.

Workload (Independent Variable 1)

Workload refers to the volume and intensity of work tasks that must be completed within a given time frame (Van Veldhoven & Meijman, 1994). It can be divided into quantitative workload (number of tasks) and qualitative workload (complexity of tasks relative to skill level) (Glaser et al., 1999). Excessive workload often functions as a job demand in the JD-R model, draining employees' energy and reducing engagement. For public hospital nurses in Kedah, workload is a daily reality, shaped by long hours, high patient loads, and emotionally demanding care responsibilities. When workload becomes overwhelming, it risks undermining engagement, leading to fatigue, stress, and lower quality of care. However, when managed appropriately, workload can also stimulate resilience and foster a sense of professional accomplishment.

Autonomy (Independent Variable 2)

Autonomy is the degree of freedom, discretion, and independence employees have in organizing and executing their tasks (Hackman & Oldham, 1975). It is closely linked to empowerment and professional decision-making, particularly in nursing (Mrayyan, 2004). Autonomy allows nurses to exercise judgment in patient care, enhancing both efficiency and job satisfaction. Among nurses in Kedah's public hospitals, autonomy remains limited by hierarchical structures, strict procedures, and resource constraints. While autonomy can foster engagement by empowering nurses to act decisively, its absence may reduce their sense of control and professional growth. Thus, autonomy represents a critical but underleveraged job resource in Malaysia's healthcare system.

Supervisor Support (Independent Variable 3)

Supervisor support is the extent to which supervisors provide emotional, instrumental, and professional backing to their subordinates (Eisenberger et al., 2002). Within the JD-R model, supervisor support is a job resource that buffers against stress, builds motivation, and enhances engagement. For nurses in Kedah, supportive supervision can make the difference between burnout and resilience. Supervisors who provide encouragement, constructive feedback, and advocacy not only enhance nurses' engagement but also foster a sense of belonging and recognition. In an environment marked by high job demands, supervisor support is a pivotal factor sustaining morale and performance.

Resilience (Mediator)

Resilience is the capacity to adapt, recover, and thrive in the face of adversity and stress (Luthans, 2002). In Conservation of Resources (COR) theory (Hobfoll, 1989), resilience is framed as a personal resource that helps employees conserve and replenish energy when exposed to high job demands. For nurses in public hospitals in Kedah, resilience is not optional. Coping with high workloads, emotional strain, and systemic constraints requires adaptive strength. Resilience acts as a mediator, enabling nurses to sustain engagement despite job pressures. In this context, resilience is both a shield against burnout and a driver of sustained professional dedication.

Linking Job Demand, Job Resources, Personal Resources, And Work Engagement via

JD-R theory

This study is grounded in two complementary frameworks: the Job Demands–Resources (JD–R) theory and the Conservation of Resources (COR) theory, both of which explain how workplace demands and resources shape engagement in high-stress professions such as nursing (Bakker & Demerouti, 2017; Hobfoll, 1989).

The JD–R model posits that engagement depends on the balance between job demands such as workload and emotional strain and resources, including autonomy and supervisory support. Excessive demands deplete energy and foster burnout, whereas adequate resources stimulate motivation and meaningful work (Bakker & Demerouti, 2017). Supervisor support functions as a critical social resource, providing recognition, guidance, and feedback (Eisenberger et al., 2002), while autonomy enhances decision latitude and control (Mrayyan, 2004; Boamah & Laschinger, 2016; Poghosyan et al., 2019). These resources also foster personal resource development. For instance, autonomy and coworker support strengthen psychological capital, which predicts engagement (Mazzetti et al., 2016), while supportive leadership enhances psychological safety and recognition (Grover et al., 2018; Aiken et al., 2021; Al-Hamdan et al., 2017). In Malaysia, autonomy and supervisory support significantly predict engagement, though hierarchical structures may constrain autonomy's impact (Othman & Nasurdin, 2012; Othman, Ghazali, & Ahmad, 2017).

Workload demonstrates a dual role within JD–R. Some studies identify it as a depleting demand undermining engagement (Tomic, 2010; Van Mol et al., 2018; Upadyaya et al., 2016), while others classify it as a challenge demand that motivates when paired with sufficient resources (Crawford et al., 2010; Bakker & Demerouti, 2017). Moderate workloads can even stimulate innovation (Montani et al., 2019). However, in Malaysian hospitals, where staff shortages are acute, workloads typically erode well-being (Haruna & Marthandan, 2016). Comparative evidence supports this duality: manageable workloads in Canada enhanced engagement (Keyko et al., 2016), whereas extreme workloads in China reduced engagement and increased turnover intention (Zhang et al., 2020).

COR theory extends this understanding by emphasising resilience as a critical personal resource (Luthans, 2002; Hobfoll, 1989). Resilience enables employees to adapt to stress, preserve motivation, and sustain engagement. Empirical evidence consistently links resilience to engagement in healthcare (Mache et al., 2014; Grover et al., 2018; Wang & Li, 2016), including among Malaysian nurses (Othman et al., 2013). However, sectoral differences exist where resilience was non-significant in South Africa's sales sector (Meintjes & Hofmeyr, 2018) underscoring the importance of context. Globally, post-COVID studies affirm resilience as a buffer enabling frontline nurses to maintain engagement under extreme demands (WHO, 2022).

Together, JD–R and COR offer an integrated perspective: job resources such as supervisory support and autonomy not only foster engagement directly but also build resilience, while resilience generates a resource gain cycle that sustains engagement over time (Luthans, 2002; Hobfoll, 1989). In Malaysia's public hospitals where heavy patient loads, hierarchical constraints, and resource shortages prevail. This framework highlights the necessity of both organisational and personal resources to mitigate strain and maintain engagement.

Previous Research on Nurses' Work Engagement and Its Predictors

Nurses' work engagement has been extensively examined through the Job Demands–Resources (JD–R) and Conservation of Resources (COR) frameworks, which explain how job resources (e.g., autonomy, supervisor support) and personal resources (e.g., resilience) buffer demands such as workload to sustain motivation (Bakker & Demerouti, 2017).

Workload and Engagement

Workload is a central yet complex predictor. High workloads are often associated with fatigue, burnout, and disengagement (Tomic, 2010; Van Mol et al., 2018; Upadyaya et al., 2016). However, when framed as a challenge, workload can enhance accomplishment and engagement (Crawford et al., 2010; Bakker & Demerouti,

2017). Evidence suggests an inverted U-shape: moderate workloads stimulate innovation, while excessive workloads erode well-being (Montani et al., 2019). Context matters manageable workloads in Canada improved engagement (Keyko et al., 2016), whereas extreme workloads in China reduced engagement and raised turnover (Zhang et al., 2020). In Malaysia, staffing shortages exacerbate patient loads (Haruna & Marthandan, 2016), yet findings are inconsistent some studies, such as Nurul Aimi et al. (2015), found no significant workload–engagement link. This inconsistency suggests resilience may transform workload into a challenged demand.

Autonomy and Engagement

Autonomy consistently predicts engagement by enabling clinical judgment, improving decisions, and protecting against emotional exhaustion (Mrayyan, 2004; Taipale et al., 2010; Boamah & Laschinger, 2016). It also enhances professional identity and motivation (Mazzetti et al., 2016; Poghosyan et al., 2019). Evidence from healthcare and academia shows autonomy combined with supervisor and coworker support strengthens engagement (Vera et al., 2015; Hafizah, 2015). Yet in Malaysian hospitals, hierarchical structures may constrain its positive impact (Othman, Ghazali, & Ahmad, 2017).

Supervisor Support and Engagement

Supervisor support is a vital resource that fosters competence, recognition, and relatedness (Eisenberger et al., 2002). Strong evidence links supportive leadership to engagement across contexts: in Malaysia, it significantly predicted nurses' engagement (Othman & Nasurdin, 2012) and mediated turnover intentions (Ibrahim et al., 2018). Internationally, supportive supervision enhanced psychological safety and buffered stress (Grover et al., 2018; Aiken et al., 2021; Al-Hamdan et al., 2017). Although some mixed findings exist (Wu et al., 2013), the consensus is that supervisor support is especially critical in resource-constrained hospitals.

Resilience as a Mediator

Resilience, defined as the ability to adapt under adversity (Luthans, 2002), is conceptualised in COR theory as a personal resource that conserves energy and sustains motivation (Hobfoll, 1989). It consistently predicts engagement in healthcare (Grover et al., 2018; Wang & Li, 2016; Mache et al., 2014), including in Malaysia (Othman et al., 2013). Findings, however, vary by sector, show a non-significant result in South Africa's sales sector (Meintjes & Hofmeyr, 2018) highlighting contextual influences. Post-COVID, resilience proved critical for frontline nurses, sustaining engagement despite overwhelming demands (WHO, 2022).

Overall, work engagement flourishes when job and personal resources outweigh demands. Yet evidence on workload remains mixed, necessitating simultaneous examination of workload, autonomy, supervisor support, and resilience in Malaysia. Given shortages, rigid hierarchies, and pandemic pressures, Malaysia's public hospitals provide a unique context to extend JD–R and COR models. Hence this study tests resilience as a mediator of workload's effects while offering insights into strengthening supervisor support, expanding autonomy, and embedding resilience-building initiatives to sustain nurses' engagement.

Hypotheses Development

Workload and Engagement

Workload is often linked to disengagement, exhaustion, and burnout (Tomic, 2010; Upadyaya et al., 2016; Van Mol et al., 2018). Yet, when viewed as a challenge rather than a hindrance, it can promote motivation and engagement (Crawford et al., 2010; Bakker & Demerouti, 2017). Moderate workload may even encourage innovative behaviours (Montani et al., 2019). However, excessive demands are common in Malaysian public hospitals with staffing shortages (Haruna & Marthandan, 2016) hence increasing risk overwhelming nurses. This raises the question of whether resilience can buffer these effects.

H1: Workload significantly influences nurses' work engagement.

Autonomy and Engagement

Autonomy allows nurses to exercise judgment, improving motivation and professional identity. It has been consistently shown to enhance engagement across settings (Mazzetti et al., 2016; Boamah & Laschinger, 2016; Poghosyan et al., 2019). In healthcare, autonomy interacts with support systems to strengthen dedication (Vera et al., 2015). However, Malaysian hospitals' hierarchical structures may restrict autonomy, limiting its potential (Othman, Ghazali, & Ahmad, 2017).

H2: Autonomy has a significant influence on nurses' work engagement.

Supervisor Support and Engagement

Supportive supervision provides recognition, feedback, and emotional resources that buffer stress and strengthen engagement (Eisenberger et al., 2002). Evidence across contexts confirms its positive role. In Malaysia, supervisor support predicted nurses' engagement (Othman & Nasurdin, 2012) and mediated turnover intention (Ibrahim et al., 2018); internationally, it enhanced resilience and safety climates (Grover et al., 2018; Aiken et al., 2021; Al-Hamdan et al., 2017). While findings can vary (Wu et al., 2013), supervisor support remains especially critical in resource-constrained environments.

H3: Supervisor support has a significant influence on nurses' work engagement.

Resilience as Mediator

Resilience, the ability to adapt and thrive (Luthans, 2002) is vital in high-stress nursing roles. COR theory frames it as a personal resource that conserves energy and sustains motivation (Hobfoll, 1989). Studies confirm its role in boosting engagement under strain (Mache et al., 2014; Wang & Li, 2016; Othman et al., 2013; Grover et al., 2018). During COVID-19, resilient nurses-maintained engagement despite fatigue (WHO, 2022). However, evidence is mixed across sectors (Meintjes & Hofmeyr, 2018), suggesting cultural and occupational nuances. In Malaysia, resilience is expected to mediate the workload–engagement pathway, enabling nurses to reframe demands as challenges rather than threats.

H4: Resilience significantly mediates the relationship between workload and nurses' work engagement.

Research Framework

The proposed framework (Figure 2.1) positions work engagement as the dependent variable, predicted by workload, autonomy, supervisor support, and resilience act as mediator between workload and nurses work engagement. The JD-R model provides the overall structure, while COR theory explains the role of resilience as a critical personal resource.

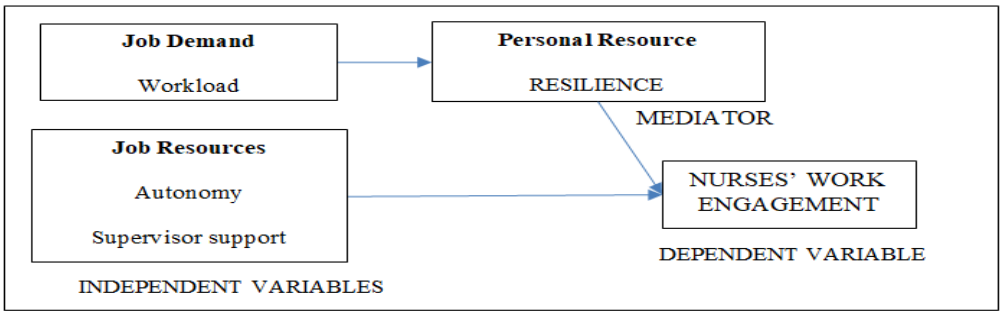

Figure 1 Theoretical Framework of the Study

This section reviewed and discussed theoretical and empirical literature of work engagement and its antecedents. Work engagement is vital for sustaining nurses' performance, job satisfaction, and quality of patient care. Workload, autonomy, supervisor support, and resilience are identified as critical factors shaping work engagement. Globally, and in Malaysia specifically, findings reveal both consistencies and contradictions,

highlighting the complexity of these relationships. The JD-R model offers a robust framework for explaining how demands and resources interact to predict work engagement, while COR theory underscores the importance of resilience in conserving energy under stress. Together, they provide a strong theoretical foundation for the present study. By addressing gaps in Malaysian public healthcare research, this study aims to extend understanding of how job demands, job resources, and personal resources shape nurses' work engagement in a post-pandemic context.

METHODOLOGY

This section outlines the methodology adopted to investigate the influence of workload, autonomy, supervisor support, and resilience on nurses' work engagement in public hospitals in Kedah. It details the research design, population and sampling, data collection procedures, measurement instruments, translation process, pilot testing, and data analysis techniques.

Research Design

A quantitative, cross-sectional survey design was employed. Quantitative methods enable systematic measurement of relationships among variables and allow for hypothesis testing using statistical models (Creswell & Creswell, 2018; Hair et al., 2020). A cross-sectional design was selected as it permits data collection within a limited time frame, reduces cost, and minimizes recall bias (Setia, 2016). The unit of analysis was individual Staff Registered Nurses (SRNs) working in Kedah public hospitals. Questionnaires captured nurses' perceptions of workload, autonomy, supervisor support, and resilience, which were then analyzed as predictors of work engagement.

Population, Sample, Sampling Technique, Data Collection

The study population comprised 3,370 SRNs across nine public hospitals in Kedah (State Health Department, 2019). The focus was on nurses working in clinical units such as medical, surgical, emergency, maternity, orthopedics, and critical care. Assistant nurses, matrons, and community nurses were excluded to maintain homogeneity of roles.

Table 1 Target population of Staff registered Nurses at Public Hospital in Kedah 2019

Population	**Number**
Staff Registered Nurses (SRN)	
Hospital Sultanah Bahiyah	1334
Hospital Sultan Abdul Halim	923
Hospital Kulim	420
Hospital Sultanah Maliha	168
Hospital Jitra	104
Hospital Baling	136
Hospital Yan	92
Hospital Sik	105
Hospital Kuala Nerang	88
Total	**3370**

Sample size was determined using Krejcie and Morgan's (1970) formula. For a population of 3,370, a minimum of 346 respondents was required. To account for potential non-responses, 459 questionnaires were distributed, consistent with recommendations to oversample for higher response rates (Etikan & Bala, 2017). A purposive sampling strategy targeted SRNs directly involved in patient care, appropriate when specific characteristics are required to ensure valid generalization within the defined population (Palinkas et al., 2015). Primary data were collected through a self-administered bilingual questionnaire (English–Malay). Approval was obtained from the Ministry of Health Malaysia, the National Medical Research Register (NMRR), and hospital directors. Following briefing sessions with matrons and nursing supervisors, data collection was conducted between February and March 2020. Respondents were given three weeks to complete the questionnaire, with follow-ups undertaken to improve return rates.

Measurements

The questionnaire contained 52 items across six sections: demographics (gender, race, age, marital status, and tenure), one dependent variable (work engagement), and four independent variables (workload, autonomy, supervisor support, and resilience). All constructs were measured on a 5-point Likert like scale, adapted from validated instruments: i) Work engagement: 17 items (Schaufeli & Bakker, 2003); ii) Workload: 5 items (Van den Oetelaar, Van Rhenen, Stellato, & Grolman, 2016); iii) Autonomy: 6 items (Sims, Shzilagyi, & Keller, 1976); iv) Supervisor support: 9 items (Greenhaus, Parasuraman, & Wormley, 1990); and v) Resilience: 10 items (Connor & Davidson, 2003)

Instruments' Translation and Pilot Study

The instrument was translated into Malay using Brislin's (1970) back-translation method, with linguistic experts confirming semantic equivalence, clarity, and cultural appropriateness. A pilot test with 30 nurses was conducted to assess clarity and reliability. Cronbach's alpha values exceeded the 0.70 threshold (Taber, 2018), confirming internal consistency: work engagement (0.866), workload (0.779), autonomy (0.780), supervisor support (0.951), and resilience (0.868). Minor wording adjustments were made for clarity.

Data Analysis

Data were analyzed using SPSS version 25. Statistical analyses included descriptive statistics, reliability testing, pearson correlations, multiple regression analysis and medgraph analyses to examine predictive relationships between job demands, resources, and engagement. These procedures are widely recommended for social science research involving latent constructs (Hair et al., 2020).

RESULTS

Response Rate and Sample Profile

Out of 459 distributed questionnaires, 250 were returned (54.5%), of which 225 were usable (49%). The sample consisted predominantly of female nurses (81.3%), with the largest age group being 20–29 years (67.1%). Most respondents were Malay (68.9%), single (51.6%), and had less than five years of service (48.9%). These demographics align with the younger nursing

The measurement Reliability and Validity of Measures

All study constructs demonstrated acceptable to excellent internal consistency and construct validity. Cronbach's alpha values ranged from 0.751 (autonomy) to 0.951 (supervisor support), with work engagement at 0.913, indicating strong reliability. This supports the robustness of the measurement instruments used. Meanwhile the construct validity exhibits acceptable result indicating that all measurements are valid.

Descriptive Statistics: Descriptive Results and Implications through the JD–R Lens

Descriptive statistics are presented to answer Research Question 1. Table 1 to Table 6 are presented as below. For interpretation, the researchers used indicator by Moidunny (2009): 1.00–1.80 very low; 1.81–2.60 low; 2.61–3.20 medium; 3.21–4.20 high; 4.21–5.00 very high.

The findings show that nurses in Kedah's public hospitals experience high workload yet also report high resilience and strong work engagement (Table 1). Job resources, autonomy and supervisor support are moderately high, though supervisor support shows greater variability across units. This profile aligns with the JD–R model, which predicts that high demands can coexist with engagement when sufficient job and personal resources are present.

Table 1. Construct Level Descriptives (N = 225; scale 1–5)

Construct	Mean	SD
Workload	3.85	0.78
Autonomy	3.50	0.68
Supervisor support	3.50	0.96
Resilience	3.96	0.65
Work engagement	3.83	0.60

Workload

Workload is primarily fast-paced, cognitively and emotionally demanding, with means above 4.0 for pace and mental challenge, and 3.81 for emotional strain (Table 2). Physical strain is lower (M = 3.45). Thus, strain risks are tied more to time pressure and emotional intensity than physical effort. Practical interventions include staffing buffers, streamlined documentation, and cognitive supports such as checklists and "no-interruption" medication windows strategies that target the cognitive–emotional load rather than physical exertion.

Table 2. Workload Items (N = 225)

Item	Mean	SD
Do you have to work very fast?	4.07	0.899
Do you have too much work to do?	3.89	0.861
Do you consider your work mentally very challenging?	4.03	1.000
Do your work demand a lot from you emotionally?	3.81	1.116
Do you find your work physically strenuous?	3.45	1.068

Autonomy

Autonomy is uneven. Nurses feel trusted to work independently (M = 3.97) but report lower decision latitude (M = 3.25) and modest pace control (M = 3.42) (Table 3). In Malaysia's hierarchical public hospitals, such limits are expected. Engagement could be enhanced by clarifying clinical decision rights (e.g., standing orders, escalation protocols) and allowing safe micro-control over task sequencing. These targeted changes are more feasible than broad autonomy increases.

Table 3. Autonomy Items (N = 225)

Item	Mean	SD
How much are you left on your own to do your own work?	3.97	1.037
Able to act independently of your supervisor in performing your job?	3.25	1.036
Able to do your job independently of others?	3.34	0.992
Freedom to work/make decisions as you want on your job	3.45	0.954
Opportunity for independent thought and action	3.57	0.971
Control over the pace of your work	3.42	1.099

Supervisor Support

Supervisor support is strong for coaching and advice (M ≈ 3.7) but weaker in career sponsorship and recognition (M ≈ 3.3), with large SDs reflecting unit variation (Table 4). Formalizing recognition, ensuring credit, and holding career check-ins would strengthen this resource. These efforts are especially valuable for early-career nurses, the modal group in the sample, and align with Malaysian workforce development priorities.

Table 4. Supervisor Support Items (N = 225)

Item	Mean	SD
Supervisor learns about my career goals	3.32	1.042
Supervisor cares whether I achieve my goals	3.54	1.157
Supervisor informs me about career opportunities	3.27	1.191
Supervisor ensures I get credit for accomplishments	3.33	1.278
Supervisor gives helpful performance feedback	3.62	1.096
Supervisor gives helpful advice when needed	3.72	1.105
Supervisor supports training/education	3.64	1.069
Assignments strengthen new skills	3.70	1.007
Assigns special projects increasing visibility	3.40	1.165

Table 5. Resilience Items (N = 225)

Item	Mean	SD
Able to adapt to changes	4.08	0.831
Can cope with whatever job given	3.91	0.830
Look at humorous side when facing problems	4.09	0.904

Coping with stress makes me stronger	3.84	0.999
Build up after illness/injury/hardship	3.95	0.867
Can achieve goals despite obstacles	4.08	0.833
Can stay focused and think clearly under stress	3.67	0.986
Not easily discouraged by failure	4.18	0.839
See myself as strong in life's challenges	3.98	0.906
Can handle unpleasant feelings	3.78	0.947

Resilience

Resilience levels are high, with nurses scoring strongly on bounce-back and optimism (M > 4.0 for humor in adversity, adapting to change). Lower means for thinking clearly under stress (M = 3.67) and managing unpleasant emotions (M = 3.78) suggest areas for improvement (Table 5). Targeted, low-cost resilience training, with brief cognitive reappraisal modules, paced breathing, and peer debriefs can strengthen these micro-skills without heavy time costs.

Table 6. Work Engagement Items (UWES-17; N = 225)

Item	Mean	SD
Bursting with energy at work	3.69	0.829
Feel strong and vigorous at work	3.72	0.918
In the morning, feel like going to work	3.55	0.999
Can work for very long periods	3.50	1.090
Mentally resilient at work	3.91	0.835
Persevere even when things don't go well	3.99	0.818
Work has meaning and purpose	4.16	0.704
Enthusiastic about my job	3.93	0.982
My job inspires me	3.98	0.961
Proud of the work I do	4.14	0.854
My job is challenging	4.33	0.785
Time flies when I'm working	4.00	0.938
Forget everything else around me when working	3.35	1.079
Happy when working intensely	4.19	0.819
Immersed in my work	3.87	0.843

Get carried away when working	3.20	1.055
Difficult to detach from my job	3.62	1.058

Work Engagement

Engagement is marked by dedication (challenge, meaning, pride all > 4.1), solid vigor (M = 3.99), and balanced absorption (time flies, M = 4.0, but "getting carried away" lower at M = 3.2) (Table 6). This balance indicates focused engagement without losing situational awareness, which is critical for patient safety.

Integrating the JD–R Perspective

Overall, Kedah nurses demonstrate high engagement despite demanding roles, supported by resilience and moderate job resources. Yet resource bottlenecks are evident: limited decision latitude and pace control, inconsistent supervisor recognition and career guidance, and weaker stress-clarity and emotion regulation. Addressing these specific gaps will yield the greatest return.

From the context of practical implications, perhaps the hospital management should put more focus on i) Workload: prioritise smarter rosters, protected breaks, and shifting non-clinical tasks (e.g., routine data entry) to clerical staff.; ii) Autonomy: focus on expanding nurses' clinical decision latitude within safe protocols.; iii) Supervisor support: focus on embedding recognition practices, transparent workload allocation, and regular development check-ins. And iv) Resilience: that emphasizes on the on-shift resilience boosters, brief refreshers, post-case debriefs and ensuring adequate rest.

In sum, Kedah's nurses are resilient and dedicated despite heavy cognitive–emotional demands. Consistent with the JD–R model, sustaining their engagement requires lightening avoidable workload, enhancing safe decision latitude, strengthening supervisor support, and embedding micro-skills for resilience. These focused interventions conserve energy, maintain motivation, and directly contribute to safer, higher-quality patient care.

Inferential analyses: The influence of Workload, Autonomy, Supervisor's support and Resilience on Nurses Work Engagement

Prior performing regression and mediation analysis, the researchers have run correlation analysis as Table 7. The zero-order correlations show a pattern fully consistent with JD-R and COR. Among predictors, the strongest association with work engagement is resilience ($r = .651$, $p < .001$), a large effect by conventional benchmarks—indicating that more resilient nurses report substantially higher engagement.

Supervisor support also shows a moderate-to-large positive correlation with engagement ($r = .507$, $p < .001$), while autonomy is small-to-moderate yet significant ($r = .329$, $p < .001$). In contrast, workload is essentially uncorrelated with engagement at the bivariate level ($r = .027$, $p = .692$). Crucially for the proposed mediation, workload is negatively related to resilience ($r = –.138$, $p = .039$; small effect). This means heavier workload is associated with slightly lower resilience, while resilience in turn is strongly related to higher engagement. That configuration (IV→mediator significant; mediator→DV significant; IV→DV near zero) is exactly the pattern under which an indirect-only (competitive) mediation can emerge—i.e., the indirect path can be meaningful even when the zero-order IV–DV correlation is weak (Hayes, 2018; Zhao et al., 2010). Correlations among the predictors are in the moderate range (autonomy–supervisor support $r = .501$; supervisor support–resilience $r = .478$; autonomy–resilience $r = .369$; all $p < .001$).

None approach levels that typically raise multicollinearity concerns (e.g., $r \geq .80$), so proceeding to multiple regression is appropriate. By performing this analysis means preliminarily, RQ2 is supported at the correlational level for autonomy and supervisor support (both positive), and strongly for resilience; workload shows no direct bivariate association with engagement. The negative workload–resilience and positive resilience–engagement correlations provide a clear empirical rationale to test H4 (resilience as mediator of workload to engagement) with a formal mediation model (bootstrapped INDIRECT effect).

In summary, at the correlational level, resilience emerges as the strongest driver of engagement, followed by supervisor support and autonomy, while workload exerts its influence indirectly by eroding resilience. These results preliminarily support H2–H4 and highlight resilience as a critical mechanism linking job demands and resources to engagement in Malaysian public hospitals.

Table 7 Correlations

		1	2	3	4	5
1 Workload	Pearson Correlation	1				
	Sig.					
2 Autonomy	Pearson Correlation	.242**	1			
	Sig.	.000				
3 Supervisor support	Pearson Correlation	-.096	.501**	1		
	Sig.	.151	.000			
4 Resilience	Pearson Correlation	-.138*	.369**	.478**	1	
	Sig.	.039	.000	.000		
5 Work Engagement	Pearson Correlation	.027	.329**	.507**	.651**	1
	Sig.	.692	.000	.000	.000	
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

After correlation is performed the researchers proceeded with multiple regression to answer Research Question 2.

Table 8 Multiple Regression

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.930	.248		3.751	.000
	Workload	.109	.040	.142	2.729	.007
	Autonomy	-.045	.053	-.051	-.838	.403
	Supervisor Support	.175	.038	.280	4.613	.000
	Resilience	.511	.052	.555	9.825	.000
r		0.70				
R^2		0.490				
Adjusted R^2		0.481				

F-test	52.922
Sig.	0. 000

The regression analysis indicated that the model explained a substantial proportion of variance in nurses' work engagement, $R = .70$, $R^2 = .49$, Adjusted $R^2 = .48$, $F(4, 220) = 52.92$, $p < .001$. Collectively, the four predictors accounted for almost half of the variation in engagement, representing a large effect size for field data in hospital settings.

Resilience emerged as the strongest predictor ($\beta = .56$, $p < .001$). Nurses who could regain focus after setbacks, remain composed during surges, and reframe challenges as opportunities reported significantly higher engagement. This result is consistent with the demographic profile of the sample, which was predominantly early-career (67% aged 20–29; 49% with <5 years' tenure) and employed in fast-paced, cognitively demanding wards ("mentally very challenging," M = 4.03; "work very fast," M = 4.07). In these conditions, resilience functions as a psychological reserve that sustains energy and motivation throughout demanding shifts.

Supervisor support was the next most influential factor ($\beta = .28$, $p < .001$). Independent personal coping capacity, timely feedback, recognition, equitable workload allocation, and career guidance from supervisors were strongly associated with higher engagement. This finding highlights the critical role of ward leaders and charge nurses in shaping engagement among a young workforce, where everyday leadership behaviors through coaching, skill-building assignments, and visible appreciation, translate directly into increased dedication and vigor.

Workload demonstrated a smaller but positive effect ($\beta = .14$, $p = .007$). This supports the Job Demands–Resources proposition that workload may operate as a challenge demand when sufficient resources are present. Indeed, nurses reported perceiving their jobs as highly challenging (M = 4.33), and under supportive conditions, workload appeared to sharpen focus and heighten purpose. However, bivariate correlations revealed a negative association between workload and resilience ($r = –.14$, $p < .05$), underscoring the risk that unmanaged workload depletes the very personal resource that renders it motivating. This suggests the need for acuity-based staffing, removal of low-value administrative tasks, protected breaks, and surge coverage to maintain workload as a challenge rather than a hindrance.

Autonomy did not contribute uniquely once other predictors were included ($\beta = –.05$, $p = .403$), despite its positive correlation with engagement ($r = .33$). Two explanations are likely: (a) autonomy overlaps with supervisor support and resilience ($r = .50$ and $r = .37$, respectively), and (b) decision latitude in public hospitals is restricted by protocols and physician orders. Thus, while autonomy may rise indirectly through supportive supervision and resilience, its incremental effect is minimal in this context.

Overall, the findings align with JD–R and COR perspectives: in high-demand healthcare environments, resources are decisive. Resilience offers the greatest individual return, supervisor support provides the most actionable organisational intervention, and workload can be motivating when buffered by adequate resources. For hospital leaders, priorities should include embedding resilience-building and recovery protections into rostering, equipping supervisors with coaching and recognition skills, and engineering "smart workloads" through acuity-based staffing and task redesign.

Mediating effect of Resilience on the relationship between nurse's workload and work Engagement

Based on Table 9, workload does not move engagement directly, but it does reduce resilience, and resilience strongly lifts engagement showing perfect conditions for an indirect (mediated) effect.

Table 9 Preliminary Associations Supporting the WL→RES→WE Mediation Hypothesis

Pair	Correlation r	Meaning
WL → WE	0.03 (ns)	By itself, workload does not predict engagement.

WL → RES	–0.14*	Heavier workload is linked to lower resilience.
RES → WE	0.65*	More resilient nurses are much more engaged.

$p < .05$ (two-tailed); N = 225

Next mediation is performed using MEDGRAPH as shown in Table 10. (**Model:** X = Workload, M = Resilience, Y = Work Engagement (N = 225)). Based on the table, "A MedGraph mediation analysis (Model: WL → RES → WE; N = 225) indicated that Workload was unrelated to Work Engagement at the zero-order level (c = .027, ns) but was negatively related to Resilience (a = –.138, p = .039). Resilience strongly predicted Work Engagement controlling for Workload (b ≈ .667, p < .001). The indirect effect was negative and significant (a×b ≈ –.090; Sobel z = –2.06, p = .040). The direct effect of Workload on Engagement controlling for Resilience was positive (c′ ≈ .117, p < .05), evidence of competitive mediation.

These results suggest Workload undermines Engagement primarily by eroding Resilience, while a small positive challenge-type direct effect remains. The finding indicates that when workloads spike, the management of hospital should investigate buffer and rebuild resilience through debriefs, recovery time, peer support, skills for thinking clearly under stress, to keep nurses, work engagement from slipping.

Table 10 Mediation Analysis using MEDGRAPH

Path	Meaning	Coefficient	p-value
A	Workload → Resilience	–0.138	.039
B	Resilience → Work Engagement (controlling Workload)	≈ 0.667	< .001
C	Total effect: Workload → Work Engagement	0.027	.692 (ns)
c′	Direct effect: Workload → Work Engagement (controlling Resilience)	≈ 0.117	< .05
a×b	Indirect effect (mediation)	–0.090	Sobel z = –2.06, p = .040

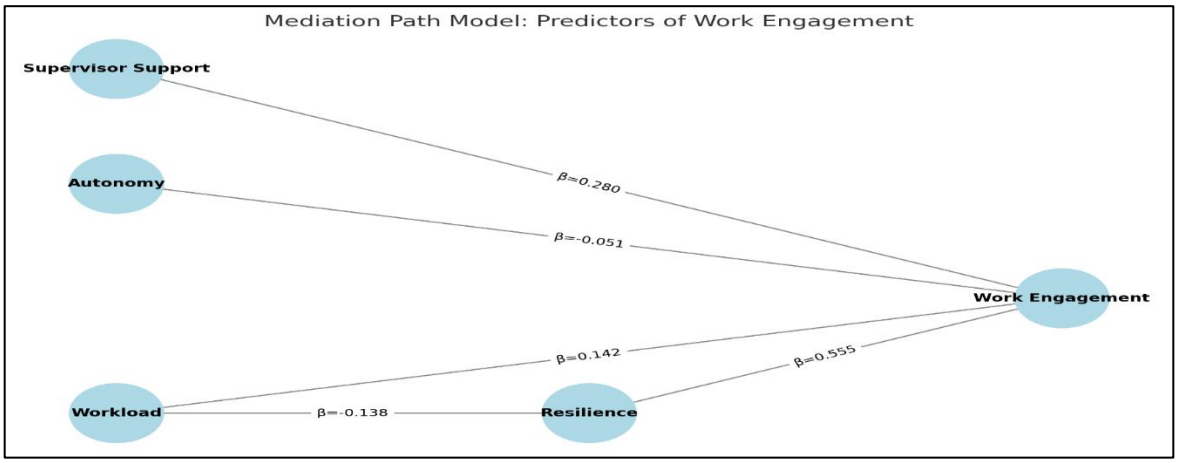

Figure 2 Mediation Path Model: Predictors of Work Engagement

Managerial Implications

This study identifies three primary levers for sustaining nurses' engagement in Kedah's public hospitals: (1) intelligent workload management, (2) strengthened supervisor support and autonomy, and (3) resilience-building as a core personal resource. These align with JD–R theory, which links engagement to the balance of demands

and resources (Bakker & Demerouti, 2007, 2017), and COR theory, which stresses the accumulation of resources and the risks of resource loss (Hobfoll, 1989).

Managing Workload

Nurses reported high, fast-paced, and cognitively demanding workloads (M = 3.85). Findings suggest workload can serve as a challenge demand when sufficient resources are available, consistent with the challenge–hindrance perspective (Crawford et al., 2010). This duality explains why workload sometimes undermines engagement (Tomic, 2010) yet can stimulate it under supportive conditions (Mauno et al., 2007). Leaders should minimise unnecessary burdens through acuity-based staffing, float pools, and clerical task transfer, while protecting meaningful challenges. Roster hygiene, protected breaks, and escalation protocols are essential to prevent chronic strain.

Supervisor Support

Supervisor support (M = 3.50) strongly predicted engagement, reinforcing JD–R evidence that social resources energise motivation and buffer stress (Hakanen et al., 2006; Schaufeli & Bakker, 2004). Prior research confirms Malaysian nurses thrive under supportive supervision (Othman & Nasurdin, 2012), while Portuguese studies show supervisor and coworker support amplify autonomy's impact (Vera et al., 2015). Leaders should embed recognition practices, routine coaching, non-punitive debriefs, and transparent workload allocation to signal fairness and justice.

Autonomy

Although autonomy correlated with engagement, its direct effect diminished once support and resilience were considered, reflecting limits in regulated hospital contexts (Freeney & Fellenz, 2013; Taipale et al., 2011). Leaders should therefore promote bounded decision latitude by clarifying bedside rights, engaging nurses in workflow councils, and introducing participative scheduling, enhancing agency without compromising safety.

Resilience

Resilience was the strongest personal predictor (M = 3.96), consistent with COR's emphasis on resource caravans (Hobfoll, 1989). While resilience and optimism predict engagement (Mache et al., 2014; Othman et al., 2013), it must complement, not replace, systemic reforms. Practical strategies include shift-sensitive resilience training (e.g., CBT, mindfulness), peer support, structured debriefs, and rest protections, reinforced by adequate staffing and resources.

Continuous Monitoring and Tailored Support

Hospitals should monitor engagement regularly using validated short tools (Schaufeli & Bakker, 2003) and link results to turnover, absenteeism, and patient satisfaction. Rapid-cycle pilots (e.g., coaching with participative scheduling) enable scaling of effective interventions. Support must also be equitable: new nurses require mentoring and lighter caseloads, experienced staff value leadership roles, and night/weekend teams need access to supervisors and recognition. Reducing supervisors' span of control ensures support and resilience-building practices are embedded within scheduled hours.

Overall, safeguarding engagement in Kedah hospitals requires reducing unnecessary workload, institutionalising supervisor support, clarifying decision rights, and embedding resilience strategies with real resource backing. Together, these levers create the supportive passageways that JD–R and COR identify as vital for sustaining engagement in high-demand healthcare contexts.

Future Research Directions

For future research directions, some suggestions were made based on the findings from the study and the gaps identified in the literature. Firstly, the future studies could consider adopting a longitudinal design to examine how changes in workload, autonomy, supervisor support, and resilience over time influence nurses' work

engagement. A longitudinal approach would help establish causal relationships and provide deeper insights into the long-term effects of job demands and resources on engagement, particularly in post-pandemic contexts where the healthcare landscape is still evolving.

Given the current findings on the mediation role of resilience on the relationship between nurses workload and their work engagement, perhaps the future study should include the moderating role of prominent variable on the relationship between independent variables and dependent variables. Investigating additional moderators such as leadership styles, organizational culture, or social support networks to see how these factors interact with job demands, resources and the outcome variable. Perhaps future study could focus on testing multiple moderators simultaneously to seek how the interplay between supervisor support, autonomy, and workload influences engagement outcomes. Perhaps, future study could compare public and private healthcare settings, or even different states in Malaysia. Through comparing the public and private sector would help explore the sectoral differences in workload, autonomy, supervisor support, and resilience; and how systemic factors like funding, policy, and staffing models contribute to work engagement in both sectors that could provide valuable insights for healthcare administrators aiming to improve engagement across various types of healthcare organizations.

Another suggestion for future study direction is exploring sectoral differences in resilience training; where through future studies, researchers could investigate how resilience training programs vary across hospitals with different characteristics (e.g., size, patient volume, staff composition) and how these programs impact work engagement. Perhaps the future study is also able to tap the effectiveness of different types of resilience-building interventions (e.g., mindfulness, cognitive behavioral therapy, peer support programs); and whether resilience interventions need to be tailored to specific nurses' groups, such as those working in high-stress wards (e.g., ICU, emergency departments) versus those in less demanding settings. Lastly, perhaps future study could delve into exploring other constructs that impact nurses' work engagement. While workload, autonomy, supervisor support, and resilience are important predictors of work engagement, other factors might also play a significant role. Hence future studies could examine other constructs such as job crafting, organizational justice, co-workers' relationships, team dynamics and social support, since these variables strictly influence and maintain nurses' work engagement especially during high-stress environments.

CONCLUSION

Future research should continue to build on the findings of this study by investigating the moderating effects of leadership and organizational culture, exploring cross-sectoral and cross-cultural differences, and testing the long-term impacts of resilience interventions. Additionally, examining the role of technology in healthcare work engagement and organizational strategies will be critical for adapting to the evolving demands in the healthcare sector. These future directions will not only contribute to academic literature but also provide actionable insights for improving nurse engagement and retention, ultimately leading to better patient care and outcomes.

In conclusion, the evidence suggests a balanced strategy that includes reducing or redesigning hindering elements of workload while preserving meaningful challenge, amplify supervisor support as the everyday drivers of motivation, grant bound autonomy that respects safety, and build resilience as a personal buffer paired with structural resources. Implemented together, these actions should lift engagement, curb burnout and absenteeism, and improve patient outcomes. Theoretically, the pattern supports JD–R's dual-path model (demands can be motivating when buffered by resources) and extends COR by showing that resilience functions best when embedded within supportive systems. Practically, they offer a concrete strategy for public hospitals in Kedah to sustain a healthy, engaged nursing workforce in a persistently demanding environment.

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