IJPHS:
International Journal of Psychology and Health Science
GREENATION PUBLISHER
+62 812 1046 7572 http://greenpub.org greenation.info@gmail.com
DOI: https://doi.org/10.38035/ijphs.v4i4
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Received: 11 November 2026 | **Revised:** 14 November 2026 | **Accepted:** 21 November 2026

The Influence of Work Environment, Coworker Support and Supportive Leadership on Healthcare Workers Performance with Work Engagement as a Mediating Variabel: A Multicenter Study

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Abstract: Purpose: This study examines the effects of the physical work environment and facilities, coworker support, and supportive leadership on healthcare workers performance, with work engagement as a mediator. Method: A cross-sectional multicenter survey (27 October to 4 November 2026) of 88 healthcare workers selected by purposive sampling, analyzed with PLS-SEM using SmartPLS. Results: coworker support was positively associated with work engagement ($\beta = 0.308$; $p = 0.011$), whereas the physical work environment ($p = 0.334$) and supportive leadership ($p = 0.197$) did not. Work engagement strongly affected performance ($\beta = 0.555$; $p < 0.001$). Only the indirect effect through coworker support was significant ($\beta = 0.171$; $p = 0.026$), and it was borderline in a sensitivity analysis ($n = 78$; $p = 0.052$). Conclusion: Coworker support and work engagement play an important role in healthcare workers performance.

Keywords: Work Environment Coworker Support, Supportive Leadership, Work Engagement, Healthcare Workers Performance

INTRODUCTION

Healthcare workers are the foundation of any health system, and their performance directly determines healthcare service quality (Satria et al., 2025). To change and improve the performance of healthcare professionals, it is essential to determine whether dimensions of work environment and organizational support can be used as references for job performance research in healthcare organizations (Krijgsheld et al., 2022). Healthcare workers operate under high workloads, stringent procedural requirements, and intensive patient interactions. Therefore, workplace factors that foster motivation and commitment remain critical considerations for healthcare facility management

The Job Demands-Resources (JD-R) model explains that job resources stimulate motivational processes that enhance work engagement and ultimately improve work

outcomes (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004). Work engagement is defined as a positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption (Schaufeli et al., 2006). Quantitative reviews have demonstrated that work engagement is associated with both task performance and contextual performance (Christian et al., 2011).

This study focuses on three key workplace resources. First, the physical work environment and facilities, which include the adequacy of infrastructure, workplace comfort, and physical conditions such as lighting and noise levels, can influence employee performance through their effects on workplace stress (Vischer, 2007). Second, coworker support refers to task assistance, supportive communication, and teamwork (Karasek et al., 1998). Third, supportive leadership refers to supervisory behaviors that demonstrate concern for employees' well-being, provide recognition and appreciation, and offer guidance and support (House, 1996).

Although several studies have investigated job resources in healthcare settings, most prior research has primarily focused on nurses (e.g., Kim et al., 2023; Zhang et al., 2024), with fewer studies examining multiple healthcare professions simultaneously. Furthermore, integrated research models evaluating the mediating role of work engagement across diverse geographical regions and facility types ranging from clinics and primary health centers (puskesmas) to hospitals remain limited. Therefore, a multicenter study involving a broader range of healthcare professionals provides a more comprehensive perspective on employee performance. Based on the above discussion, this study aims to analyze the effects of the physical work environment and facilities, coworker support, and supportive leadership on healthcare workers' performance through work engagement as a mediating variable.

Literature Review

1. The Relationship Between the Physical Work Environment and Facilities and Work Engagement

The physical work environment and facilities encompass the adequacy of infrastructure and equipment, workplace comfort, and physical conditions such as lighting, air circulation, and noise levels. Within the *Job Demands-Resources* (JD-R) framework, supportive physical working conditions are considered job resources that help employees accomplish their tasks and reduce work-related strain (Bakker & Demerouti, 2007). Conversely, an inadequate physical work environment has also been associated with workplace stress and decreased job performance (Vischer, 2007). Kohnen et al. (2023) demonstrated that characteristics of the clinical work environment are associated with nurses' motivation and well-being. A supportive work environment can help create positive psychological conditions, thereby encouraging healthcare workers to become more enthusiastic about their jobs. Furthermore, Petäjä et al. (2025) identified an association between satisfaction with the physical hospital environment and *work engagement* among healthcare professionals. Aspects such as comfort, security, and physical safety are important elements in creating positive workplace experiences.

Based on these findings, a favorable work environment is expected to foster vigor, dedication, and absorption in employees' work. Adequate facilities and comfortable working conditions enable healthcare professionals to deliver services more effectively without being disrupted by physical barriers or inadequate resources. Therefore, the following hypothesis is proposed: **H1:** The physical work environment and facilities have a positive and significant effect on *work engagement*.

2. The Relationship Between Coworker Support and Work Engagement

Coworker support encompasses task assistance, supportive communication, and teamwork (Karasek et al., 1998). In healthcare services, work is generally performed by multidisciplinary teams. Consequently, coworker support represents an important social job

resource that fulfills employees' need for relatedness and facilitates the achievement of work-related objectives. Such social resources stimulate motivational processes that enhance work engagement (Schaufeli & Bakker, 2004). Othman and Nasurdin (2013), in a study involving 402 nurses from three public hospitals in Malaysia, found that supervisory social support was positively associated with *work engagement*, although coworker support did not demonstrate a statistically significant individual effect. This finding indicates that the influence of social support may vary depending on its source. Meanwhile, Kim et al. (2023), in a study involving 477 nurses in South Korea, found that coworker support was positively and significantly associated with *work engagement* ($\beta = 0.14$). Dal Santo et al. (2024) also examined the role of emotional coworker support in promoting *work engagement* among pediatric healthcare professionals.

Accordingly, coworker support demonstrated through willingness to assist, share information, provide motivation, and establish open communication is expected to enhance healthcare professionals' engagement with their work. Such support may also reduce feelings of isolation when facing heavy workloads and demanding patient care responsibilities. Therefore, the following hypothesis is proposed: **H2:** Coworker support has a positive and significant effect on *work engagement*.

3. The Relationship Between Supportive Leadership and Work Engagement

Supportive leadership is characterized by leaders' behaviors that demonstrate concern for employees' well-being, listen to their suggestions, and provide appreciation, recognition, and guidance (House, 1996). Supportive leaders are expected to make healthcare professionals feel valued and adequately equipped with the resources needed to perform their responsibilities, thereby enhancing their work engagement. Kim et al. (2023) demonstrated that nursing managers' leadership was the strongest predictor of *work engagement* among nurses in South Korea, with a coefficient of $\beta = 0.26$. Furthermore, Zhang et al. (2024), in a study involving 2,502 nurses from six tertiary hospitals in China, found that *caring leadership* was positively and significantly associated with *work engagement* ($\beta = 0.05$; $p < 0.001$). In addition, Alluhaybi et al. (2024) identified an association between nursing managers' leadership styles and nurses' levels of work engagement in hospitals in Saudi Arabia.

These findings strengthen the argument that leadership characterized by concern, emotional support, recognition of work achievements, and clear guidance can foster positive relationships between leaders and healthcare professionals. Such conditions encourage feelings of appreciation, trust, and intrinsic motivation, thereby motivating healthcare professionals to invest their energy and abilities in performing their jobs. Therefore, the following hypothesis is proposed: **H3:** Supportive leadership has a positive and significant effect on *work engagement*.

4. The Relationship Between Work Engagement and Healthcare Workers' Performance

Work engagement is a positive work-related psychological state characterized by vigor, dedication, and absorption (Schaufeli et al., 2006). A quantitative review has demonstrated that work engagement is associated with both task performance and contextual performance (Christian et al., 2011). Bakertzis and Myloni (2021), in a study involving 269 healthcare employees, including physicians, nurses, and administrative staff in Greece, found that *work engagement* was associated with job performance, although the strength of this relationship varied across professional groups. Furthermore, Bhatti et al. (2018) found that *work engagement* played an important role in explaining the relationship between job resources and nurses' performance, including both task and contextual performance. Hasan et al. (2023), in a study involving 353 nurses from various healthcare clinics in the United Arab Emirates, also demonstrated that *work engagement* played an important role in the relationship between transformational leadership and nurses' job performance.

Among healthcare professionals, performance is reflected in compliance with standard operating procedures, punctuality, accuracy in performing medical procedures, effective patient communication, teamwork, and commitment to patient safety. Healthcare professionals with high levels of *work engagement* tend to demonstrate greater energy, enthusiasm, and concentration when fulfilling their professional responsibilities. Therefore, higher levels of *work engagement* are expected to increase the likelihood of optimal performance among healthcare professionals. Accordingly, the following hypothesis is proposed: **H4:** *Work engagement* has a positive and significant effect on healthcare workers' performance.

5. The Mediating Role of Work Engagement

The motivational process within the JD-R framework explains that job resources influence work outcomes through increased work engagement (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004). An adequate physical work environment and facilities, coworker support, and supportive leadership represent important job resources that can encourage healthcare professionals to demonstrate greater enthusiasm, dedication, and concentration in performing their responsibilities. Bhatti et al. (2018) demonstrated that *work engagement* serves as a mediating variable in the relationship between job resources, including supervisory and coworker support, and nurses' job performance. Furthermore, Hasan et al. (2023) found that *work engagement* plays a mediating role in the mechanism linking leadership to nurses' performance in healthcare clinics. Ni et al. (2024), in a study involving 893 nurses in China, also demonstrated that *work engagement* functions as a mediating mechanism connecting job demands with several dimensions of nurses' performance.

Based on these findings, *work engagement* is expected to serve as a psychological mechanism that explains how job resources can be translated into improved healthcare workers' performance. A comfortable work environment may enhance energy and concentration, coworker support may strengthen motivation and collaboration, while supportive leadership may foster feelings of appreciation and commitment to work. These three factors are expected to enhance *work engagement*, which subsequently encourages healthcare professionals to deliver high-quality services and prioritize patient safety.

Accordingly, this study proposes the following mediation hypotheses:

H5a: *Work engagement* mediates the effect of the physical work environment and facilities on healthcare workers' performance.

H5b: *Work engagement* mediates the effect of coworker support on healthcare workers' performance.

H5c: *Work engagement* mediates the effect of supportive leadership on healthcare workers' performance.

METHODS

Research Design and Study Location

This study employed a quantitative approach with a multicenter cross-sectional design. The quantitative approach was used to test hypotheses within a specific population or sample using research instruments and statistical analysis (Sugiyono, 2013). Respondents were recruited from at least 11 healthcare facilities (five hospitals and six clinics) located in Banten, Bali, East Java, and other regions of Java. Data were collected from October 27 to November 4, 2026.

Population, Sample, and Sampling Technique

The study population consisted of healthcare professionals, including general practitioners, dentists, specialist physicians, nurses, midwives, and allied health professionals working in clinics, hospitals, and community health centers (puskesmas). The sample was selected using purposive sampling. The inclusion criteria were healthcare professionals who

were actively employed at a healthcare facility and had a minimum of one year of work experience at that facility. The exclusion criteria included internship participants, medical clerkship students (clinical trainees), employees on extended leave during the data collection period, and non-healthcare personnel (administrative and operational staff). Respondent eligibility was confirmed through screening statements at the beginning of the questionnaire, which was distributed through the researcher's personal contacts.

The minimum sample size was calculated using G*Power (Faul et al., 2009) for multiple regression analysis with three predictors ($f^2 = 0.15$; $\alpha = 0.05$; power = 0.80), resulting in approximately 77 respondents. This sample size also met the 10-times rule (Barclay et al., 1995), based on the maximum number of structural paths directed toward a single construct, namely three paths. The target sample size was 80–100 respondents. Of the 96 responses received, 88 were included in the analysis. A sensitivity analysis was also conducted using 78 respondents after excluding 10 respondents who provided identical scores across all questionnaire items.

Research Instrument

The research instrument consisted of an online questionnaire administered through Google Forms, using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire comprised respondent characteristics (profession, location, type of healthcare facility, name of healthcare facility [optional], work unit, and length of employment) and 20 statements, with four items assigned to each of the five constructs. The items were adapted from existing instruments and modified to suit the context of healthcare facilities rather than directly translated from the original statements.

Table 1. Constructs and Adaptation Sources

Construct	Number of Items	Adaptation Source
Physical Work Environment and Facilities (X1)	4	Literature on physical work environments and ergonomics (Vischer, 2007)
Coworker Support (X2)	4	Job Content Questionnaire (Karasek et al., 1998)
Supportive Leadership (X3)	4	Path-Goal Leadership Theory (House, 1996)
Work Engagement (M)	4	Utrecht Work Engagement Scale (UWES-9) (Schaufeli et al., 2006)
Healthcare Workers' Performance (Y)	4	Individual Work Performance Questionnaire (IWPQ) (Koopmans et al., 2013)
Total	20	Five constructs

The validity and reliability of the research instrument were assessed using the study data through the evaluation of the PLS-SEM measurement model.

Data Collection and Ethical Considerations

The questionnaire link was distributed online through the researcher's private messages to healthcare professionals in each geographical area who met the eligibility criteria. The sampling procedure employed purposive sampling with a snowball sampling component, without direct institutional involvement. Respondents were informed about the research objectives, the voluntary nature of their participation, and the confidentiality of their data. Informed consent was obtained before they proceeded with the questionnaire.

The questionnaire did not collect respondents' names, and providing the name of their healthcare facility was optional. Email addresses were recorded for most responses solely to identify potential duplicate submissions. These email addresses were not linked to questionnaire responses during the analysis and were deleted before the data were analyzed.

Data Analysis

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS software (Ringle et al., 2022), following a two-stage evaluation procedure (Hair et al., 2019; Hair et al., 2022).

For the measurement model, the evaluation criteria included outer loadings (≥ 0.70), Cronbach's alpha and composite reliability (≥ 0.70), average variance extracted (AVE ≥ 0.50), and discriminant validity using the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the heterotrait-monotrait ratio (HTMT < 0.90; Henseler et al., 2015).

For the structural model, the evaluation involved collinearity assessment using the variance inflation factor (VIF), path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2) using the blindfolding procedure, and the standardized root mean square residual (SRMR), with a threshold of less than 0.10 and an ideal value below 0.08 (Henseler et al., 2015).

Hypothesis significance was assessed using bootstrapping with 5,000 subsamples, a two-tailed test, and the percentile bootstrap method at a significance level of $\alpha = 0.05$. Mediation effects were evaluated based on the significance of specific indirect effects and their corresponding 95% confidence intervals (Zhao et al., 2010).

A sensitivity analysis was conducted by excluding respondents who provided identical scores across all questionnaire items. The structural model did not include direct paths from the independent variables to healthcare workers' performance. Therefore, the classification of mediation effects as either full or partial mediation could not be established.

RESULTS AND DISCUSSION

Result

Of the 96 responses received, 88 respondents met the eligibility criteria and were included in the analysis. Eight responses were excluded, comprising two respondents who declined to participate or did not meet the eligibility criteria, one non-healthcare employee, and five respondents who did not complete all questionnaire items. The largest proportion of respondents were nurses (44.3%), worked in the Tangerang/Banten region (44.3%), and were employed in hospitals (75.0%). Based on the healthcare facility names provided by approximately 77% of respondents, at least 11 healthcare facilities were identified, consisting of five hospitals and six clinics. The mean indicator scores ranged from 3.42 to 4.51, with the lowest scores observed for supportive leadership (3.42–3.77) and the highest scores for performance (4.19–4.51).

Table 2. Respondent Characteristics (n = 88)

Characteristics	Category	n	%
Profession	Nurses	39	44.3
	General practitioners	20	22.7
	Dentists	9	10.2
	Specialist physicians	8	9.1
	Midwives	7	8.0
	Other healthcare professionals	5	5.7
Location	Tangerang/Banten	39	44.3
	Bali	22	25.0
	Surabaya/East Java	13	14.8
	Other regions of Java	12	13.6
	Special Capital Region of Jakarta	1	1.1
	Other locations	1	1.1
Type of healthcare facility	Hospital	66	75.0
	Clinic	20	22.7
	Community health center (*puskesmas*)	2	2.3
Length of employment	1–3 years	36	40.9

	More than 3–5 years	19	21.6
	More than 5 years	33	37.5

Measurement Model Evaluation

Two indicators, namely WE3 (outer loading = 0.655) and WEg3 (0.609), were removed because their outer loadings were below the recommended threshold of 0.70. Consequently, the final measurement model consisted of 18 indicators, with outer loadings ranging from 0.741 to 0.916. The physical work environment and *work engagement* constructs were each measured using three indicators. All constructs met the requirements for reliability and convergent validity, as presented in Tables 3 and 4.

Discriminant validity was also established, as the square root of the AVE for each construct exceeded its correlations with other constructs. Furthermore, the highest HTMT value was 0.708, observed between the physical work environment and coworker support, which remained below the recommended threshold of 0.90.

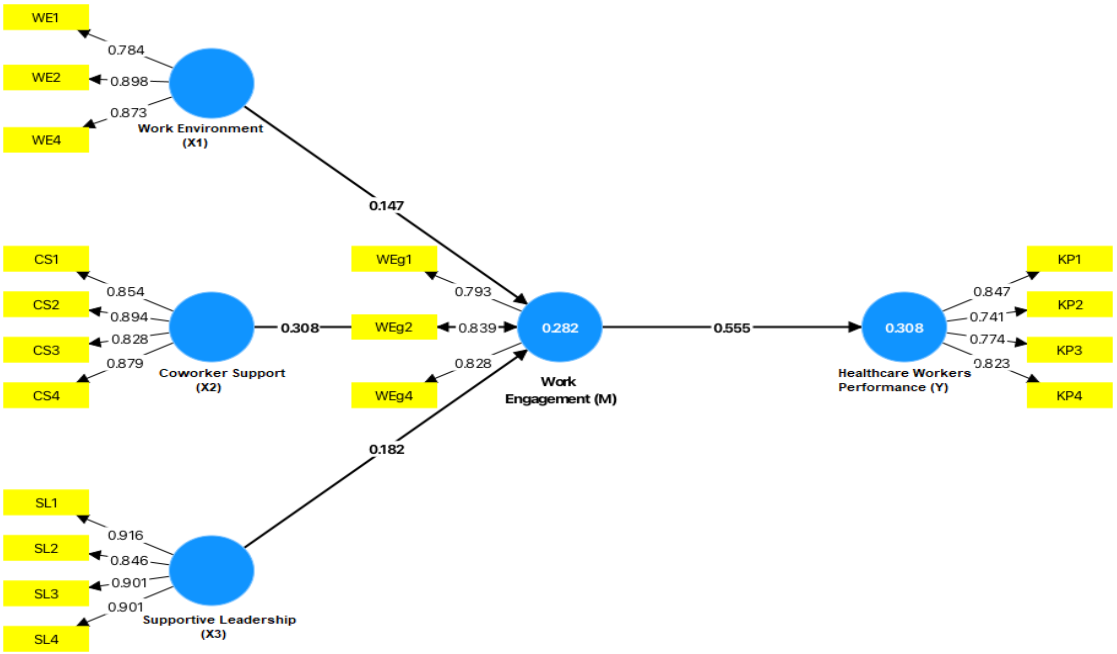


Figure 1. Outer Model Result

Table 3. Construct Validity and Reliability

Variable	Item	Loading (>0.70)	Cronbach's Alpha	CR (>0.70)	AVE (>0.50)
Physical Work Environment (X1)	WE1	0.784	0.813	0.889	0.727
	WE2	0.898			
	WE4	0.873			
Coworker Support (X2)	CS1	0.854	0.888	0.922	0.747
	CS2	0.894			
	CS3	0.828			
	CS4	0.879			
Supportive Leadership (X3)	SL1	0.916	0.915	0.939	0.794
	SL2	0.846			
	SL3	0.901			
	SL4	0.901			
Work Engagement (M)	WEg1	0.793	0.759	0.860	0.673
	WEg2	0.839			
	WEg4	0.828			
Performance (Y)	KP1	0.847	0.810	0.874	0.636
	KP2	0.741			
	KP3	0.774			
	KP4	0.823			

Table 4. Heterotrait-Monotrait Ratio (HTMT)

Variable	X1	X2	X3	M
X2	0.708			
X3	0.543	0.514		
M	0.518	0.576	0.466	
Y	0.349	0.372	0.142	0.674

Note: X1 = Physical Work Environment; X2 = Coworker Support; X3 = Supportive Leadership; M = *Work Engagement*; Y = Performance.

Structural Model Evaluation and Hypothesis Testing

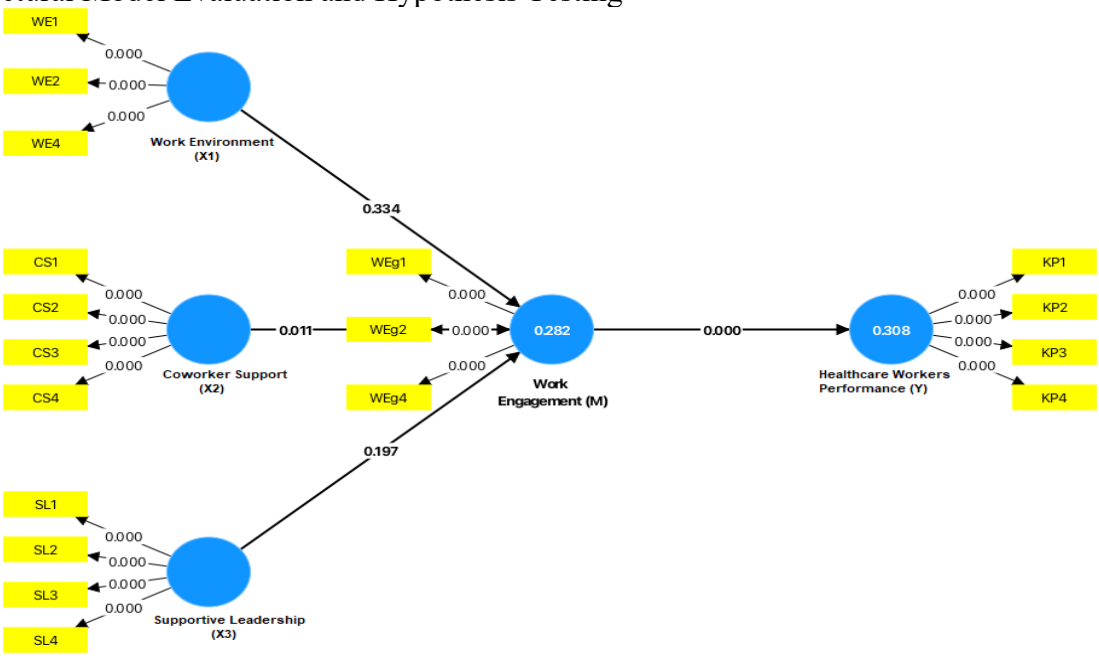


Figure 2. Inner Model Result

The VIF values in the structural model ranged from 1.00 to 1.69, indicating that there were no collinearity concerns. The R^2 value for *work engagement* was 0.282, while the R^2 value for performance was 0.308, indicating relatively weak to moderate explanatory power (Table 5).

Regarding effect sizes (f^2), coworker support had an effect size of 0.079 on *work engagement*, representing a small effect. Supportive leadership had an effect size of 0.033, also representing a small effect, whereas the physical work environment had an effect size of 0.018, which was below the threshold for a small effect. In contrast, the effect of *work engagement* on performance was 0.445, indicating a large effect.

The Q^2 values were 0.180 for performance and 0.133 for *work engagement*, indicating predictive relevance. The model's SRMR value was 0.089, which was considered acceptable because it was below 0.10, although it did not meet the more stringent threshold of 0.08.

Table 5. Coefficient of Determination

Variable	R^2	Adjusted R^2
Work Engagement (M)	0.282	0.256
Performance (Y)	0.308	0.300

The results of hypothesis testing are presented in Table 6

Table 6. Hypothesis Testing Results (n = 88)

Hypothesis	Relationship	Coefficient (β)	t-statistic	p-value	Decision
H1	X1 → M	0.147	0.967	0.334	Not supported
H2	X2 → M	0.308	2.531	0.011	Supported

H3	X3 → M	0.182	1.291	0.197	Not supported
H4	M → Y	0.555	7.528	<0.001	Supported
H5a	X1 → M → Y	0.082	0.904	0.366	Not supported
H5b	X2 → M → Y	0.171	2.220	0.026	Supported
H5c	X3 → M → Y	0.101	1.276	0.202	Not supported

The 95% confidence intervals for H2, H4, and the indirect effect of H5b were [0.061, 0.535], [0.420, 0.708], and [0.033, 0.331], respectively. All confidence intervals for the unsupported hypotheses included zero, indicating that these effects were not statistically significant.

Sensitivity Analysis

To assess the robustness of the findings, the model was re-estimated using 78 respondents after excluding 10 respondents who had provided identical scores across all questionnaire items. The same indicators were removed as in the main analysis (WE3 and WEg3). In the sensitivity analysis, the final outer loadings ranged from 0.717 to 0.910, AVE values ranged from 0.609 to 0.778, and the highest HTMT value was 0.700.

Table 7. Comparison of the Main Analysis (n = 88) and Sensitivity Analysis (n = 78)

Hypothesis	Relationship	n = 88: β (p-value)	n = 78: β (p-value)
H1	X1 → M	0.147 (0.334)	0.139 (0.369)
H2	X2 → M	0.308 (0.011)	0.277 (0.028)
H3	X3 → M	0.182 (0.197)	0.190 (0.178)
H4	M → Y	0.555 (<0.001)	0.522 (<0.001)
H5a	X1 → M → Y	0.082 (0.366)	0.073 (0.402)
H5b	X2 → M → Y	0.171 (0.026)	0.145 (0.052)
H5c	X3 → M → Y	0.101 (0.202)	0.099 (0.193)

The direction and decisions of the six hypotheses were consistent across both analyses. The only difference concerned H5b, for which the p-value in the 78-respondent analysis was 0.052, slightly above the 0.05 significance threshold. However, the 95% confidence interval for the indirect effect [0.009, 0.301] did not include zero. Thus, the mediating effect of coworker support remained positive and relatively similar in magnitude, although the statistical evidence was weaker than that observed for its constituent pathways. The R^2 values in the sensitivity analysis were 0.250 for *work engagement* and 0.273 for performance.

Discussion

Physical Work Environment and Facilities and Work Engagement (H1).

The physical work environment and facilities did not have a statistically significant effect on work engagement (β = 0.147; p = 0.334). The Job Demands-Resources (JD-R) model considers physical resources as important job resources that can support employee motivation (Bakker & Demerouti, 2007). However, several factors may explain this finding. First, the scores for the physical work environment were relatively homogeneous (mean scores ranging from 3.86 to 4.06, with limited dispersion), suggesting that the available variation was insufficient to explain differences in work engagement. Second, the physical work environment was moderately to strongly correlated with coworker support (r = 0.60), potentially reducing its unique contribution to work engagement when both variables were simultaneously included in the model ($f^2 = 0.018$). Third, physical facilities may be perceived as basic working requirements rather than direct motivational drivers, meaning that their contribution to employee outcomes may operate indirectly (Vischer, 2007). This interpretation can be compared with Kohnen et al. (2023), who examined clinical work-environment characteristics in relation to nurses' motivation and well-being, and Petäjä et al. (2025), who reported an association between satisfaction with the physical hospital

environment and work engagement. The difference between these findings and the present study may reflect differences in research settings, measurement approaches, and the relative importance of physical resources compared with social resources in healthcare workplaces.

Coworker Support and Work Engagement (H2).

Coworker support had a positive and statistically significant effect on work engagement (β = 0.308; p = 0.011), and this finding remained significant in the sensitivity analysis (p = 0.028). Healthcare professionals work in multidisciplinary teams; therefore, task assistance, effective communication, and teamwork constitute important social resources that can sustain employees' enthusiasm and dedication (Karasek et al., 1998; Schaufeli & Bakker, 2004). This finding is consistent with the motivational process proposed by the JD-R model, in which social resources fulfil employees' need for relatedness and help them accomplish their work objectives. Empirically, the result is consistent with Kim et al. (2023), who identified a positive and significant association between coworker support and work engagement (β = 0.14). However, it differs from Othman and Nasurdin (2013), who reported that coworker support was not a significant predictor of work engagement. These differences suggest that the contribution of coworker support may depend on organizational context, team dynamics, and the extent to which healthcare tasks require interprofessional collaboration. Among the three job resources examined in the present study, coworker support demonstrated the largest effect on work engagement, although its effect size was classified as small ($f^2 = 0.079$).

Supportive Leadership and Work Engagement (H3).

Supportive leadership showed a positive but statistically insignificant relationship with work engagement (β = 0.182; p = 0.197). This finding does not support the expectation derived from Path-Goal Theory (House, 1996). Although supportive leadership was positively correlated with work engagement at the bivariate level (r = 0.40), its unique contribution becae smaller after coworker support was controlled for, particularly because the two predictors were correlated (r = 0.47). In addition, perceptions of leadership may vary across professional groups and healthcare facilities because of differences in organizational structures and hierarchical relationships. Such variation may have weakened the observed effect, particularly given the relatively small sample size. Another possible explanation is that leadership may influence work engagement through other mechanisms, such as organizational culture or trust in management, which were not examined in this study. This result contrasts with Kim et al. (2023), who identified supportive leadership as the strongest predictor of work engagement (β = 0.26). Similarly, Zhang et al. (2024) reported a positive and significant relationship between caring leadership and work engagement (β = 0.05; p < 0.001), while Alluhaybi et al. (2024) also identified an association between leadership style and work engagement. These contrasting findings indicate that the influence of leadership may depend on how leadership behaviors are experienced by employees and how leadership interacts with other available social resources in the workplace.

Work Engagement and Healthcare Workers' Performance (H4).

Work engagement had a positive and substantial effect on healthcare workers' performance (β = 0.555; p < 0.001; $f^2 = 0.445$). Healthcare professionals who demonstrate enthusiasm, dedication, and active involvement in their work are more likely to maintain work discipline, comply with procedures, complete tasks on time, and prioritize patient safety. This interpretation is consistent with Christian et al. (2011), who highlighted the contribution of work engagement to individual task performance and contextual performance. It is also supported by Bakertzis and Myloni (2021), who reported an association between work engagement and job performance in healthcare settings, and Bhatti et al. (2018), who

linked job resources and work engagement with nurses' task and contextual performance. This is the strongest relationship identified in the present study and remained consistent across both the primary and sensitivity analyses. The finding reinforces the importance of work engagement as a motivational mechanism associated with healthcare workers' performance.

The Mediating Role of Work Engagement (H5a–H5c).

A statistically significant indirect effect was identified only for coworker support (H5b: $\beta = 0.171$; $p = 0.026$; 95% CI [0.033, 0.331]), whereas the indirect effects of the physical work environment and facilities (H5a) and supportive leadership (H5c) were not statistically significant. This finding suggests that coworker support is associated with healthcare workers' performance partly through its contribution to work engagement. In practical terms, support from colleagues may strengthen employees' enthusiasm and dedication, which are subsequently associated with better work performance. This interpretation is consistent with the JD-R motivational process and with previous research linking job resources, work engagement, and nurses' performance (Bhatti et al., 2018). Nevertheless, the mediation result should be interpreted cautiously because the indirect effect of coworker support became marginal in the sensitivity analysis ($p = 0.052$). Although the estimated effect remained positive and relatively similar in magnitude, the p-value exceeded the conventional 0.05 threshold. Furthermore, because the model did not include direct paths from the three independent variables to healthcare workers' performance, the mediation effects cannot be classified as either full or partial mediation (Zhao et al., 2010). Finally, the observed relationships should not be interpreted as evidence of causality because the study employed a cross-sectional research design.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study demonstrates that coworker support has a positive and statistically significant effect on work engagement, whereas the physical work environment and supportive leadership do not have statistically significant effects. Work engagement has a strong positive effect on healthcare workers' performance. Furthermore, work engagement mediates the relationship between coworker support and healthcare workers' performance, but does not mediate the effects of the physical work environment or supportive leadership. However, the mediating effect of coworker support was marginal in the sensitivity analysis. Healthcare facility management is therefore encouraged to prioritize strengthening teamwork and interprofessional collaboration to foster work engagement and improve healthcare workers' performance. These findings are applicable to the study sample and should be further examined using more robust research designs.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design limits causal interpretation and prevents the establishment of temporal relationships among the variables, including the mediation effects. Second, purposive sampling with a snowball component may have introduced selection bias, limiting the generalizability of the findings to healthcare workers across Indonesia. The response rate could not be calculated because the total number of questionnaire recipients was unknown. Third, the sample size was relatively small ($n = 88$), although it exceeded the minimum G*Power requirement (approximately 77 respondents). The sample was also unevenly distributed across professions, geographical locations, and healthcare facility types, limiting statistical power for detecting small effects and conducting subgroup analyses. Fourth, reliance on a single self-reported questionnaire may have introduced social

desirability and common method biases, while healthcare workers' performance was assessed through self-evaluation rather than objective indicators. Fifth, the adapted instruments had not undergone comprehensive cross-cultural validation. Two of the 20 indicators (WE3 and WEg3) were removed due to outer loadings below 0.70, leaving three indicators for each of the physical work environment and work engagement constructs. All items were positively worded, and 10 respondents (11.4%) provided identical scores across all items. Although the sensitivity analysis generally produced consistent findings, the indirect effect of coworker support became marginal ($p = 0.052$). Sixth, respondents represented diverse professional backgrounds and work units, including non-clinical roles, while the model did not control for professional background, healthcare facility type, or length of service. Seventh, the nested structure of respondents across healthcare facilities was not accounted for in the PLS-SEM analysis. Facility names were optional and provided by approximately 77% of respondents; therefore, the identification of at least 11 facilities represents a lower-bound estimate. Eighth, the model included only three job resources and one mediator, excluding other potentially relevant factors such as workload, shift systems, compensation, career development, safety culture, and personal resources. The R^2 values for work engagement (0.282) and healthcare workers' performance (0.308) indicate that substantial variance remains unexplained. Finally, the short data collection period (27 October–4 November 2026), online recruitment, incomplete verification of duplicate submissions without email addresses, and exclusion of eight out of 96 responses may have affected the final sample composition.

Future research should employ longitudinal or time-lagged designs to establish temporal relationships and examine mediation mechanisms more rigorously. Larger and more representative samples, preferably selected through random or stratified sampling based on professional background and healthcare facility type, are recommended to improve generalizability and enable subgroup analyses. Future studies should also incorporate objective or independent performance assessments, such as supervisor evaluations and healthcare quality indicators, and consider additional direct relationships, control variables, and relevant factors, including workload, compensation, shift systems, career development, safety culture, and personal resources, to improve the explanatory power and comprehensiveness of the research model.

Recommendations

For healthcare facility management, the findings indicate that strengthening teamwork, interprofessional communication, and a culture of mutual support should be prioritized to foster work engagement and, in turn, improve healthcare workers' performance. Initiatives to enhance work engagement are particularly relevant given its substantial effect on performance. Although the physical work environment and supportive leadership were not found to have statistically significant effects in this sample, this does not imply that they are unimportant. Both should continue to be maintained as fundamental organizational conditions that support effective teamwork and healthcare service delivery.

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