

Effects of robotic surgery services on burnout, with well-being and job satisfaction as mediating variables, among operating room nurses: A case study at Siloam Hospitals Lippo Village

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Article Information

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ABSTRACT

Objective: Burnout among operating room nurses is a serious issue that affects the quality of healthcare services and hospital workforce turnover. This study aimed to examine the effect of robotic surgery services on burnout among operating room nurses, with well-being and job satisfaction as mediating variables. **Methods:** This study employed a quantitative approach with an explanatory cross-sectional research design. The sample consisted of all 35 operating room nurses at Siloam Hospitals Lippo Village, selected through total sampling. Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS 4.0 software. **Results:** The results showed that robotic surgery services had a positive and significant effect on well-being (coefficient 0.660; $t = 5.429$) and job satisfaction (coefficient 0.734; $t = 8.737$) and a negative and significant effect on burnout (coefficient -0.635; $t = 5.621$). Well-being was also found to have a negative and significant effect on burnout (coefficient -1.650; $t = 9.482$) and to mediate the relationship between robotic surgery services and burnout. Conversely, job satisfaction was found to have a positive effect on burnout and therefore failed to function as a mediator as initially hypothesized, likely due to multicollinearity between job satisfaction and well-being. **Discussion:** These findings indicate that implementing robotic surgery services can serve as a hospital management strategy to enhance the psychological well-being and job satisfaction of operating room nurses while reducing the risk of burnout, primarily by strengthening well-being as the main mediating pathway.

Article Information

Kata Kunci:

layanan bedah robotik, Burnout, Kesejahteraan, Kepuasan Kerja, perawat kamar operasi

ABSTRACT

Tujuan: *Burnout* pada perawat kamar bedah merupakan masalah serius yang memengaruhi kualitas layanan kesehatan dan *turnover* (pergantian) tenaga kerja di rumah sakit. Penelitian ini bertujuan untuk menguji pengaruh layanan bedah robotik terhadap *burnout* perawat kamar bedah, dengan *wellbeing* (kesejahteraan) dan kepuasan kerja (*job satisfaction*) sebagai variabel mediasi. **Metode:** Penelitian ini menggunakan pendekatan kuantitatif dengan desain penelitian eksplanatori secara *cross-sectional*. Sampel terdiri dari seluruh 35 perawat kamar bedah di Rumah Sakit Siloam Lippo Village yang dipilih menggunakan teknik *total sampling*. Data dianalisis menggunakan *Structural Equation Modeling – Partial Least Squares* (SEM-PLS) dengan perangkat lunak SmartPLS 4.0. **Hasil:** Hasil penelitian menunjukkan bahwa layanan bedah robotik berpengaruh positif dan signifikan terhadap *wellbeing* (koefisien 0,660; $t = 5,429$) dan kepuasan kerja (koefisien 0,734; $t = 8,737$), serta berpengaruh negatif dan signifikan terhadap *burnout* (koefisien -0,635; $t = 5,621$). *Wellbeing* juga ditemukan berpengaruh negatif dan signifikan terhadap *burnout* (koefisien -1,650; $t = 9,482$) serta memediasi hubungan antara layanan bedah robotik dan *burnout*. Sebaliknya, kepuasan kerja ditemukan berpengaruh positif terhadap *burnout*, sehingga gagal berfungsi sebagai mediator seperti yang dihipotesiskan sebelumnya. Hal ini kemungkinan disebabkan oleh multikolinearitas antara kepuasan kerja dan *wellbeing*. **Diskusi:** Temuan ini menunjukkan bahwa penerapan layanan bedah robotik dapat menjadi strategi manajemen rumah sakit untuk meningkatkan *wellbeing* psikologis dan kepuasan kerja perawat kamar bedah sekaligus mengurangi risiko *burnout*, terutama melalui penguatan *wellbeing* sebagai jalur mediasi utama.

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1. Introduction

Burnout among nurses is a critical issue driven by complex job demands, high work pressure, and direct responsibility for patient safety and well-being. Nursing is globally recognized as a profession with high levels of burnout (Ge et al., 2023). This issue is particularly relevant in the Indonesian context, where the nursing profession is still often viewed merely as a supporting role for physicians, despite nurses playing a vital role in providing physical, psychological, and spiritual patient care (Ramadhani et al., 2023). *Burnout* may reduce nurses' empathy, communication quality, and attention to detail, potentially compromising the quality of patient care (Kelly et al., 2021). In addition, nurse turnover has economic consequences for hospitals, including costs associated with recruitment, training, and filling vacant positions (Halter et al., 2017).

These challenges are exacerbated in the operating room, a work environment that demands high precision, involves time pressure and patient safety risks, and imposes substantial physical and mental demands. Without appropriate management, these conditions may negatively affect nurses' job satisfaction and well-being while increasing the risk of burnout and turnover. This phenomenon was observed at Siloam Hospitals Lippo Village. Interviews with the operating room nurse manager revealed that nurse turnover had exceeded 15% per year over the past three years, representing one of the highest rates in the hospital. High turnover requires adaptation, training, and certification for new nurses while increasing the workload of existing staff because of imbalances in scheduling and task allocation.

To address these challenges, the management of Siloam Hospitals Lippo Village developed robotic surgery services for brain and spine procedures, which were launched in September 2025. This innovation aims to improve service efficiency, accelerate surgical procedures, and reduce the risk of complications and workload. However, the effects of workplace innovation on job satisfaction, well-being, and *burnout* have produced mixed findings. Nugraha et al. (2022) found that digital innovation had a positive effect on job satisfaction. O'Hara et al. (2025) also showed that a work culture oriented toward innovation and well-being can reduce burnout and improve job satisfaction. In contrast, Schouten et al. (2025) found that implementing robotic technology in surgery can increase workload and reduce nurses' job satisfaction when it is not accompanied by adequate involvement, communication, and training. Turgut et al. (2024) also found no significant differences in job satisfaction, depression, or quality of life between nurses working in robotic surgery and those working in laparoscopic surgery. Meanwhile, the relationship between burnout and job satisfaction tends to be negative; specifically, increased *burnout* is associated with reduced job satisfaction (Heidari et al., 2022).

These inconsistent findings indicate a research gap regarding how workplace innovation based on robotic surgery services affects job satisfaction and well-being, as well as how these two variables are associated with burnout among operating room nurses. This study aims to examine the effect of robotic surgery services as a form of workplace innovation on job satisfaction and well-being, as well as the

role of these factors as mediating variables in their relationship with burnout among operating room nurses at Siloam Hospitals Lippo Village. This study covers the period from the launch of the services in September 2025 to data collection in March 2026. During this period, 239 neurosurgical procedures were performed, 74 of which used the robotic system. During the same period, the overall surgical volume decreased by approximately 34% compared with normal levels. This situation provides an important empirical context for examining the relationships among variables in an operating room work environment undergoing technological change and shifts in workload dynamics.

Literature Review and Hypotheses

1. Robotic Surgery Services

Robotic surgery services represent a form of workplace innovation that integrates technology with changes in workflow, coordination, and nurses' skills. Totterdill and Exton (2014) emphasized that workplace innovation encompasses technology and work design. Jedwab et al. (2023) showed that hospital technology can improve work experience, motivation, job satisfaction, and *well-being* when it is effectively supported by training and organizational support in surgical procedures.

2. Well-Being

Well-being is a state of psychological and subjective well-being that reflects an individual's ability to live positively and meaningfully. Ryff and Singer (2008) emphasized self-acceptance, positive relationships, personal growth, purpose in life, environmental mastery, and autonomy. Diener (1984) identified life satisfaction and affect as important components. Wright and Cropanzano (2000) linked well-being to *psychological* resilience. These conditions help individuals cope with work-related pressures.

3. Job Satisfaction

Job satisfaction is an individual's evaluation of their job, work environment, supervision, rewards, and work relationships. Spector (1985) explained that job satisfaction reflects an individual's response to various aspects of work. Luthans (2006) described job satisfaction as a positive attitude toward one's job. Jedwab et al. (2023) showed that technology can improve job satisfaction when it is perceived as supporting work rather than increasing workload. Such support strengthens nurses' positive attitudes.

4. Burnout

Burnout is a psychological condition resulting from chronic work-related stress that has not been successfully managed. Maslach et al. (2001) explained *burnout* in terms of emotional exhaustion, depersonalization, and reduced personal accomplishment. Maslach and Leiter (1997) described burnout as a response to a mismatch between individuals and their work environment. In the operating room, pressure and responsibility for patient safety increase nurses' vulnerability. These conditions impair health and performance.

Based on the theoretical review and previous studies, the research hypotheses are formulated as follows:

- H1: The implementation of robotic surgery services is hypothesized to *improve* well-being among operating room nurses at Siloam Hospitals Lippo Village.
- H2: The implementation of robotic surgery services is hypothesized to *reduce* burnout among operating room nurses at Siloam Hospitals Lippo Village.
- H3: The implementation of robotic surgery services is hypothesized to increase *job satisfaction* among operating room nurses at Siloam Hospitals Lippo Village.
- H4: It is *hypothesized* that higher well-being may *reduce* burnout among operating room nurses at Siloam Hospitals Lippo Village.
- H5: It is *hypothesized* that higher job satisfaction may affect *burnout* among operating room nurses at Siloam Hospitals Lippo Village.
- H6: It is *hypothesized* that higher well-being may mediate the relationship between robotic surgery services and *reduced* burnout among operating room nurses at Siloam Hospitals Lippo Village.
- H7: It is *hypothesized* that higher job satisfaction may mediate the relationship between robotic surgery services and *reduced* burnout among operating room nurses at Siloam Hospitals Lippo Village.

Based on the interrelationships among the variables described above, the conceptual framework of this study is presented in Figure 1 as follows:

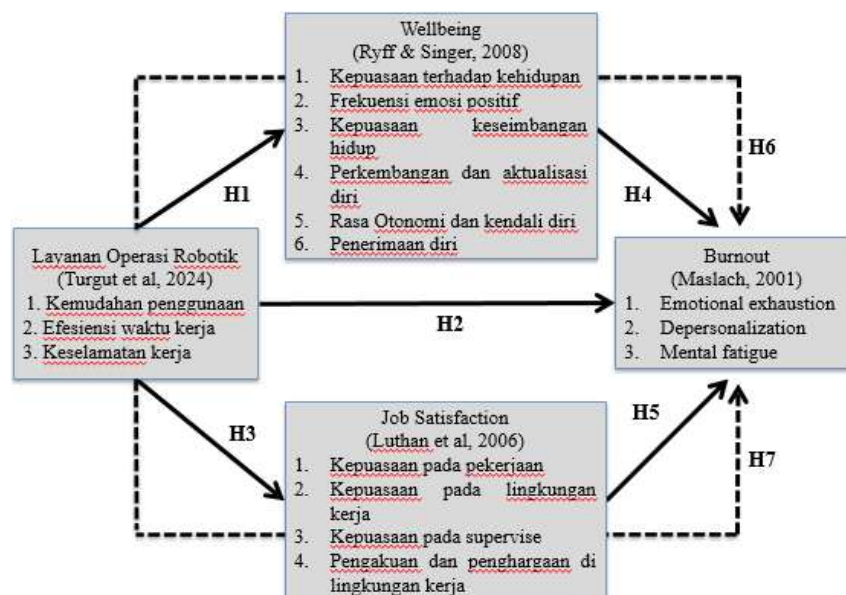


Figure 1. Conceptual Framework
Note:

————— : Direct effect
-----> : Mediating effect

2. Methods

1. This study applied a quantitative approach with an *explanatory* research design and a cross-sectional design to investigate the mechanism through which *robotic surgery services* affect *burnout* through the mediating variables of well-being and job satisfaction. The study

focused on Siloam Hospitals Lippo Village, Karawaci, Tangerang, and included operating room nurses serving as surgical assistants, circulating nurses, and instrument nurses. Given that the population comprised 35 nurses, participants were recruited using total sampling, whereby all 35 members of the population were included in the study sample.

2. The variables investigated comprised robotic surgery services as the *exogenous variable*, burnout as the *endogenous variable*, and well-being and job satisfaction as mediators. The dimensions of robotic surgery services included instrument preparation, intraoperative system observation and operation, and the safety of scientific procedures, based on Turgut et al. (2024). The well-being variable was based on the theories of Ryff and Singer (2008) and Diener (1984a, 2000b, 2020c); the job satisfaction variable referred to Luthans (2006) and Spector (1985), whereas burnout included indicators from Maslach et al. (2001). All variables were modeled as higher-order constructs because they comprised several subdimensions and indicators.
3. Primary data were collected through self-administered online questionnaires completed by nurses, with information privacy ensured, whereas secondary data were compiled from internal records of the healthcare institution and a relevant literature review. The

measurement scale was a 1 (strongly disagree) to 5 (strongly agree) Likert scale.

4. Data were processed using SmartPLS 4.0 software based on Structural Equation Modeling–Partial Least Squares (SEM-PLS). Testing consisted of measurement model (*outer model*) analysis, which assessed *outer* loading values, AVE, discriminant validity, Cronbach's alpha, and composite reliability, and structural model (*inner model*) analysis, which assessed path coefficients, R-square, f-square, and VIF. The significance of direct relationships and the mediating roles of well-being and job satisfaction through specific indirect effects was evaluated using

bootstrapping at an alpha level of 5%.

3. Results and Discussion

Respondent Characteristics

The respondent characteristics examined in this study included (1) gender, (2) age, and (3) education. These three respondent characteristics are presented sequentially in the following table:

Table 1. Characteristics of Nurses at Siloam Hospitals Lippo Village, Karawaci, Tangerang

Category	Frequency (n)	Percentage %
Gender		
Male	23	65,7
Female	12	34,3
Total	35	100
Age		
21-25 years	5	14,3
26-30 years	14	40,0
31-35 years	5	14,3
36-40 years	2	5,7
41-45 years	7	20,0
46-50 years	2	5,7
Total	35	100
Education		
D4/S1	35	100
Total	35	100

Source: Processed data, (2026)

Based on respondent characteristics, most operating room nurses at Siloam Hospitals Lippo Village were male, with 23 individuals (65,7%), whereas 12 were female (34,3%). In terms of age, respondents were predominantly in the 26–30-year age group, comprising 14 individuals (40,0%), and 54,3% of respondents were under 35 years of age. This profile indicates a predominance of

personnel of productive age who are relatively adaptable to the implementation of new technology. Meanwhile, 25,7% of respondents were aged 41 years or older and therefore require attention during training and adaptation to robotic surgery technology. All respondents had D4/S1 education, with 35 individuals (100%), suggesting that the homogeneous educational background may reduce differences in understanding of the research instrument and help focus the analysis on the variables under study.

1. Reliability test

A reliability test was conducted to assess the accuracy, precision, and consistency of the instrument in measuring a construct. Reliability testing can be performed using two methods, including Cronbach's alpha. Cronbach's alpha is an indicator used to assess whether a variable has good reliability, with an alpha coefficient value greater than 0,60. Composite reliability is considered good if its value exceeds 0,70 (Creswell, 2017). Average variance extracted (AVE) describes the magnitude of variance or diversity in manifest variables that can be explained by the latent construct, provided that its value is greater than 0,50 (Creswell, 2017). The results of Cronbach's alpha, composite reliability, and average variance extracted testing are presented in the following table:

Table 4. Cronbach's Alpha

Variable	Cronbach's Alpha	CR (rho_a)	CR (rho_c)	Remarks
<i>burnout</i>	0.906	0.922	0.942	Reliable
<i>job satisfaction</i>	0.943	0.967	0.959	Reliable
Robotic surgery services	0.838	0.917	0.923	Reliable
<i>Well-being</i>	0.956	0.960	0.965	Reliable

Source: Processed primary data, 2026

Based on Table 4, all constructs in the second stage had Cronbach's alpha and composite reliability values exceeding the 0.70 threshold. The *highest values* were observed for *job satisfaction* (CR rho_c = 0.959) and *well-being* (CR rho_c = 0.965). Thus, all higher-order constructs met the reliability requirements.

Table 5. Average variance extracted (AVE)

Variable	AVE
<i>Burnout</i>	0.846
<i>Job satisfaction</i>	0.854
Robotic surgery services	0.857
<i>Well-being</i>	0.820

Source: Processed primary data, 2026

Based on Table 5, all AVE values for the constructs

in the second stage were above 0.50. The AVE values ranged from 0.820 for well-being to 0.857 for robotic surgery services, indicating that each construct explained more than 80% of the variance in its dimensions at the higher-order level.

2. Results of the *R-square test* (coefficient of determination)

R-square values are used to assess the extent to which exogenous constructs explain the variability of endogenous constructs. In structural model evaluation, R-square indicates the predictive power of the tested model. As a general rule of thumb, R-square values of 0.75, 0.50, and 0.25 are considered strong, moderate, and weak, respectively (Hair et al., 2017). The calculated R-square values for each construct are presented in the table below:

Table 6. R-square values

Variable	R-square	Adjusted R-square
Burnout	0.912	0.904
Job satisfaction	0.538	0.524
Well-being	0.435	0.418

Source: Processed primary data, 2026

The adjusted R-square result of 0.904 indicates that *burnout* is influenced by robotic surgery services, *job satisfaction*, and well-being by 90.4%. The remaining 9.6% is influenced by other variables not examined in this study. The adjusted R-square value of 0.524 indicates that *job satisfaction* is influenced by robotic surgery services by 52.4%, while the remaining 47.6% is influenced by other variables not examined in this study. The adjusted R-square value of 0.418 indicates that *well-being* is influenced by robotic surgery services by 41.8%; the remaining 58.2% is influenced by other variables not examined in this study.

3. F-Square Values (f^2 Effect Size)

The substantive impact of a predictor variable can be assessed through the effect size (f^2), by observing changes in the coefficient of determination (R^2) when a particular exogenous variable is excluded from the structural model. Based on the methodological guidelines of Hair et al. (2017), effect categories are grouped into three levels: 0,02small (f^2), 0,15medium (f^2), and 0,35large (f^2). If the resulting value is less than 0,02, the exogenous variable is considered not to make a meaningful contribution. Thus, an increase in the f^2 value of reflects a greater proportion of the dependent variable explained by the independent variable (Hair et al., 2017).

Table 7. F-Square Values

Variable	Burnout	Job satisfaction	Robotic surgery services	Well-being
Burnout				
Job satisfaction	1.139			
Robotic surgery services	0.402	1.165		0.771
Well-being	3.805			

Source: Processed primary data, 2026

The f -square values indicate that all relationships have large effects because they exceed 0,35. *Job satisfaction* had a large effect on burnout ($f^2 = 1,139$), whereas robotic surgery services had large effects on burnout ($f^2 = 0,402$), *job satisfaction* ($f^2 = 1,165$), and well-being ($f^2 = 0,771$). In addition, well-being had a very large effect on burnout ($f^2 = 3,805$), making it one of the dominant factors in the research model. Overall, the implementation of robotic surgery services contributed substantially to increased *job satisfaction* and *well-being*, as well as reduced burnout among operating room nurses at Siloam Hospitals Lippo Village.

4. Hypothesis testing results

The estimated values for path relationships in the structural model must be significant. The significance values for these hypotheses can be obtained through the bootstrapping procedure. Hypothesis significance is assessed by examining the path coefficient values and the significance values of the *t-statistics* in the bootstrapping algorithm report. Significance is determined using the t-table value at alpha 0.05 (5%) = 1,96, after which the t-table is compared with the calculated t-value (t-statistic).

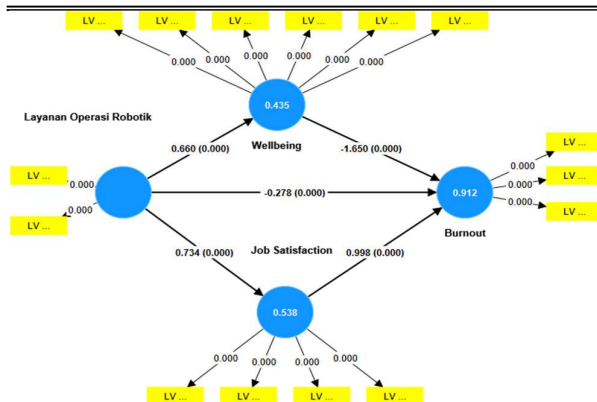


Figure 1. Full Bootstrapping Model

Table 8. Hypothesis testing results—direct and indirect effects

Variable relationship	Original sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-statistic	P-value	Results
H1: Robotic surgery services → Well-being	0.660	0.668	0.122	5.429	0.000	Significant Accepted
H2: Robotic surgery services → burnout	-0.635	-0.641	0.113	5.621	0.000	Significant Accepted
H3: Robotic surgery services → job satisfaction	0.734	0.744	0.084	8.737	0.000	Significant Accepted
H4: Robotic surgery service → well-being → burnout	-1.089	-1.081	0.217	5.025	0.000	Accepted
H5: Robotic surgery service → job satisfaction → burnout	0.732	0.736	0.170	4.310	0.000	Accepted
H6: Well-being → burnout	-1.650	-1.622	0.174	9.482	0.000	Significant Accepted

Variable relationship	Original sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-statistic	P-value	Results
H7: Job satisfaction → burnout	0.998	0.986	0.187	5.338	0.000	Significant Accepted

Source: Processed primary data, 2026
Discussion

DISCUSSION

Effects of robotic surgery services on well-being and job satisfaction

The test results showed that robotic surgery services had positive and significant effects on *well-being* ($\beta = 0.660$; $t = 5.429$; $p = 0.000$; $f^2 = 0.771$) and *job satisfaction* ($\beta = 0.734$; $t = 8.737$; $p = 0.000$; $f^2 = 1.165$). Both effects had large effect sizes, with the effect on *job satisfaction* being slightly stronger. These findings indicate that robotic surgery services have more direct effects on work-related aspects, such as satisfaction with tasks and the work environment, as conceptualized by Luthans (2006) and the *Job Satisfaction Survey* developed by Spector (1985), than on well-being, which encompasses broader welfare-related aspects according to Ryff and Singer (2008), Diener (1984, 2000), and Jebb et al. (2020). These findings are consistent with the dimensions of robotic surgery services retained in the model, namely intraoperative monitoring and the safety and precision of procedures, which are directly related to nurses' work experiences. These results also support Jedwab et al. (2023), who explained that implementing new technologies in hospitals may have more *immediate* effects on motivation and job satisfaction, whereas improvements in well-being require broader support and a longer period of time. Thus, robotic surgery services served as a *job resource* that improved both nurses' *job satisfaction* and well-being, although their effect on job satisfaction was relatively stronger.

Effects of robotic surgery services on burnout

Robotic surgery services had a negative and significant effect on *nurses' burnout* ($\beta = -0.635$; $t = 5.621$; $p = 0.000$; $f^2 = 0.402$). This means that the more optimally robotic surgery services are implemented, the lower the *level* of burnout among operating room nurses. This finding supports studies showing that robotic surgery can improve precision and reduce operators' physical workload (Dakin & Gagner, 2003; Hubert et al., 2013; Marcon et al., 2019). This result differs from findings emphasizing that technological complexity can increase mental workload and hinder team communication (Michinov, 2008; Yu et al., 2007; Schouten, 2025). In the context of Siloam Hospitals Lippo Village, the benefits of the telemanipulative characteristics of robotic surgery (Sheetz et al., 2020) appeared to be more dominant, thereby contributing to *reduced* burnout. In addition to its direct effect, robotic surgery services *also* affected *burnout*

through *well-being* and job satisfaction. This indirect effect was even stronger, indicating that the benefits of robotic surgery arise not only from technical and operational aspects but also through improvements in nurses' psychological well-being and job satisfaction.

Effects of well-being on burnout

Well-being had the strongest negative effect on burnout among operating room nurses ($\beta = -1.650$; $t = 9.482$; $p = 0.000$; $f^2 = 3.805$). An f^2 value far exceeding 0.35 indicates that well-being was the dominant predictor of burnout. This finding supports the concept of *psychological well-being*, particularly autonomy, environmental mastery, self-acceptance, and positive relationships, which play a role in reducing emotional exhaustion and depersonalization (Ryff & Singer, 2008). In addition, subjective well-being through positive affect can strengthen evaluations of personal achievement and reduce diminished personal accomplishment (Diener, 1984, 2000). Practically, strengthening well-being should be an intervention priority for the management of Siloam Hospitals Lippo Village because it has the potential to have a greater impact on reducing burnout than interventions targeting robotic surgery services or job satisfaction.

Effects of job satisfaction on burnout

The test results showed that *job satisfaction* had a positive and significant effect on burnout ($\beta = 0.998$; $t = 5.338$; $p = 0.000$; $f^2 = 1.139$), contrary to the hypothesis and the theories of Schaufeli and Bakker (2004) and Lee and Ashforth (1996). However, this finding should be interpreted cautiously because multicollinearity existed between *well-being* and *job satisfaction* ($VIF = 9.965$; $HTMT = 0.985$; correlation = 0.936). The zero-order correlation between *job satisfaction* and burnout was negative ($r = -0.750$), consistent with theory. The reversal in the direction of the coefficient in the combined model indicates a suppressor effect due to construct overlap. Thus, this result does not indicate that *job satisfaction* increases burnout but rather reflects instability in the estimation of its unique contribution. Future research should clarify the distinction between the constructs, increase the sample size, or test the variables separately.

The mediating roles of well-being and job satisfaction

Testing of the indirect effects showed that robotic surgery services affected burnout through *well-being* ($\beta = -1.089$; $t = 5.025$; $p = 0.000$) and *job satisfaction* ($\beta = 0.732$; $t = 4.310$; $p = 0.000$). Both pathways were statistically significant but had different implications. The mediation through *well-being* showed a theoretically consistent direction, whereby improved well-being contributed to reduced burnout. In contrast, mediation through *job satisfaction* produced a contradictory direction because increased *job satisfaction* was associated with increased burnout. This condition may reflect conceptual overlap and instability in the relationships among the variables. The dominance of well-being was also evident from its f^2 value of 3.805, which was greater than that of *job satisfaction* (1.139). Therefore, well-being is more appropriate as the primary mechanism for explaining burnout (Demerouti et al., 2001; Bakker & Demerouti, 2017).

Robotic surgery services as a mitigating factor for burnout through well-being

Overall, robotic surgery was found to reduce burnout among operating room nurses at Siloam Hospitals Lippo Village, both directly and through improved well-being. The pathway through *well-being* was the most dominant mechanism in the model. These findings indicate that the benefits of robotic technology, such as precision, procedural stability, and reduced physical workload for operators (Sheetz et al., 2020; Dakin & Gagner, 2003; Hubert et al., 2013; Marcon et al., 2019; Nugraha et al., 2024), outweighed the challenges related to communication and mental workload (Michinov, 2008; Yu et al., 2007; Schouten, 2025). However, the role of *job satisfaction* cannot yet be determined because of its overlap with well-being in the context of this study. Conceptually, well-being reflects an overall evaluation of life, whereas *job satisfaction* focuses on work (Ryan & Deci, 2001; Luthans, 2006).

Overall model quality

The research model produced an adjusted R-square for burnout of 0.904, indicating that robotic surgery services, *job satisfaction*, and *well-being* collectively explained 90.4% of the variation in burnout among operating room nurses. The adjusted R-square values for *job satisfaction* and *well-being* were 0.524 and 0.418, respectively, indicating that robotic surgery services explained 52.4% and 41.8% of the variation in the two mediators, respectively. These findings are consistent with the EUWIN framework, which emphasizes that workplace innovation needs to combine various work practices rather than technology alone (Totterdill & Exton, 2014). However, the high R-square for burnout should be interpreted cautiously because of potential multicollinearity between *well-being* and *job satisfaction*. Thus, the high R-square indicates the relevance of the combination of variables in explaining burnout but does not necessarily demonstrate the unique contribution of each construct to burnout based on the obtained path coefficients.

4. Conclusion

The implementation of robotic surgery services in the operating room at Siloam Hospitals Lippo Village was associated with improved *well-being* and *job satisfaction*, as well as reduced burnout among nurses. Well-being was the most dominant factor in reducing burnout and was also the primary mechanism explaining the relationship between robotic surgery services and burnout. Meanwhile, the relationship between *job satisfaction* and burnout showed a direction that was inconsistent with the initial hypothesis. These findings should be understood in the context of the strong overlap between *job satisfaction* and *well-being*; therefore, it is not yet appropriate to interpret them as indicating that *job satisfaction* actually increases burnout. Thus, improving well-being is the primary pathway that can be used to reduce burnout among nurses in the implementation of robotic surgery services.

Management needs to prioritize programs that improve well-being through stress management and mindfulness activities, professional development, and mental health support involving hospital psychologists. These programs can be integrated with initiatives to improve *job satisfaction*

because the two are strongly related. In robotic surgery services, attention needs to be directed toward improving competence in operating intraoperative monitoring equipment and enhancing procedural safety and accuracy through ongoing training, including overseas training, refinement of safety procedures, and periodic protocol evaluations. Equipment preparation can be maintained because it has been implemented well. In addition, the model's high explanatory power for burnout provides a basis for management to implement integrated burnout mitigation strategies through the optimization of robotic technology, improved competence, job satisfaction, and nurse well-being.

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