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Digital Mindfulness and Workplace Well-Being: A Structural Model of VR-Based Interventions, Technostress, and Job Satisfaction Among Dual-Role Female Employees

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Abstract: This study investigates the effects of VR-based mindfulness, technostress, and dual-role conflict on perceived work stress, work-life balance, and job satisfaction among female employees balancing professional and household responsibilities. Drawing on data collected from 200 participants in the banking sector, the analysis employed Partial Least Squares Structural Equation Modeling (PLS-SEM) with 5,000 bootstrap resamples. The findings indicate that VR-based mindfulness significantly reduces perceived stress ($\beta = -0.183$, 95% CI [–0.315, –0.047]) and enhances work-life balance, while dual-role conflict and technostress elevate stress levels. In turn, work-life balance positively influences job satisfaction ($\beta = 0.266$, 95% CI [0.031, 0.501]), whereas stress exerts a negative effect. Both variables act as mediators linking VR-based mindfulness to job satisfaction. Although digital HR support improves job satisfaction, its influence on work-life balance was not statistically significant. These results underscore the importance of integrating immersive mindfulness technologies with broader organizational strategies to reduce technostress and promote employee well-being in high-pressure environments.

Keywords: Virtual reality; Mindfulness; Stress management; Work-life balance; Job satisfaction; Technostress; Dual-role employees; Sustainable digital well-being

JEL Classification: J28, I12, O33, J16, M12

1. Introduction

Globally, the prevalence of stress among working women with dual responsibilities managing professional duties and household roles is alarmingly high. According to the International Labour Organization (ILO, 2023), approximately 60% of female employees in financial and banking services report experiencing moderate to severe stress, with nearly 45% attributing it to simultaneous work and family demands. In Indonesia, recent survey by the United Nations Children's Fund (UNICEF) (2020) reveals that 7 out of 10 women in the banking sector experience persistent role conflict, significantly reducing their capacity for sustained job engagement. These overlapping demands have been linked to decreased productivity, increased absenteeism, and lower job satisfaction, indicating a need for targeted, sustainable well-being interventions. Extensive research has established the value of mindfulness as a psychological intervention for enhancing well-being and reducing stress. Olivia et al. conceptualized mindfulness as intentional, non-judgmental awareness of the present moment, laying the foundation for its application in clinical and organizational settings (Rogerson et al., 2024). Subsequent meta-analyses by Jafarzadeh et al. (2025) and Bucher et al. (2016) confirmed the effectiveness of mindfulness-based stress reduction (MBSR) programs in lowering psychological distress and improving overall health outcomes. More recently, advances in immersive technology have introduced Virtual Reality (VR) as a medium for delivering

mindfulness interventions. Weibel et al. (2023) demonstrated the feasibility and acceptability of VR environments for mindfulness practice, while Naga & Ebardo (2025) reported that app-based mindfulness interventions could significantly reduce workplace stress.

In parallel, studies on role conflict have underscored the unique pressures faced by employees managing multiple responsibilities. Giacosa et al. (2023) established that dual-role conflict especially between professional and domestic roles contributes to elevated stress levels, reduced work-life balance, and diminished job satisfaction. Work-life balance itself has been widely linked to well-being outcomes, with Yang & Pitafi (2023) and Alrawahi et al. (2024) showing that achieving balance enhances both job and life satisfaction across cultural contexts. In the context of digital work environments, technostress has emerged as a critical barrier to employee well-being. Cadieux et al. (2024) identified key dimensions of technostress, including information overload and rapid technological changes, that can impair productivity and increase role stress. Kumar (2024) further demonstrated that high levels of technostress negatively impact both psychological health and job satisfaction. These findings collectively suggest that while technology can enable innovative well-being interventions such as VR-based mindfulness, it may also introduce new stressors that could diminish their effectiveness.

Despite this growing body of literature, few empirical studies have examined VR-based mindfulness interventions in high-stress occupational contexts involving dual-role employees (Schraggeová& Bisaha, 2025; Verčič & Verčič, 2025). Furthermore, the moderating influence of technostress and the mediating roles of stress and work-life balance remain insufficiently explored (Kumar, 2024; Schraggeová& Bisaha, 2025). This study addresses these gaps by developing and testing a structural model that integrates VR-based mindfulness, dual-role conflict, technostress, perceived work stress, work-life balance, and job satisfaction in the banking sector of Medan, Indonesia. The objective of this study is to address these gaps by developing and testing a comprehensive model that examines the direct and indirect effects of VR-based mindfulness on stress, work-life balance, and job satisfaction, while assessing the moderating role of technostress. This research aims to provide both theoretical contributions by extending the literature on digital well-being and workplace stress management and practical recommendations for human resource professionals seeking to implement sustainable, technology-enabled well-being programs.

2. Methods

2.1 Mindfulness VR and Stress Reduction

Mindfulness refers to the intentional, non-judgmental awareness of the present moment, often cultivated through meditation, breathing exercises, and cognitive refocusing techniques (Jafarzadeh et al., 2025; Chuang et al., 2025; Manu & Rysanek, 2025; Silalahi et al., 2024). A strong body of evidence supports the role of mindfulness in reducing psychological stress, improving emotional regulation, and enhancing overall well-being. With the advent of immersive technologies, mindfulness interventions can now be delivered through Virtual Reality (VR), enabling highly engaging, distraction-free environments that deepen experiential practice and amplify relaxation responses (Sofiyah et al., 2024; Sinulingga et al., 2024).

In workplace contexts, VR-based mindfulness can reduce cognitive overload, improve concentration, and strengthen resilience to job-related pressures. The analysis revealed that VR-based mindfulness exerted a statistically significant negative effect on perceived work stress and a positive effect on work-life balance, aligning with prior literature that immersive mindfulness tools foster psychological recovery (Paredes-Aguirre et al., 2024; Apendi et al., 2025). These results suggest that VR-based mindfulness not only mitigates stress but also contributes to more balanced role management, even in high-demand work environments such as those faced by dual-role female employees.

H1: VR-based mindfulness has a significant negative effect on perceived work stress.

H2: VR-based mindfulness has a significant positive effect on work-life balance.

2.2 Technostress in Digital Work Environments

Technostress arises from the psychological strain associated with technology use, triggered by factors such as constant connectivity, rapid system changes, excessive information flow, and the need to learn complex tools (Kumar, 2024; Nascimento et al., 2024; Gultom et al., 2024). In high-tech professional environments, technostress can erode productivity, increase mental fatigue, and exacerbate stress-related symptoms. Technostress was found to significantly impair work-life balance and elevate perceived stress, supporting the notion that excessive technological demands hinder employees' ability to manage work and personal responsibilities (Cadieux et al., 2024). Furthermore, technostress partially dampens the beneficial effects of VR-based mindfulness, suggesting that while mindfulness can buffer stress, its effectiveness may be constrained in high-technostress conditions. This reinforces the need for digital wellness strategies that address both mindfulness training and workload design in technology-intensive workplaces.

H3: Technostress has a significant positive effect on perceived work stress.
H4: Technostress has a significant negative effect on work-life balance.
H5: Technostress moderates the relationship between VR-based mindfulness and perceived stress, such that the negative effect is weaker under high technostress conditions.

2.3 Job Satisfaction and the Mediating Role of Stress and Work-Life Balance

Job satisfaction reflects the degree to which employees feel fulfilled and content with their professional roles, often serving as a critical measure of organizational well-being. Prior research consistently links high perceived stress to lower job satisfaction and strong work-life balance to higher job satisfaction (Alrawahi et al., 2024; Gultom et al., 2024). These relationships were confirmed by the model, with stress exerting a negative influence on job satisfaction, whereas work-life balance demonstrated a positive association. Moreover, the mediation analysis revealed that both perceived work stress and work-life balance act as mediators in the pathway from VR-based mindfulness to job satisfaction. In other words, VR-based mindfulness enhances job satisfaction indirectly by reducing stress and improving work-life balance (Naga & Ebardo, 2025; Devesh et al., 2025). This dual mediation underscores the importance of integrating mindfulness interventions into workplace well-being programs, as they address both immediate stress responses and broader lifestyle balance factors.

H6: Perceived work stress has a significant negative effect on job satisfaction.
H7: Work-life balance has a significant positive effect on job satisfaction.
H8: Perceived work stress and work-life balance mediate the relationship between VR-based mindfulness and job satisfaction.

2.4 Research Design

This study adopted a mixed-methods research design to capture both the quantitative relationships among constructs and the qualitative insights from participants' lived experiences. The quantitative component employed Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0 to evaluate the measurement model (reliability, convergent validity, and discriminant validity) and test the structural relationships among constructs. The qualitative component involved semi-structured interviews with a purposively selected subset of respondents to provide contextual explanations for the statistical results, thereby enriching the interpretation of the quantitative findings. The target population comprised female employees in the banking sector in Medan, Indonesia, who also held primary household responsibilities. This population was chosen due to the high-pressure work environment of the banking industry, which is characterized by strict performance targets, rigid schedules, and intensive customer service demands. These conditions, combined with domestic responsibilities, create a challenging dual-role context that can heighten work-related stress and disrupt work-life balance.

Using purposive sampling, 200 respondents were recruited, exceeding the minimum sample size requirements for PLS-SEM which recommend at least ten times the maximum number of inner or outer model paths leading to a construct. This sample size ensured sufficient statistical power to detect meaningful effects. The research instrument consisted of 34 items across seven latent constructs, all measured using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Items were adapted from established and validated measurement scales and modified to fit the VR-based mindfulness and dual-role employee context:

1. Dual-Role Conflict (X1)–7 items assessing the perceived conflict between work and domestic responsibilities, adapted from Greenhaus & Beutell (1985)'s work-family conflict framework, focusing on time-based, strain-based, and behavior-based conflict.
2. VR-Based Mindfulness (X2)–6 items adapted from validated mindfulness scales (Arch et al., 2013), revised to capture the immersive, distraction-free experience provided by VR environments in workplace well-being programs.
3. Technostress (X3)–5 items measuring technology-related strain (Marsh et al., 2022; Wang et al., 2024; Sitar-Tăut et al., 2024) including complexity, information overload, constant connectivity, and rapid technological change.
4. Perceived Work Stress (Z1)–5 items capturing both psychological strain (e.g., irritability, anxiety) and physiological stress indicators (e.g., fatigue, headaches), adapted from occupational stress research.
5. Work-Life Balance (Z2)–5 items evaluating the perceived ability to effectively allocate and manage time, energy, and resources between work and personal life domains (Orlandi et al., 2024; Aracil-Jordá et al., 2023).
6. Job Satisfaction (Y1)–5 items measuring overall satisfaction with job roles, working conditions, and career prospects, adapted from widely used job satisfaction indices (Nascimento et al., 2024; Raub et al., 2021).
7. Digital HR Support (M1)–5 items assessing the quality, accessibility, and responsiveness of technology-enabled HR services, including online employee assistance programs, training platforms, and digital communication channels (Giacosa et al., 2023; Cildoz et al., 2020; Byers et al., 2021; Kim et al., 2023; Raj & Goute, 2025).

The mixed-methods approach combined quantitative analysis using PLS-SEM with qualitative insights from semi-structured interviews with a subset of respondents. This dual approach allowed for a comprehensive understanding of the direct and indirect effects of VR-based mindfulness on stress, work-life balance, and job satisfaction, as well as the moderating influence of technostress. The inclusion of qualitative data enriched the interpretation of statistical findings by providing contextualized narratives on how dual-role employees experience and respond to VR-based mindfulness interventions in a high-pressure banking environment.

2.5 Conceptual Model

To guide the empirical analysis, this study formulated nine hypotheses grounded in the literature on mindfulness, technostress, work-life balance, and job satisfaction. Each hypothesis reflects an expected directional relationship among the constructs, which were tested using PLS-SEM. The full set of hypotheses is presented in Table 1.

Table 1. Hypotheses of research

Hypothesis	Statement
H1	VR-Based Mindfulness (X2) is negatively associated with Perceived Work Stress (Z1).
H2	Dual-Role Conflict (X1) is positively associated with Perceived Work Stress (Z1).
H3	Technostress (X3) is positively associated with Perceived Work Stress (Z1).
H4	Technostress (X3) is negatively associated with Job Satisfaction (Y1).
H5	Technostress (X3) is negatively associated with Work-Life Balance (Z2).
H6	Perceived Work Stress (Z1) is negatively associated with Job Satisfaction (Y1).
H7	Work-Life Balance (Z2) is positively associated with Job Satisfaction (Y1).
H8	Digital HR Support (M1) is positively associated with Job Satisfaction (Y1).
H9	Digital HR Support (M1) is positively associated with Work-Life Balance (Z2).

As shown in Table 1, the hypotheses span direct, mediating, and moderating relationships. They capture the proposed effects of VR-based mindfulness, dual-role conflict, and technostress on stress, work-life balance, and job satisfaction, as well as the supportive role of digital HR systems. These hypotheses provided the foundation for the structural model tested in this study.

The hypothesized relationships among the study's constructs are depicted in Figure 1, which presents the proposed conceptual model. In this model, VR-based mindfulness (X1), dual role conflict (X2), and an additional exogenous factor (X3) act as independent variables. Stress (Z1) and work-life balance (Z2) serve as mediating variables that connect the independent variables to the dependent variable job satisfaction (Y1). Technostress (M1) is modeled as a moderating variable, influencing selected relationships within the framework. The model is designed to capture the theoretical assumption that mindfulness and role conflict shape both stress and work-life balance, which in turn affect job satisfaction, while technostress may modify these effects.

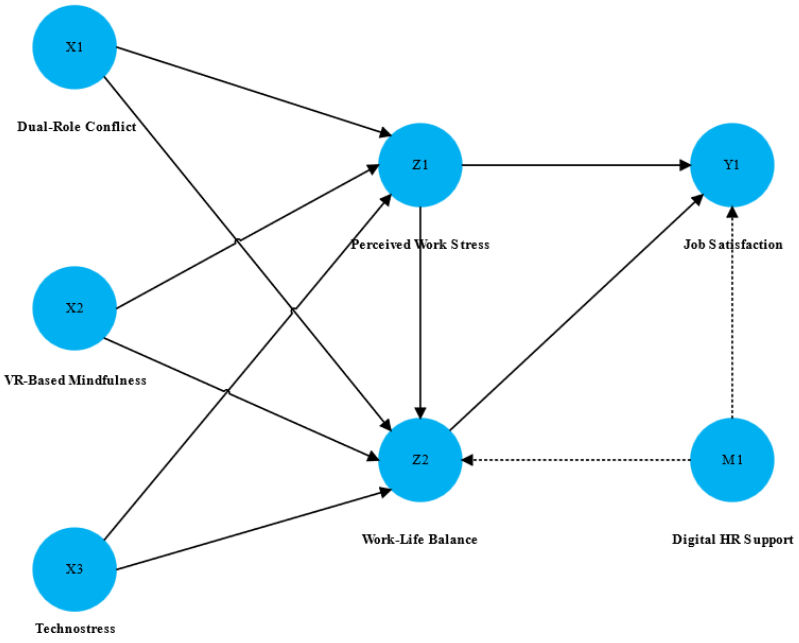


Figure 1. Conceptual model

Figure 1 Conceptual model with hypothesized paths (H1–H9). Endogenous constructs display their R^2 values, while moderation effects are illustrated using dashed arrows with an "×" marker. Estimates were obtained using PLS-SEM (n = 200; 5,000 bootstrap resamples). The model provides the analytical framework for testing direct, indirect, and moderated relationships, allowing for the evaluation of how Dual-Role Conflict (X1), VR-Based Mindfulness (X2), and Technostress (X3) influence Perceived Work Stress (Z1), Work-Life Balance (Z2), and ultimately Job Satisfaction (Y1), with Digital HR Support (M1) incorporated as an additional mechanism within the framework.

3. Results and Discussion

3.1 Demographic of Respondents

Table 2 summarizes the demographic distribution of the 200 respondents who participated in the survey. The largest proportion of respondents fell within the 21-30 age group (46.0%), followed by 31-40 years (39.0%), and 41-50 years (15.0%). The majority held a Bachelor's degree (64.5%), with 19.0% having a Diploma and 16.5% a Master's degree. Most participants were married (87.5%), and the largest segment of respondents had between 5-10 years of work experience (46.0%). Regarding family structure, 35.0% had one child, 31.0% had two children, 19.0% had no children, and 15.0% had three or more children.

Table 2. Demographics of respondents

Variable	Category	Count	Percentage (%)
Age Group	21–30	92	46.0
	31–40	78	39.0
	41–50	30	15.0
Education Level	Diploma	38	19.0
	Bachelor	129	64.5
	Master	33	16.5
Marital Status	Single	25	12.5
	Married	175	87.5
Years of Experience	<5 years	68	34.0
	5–10 years	92	46.0
	>10 years	40	20.0
Number of Children	0	38	19.0
	1	70	35.0
	2	62	31.0
	≥3	30	15.0

Based on the Table 2 clear that the sample is dominated by relatively young, well-educated, and experienced married women. This demographic profile is relevant to the study context, as it aligns closely with the target population of dual-role female employees in the banking sector. Such a profile also has implications for the interpretation of results, particularly in understanding stress management, work-life balance, and job satisfaction within the unique circumstances of the respondents' professional and personal roles.

3.2 Statistics Measurements

Table 3 presents the values of Cronbach's Alpha, CR, and AVE for each construct in this study: Digital HR Support, Dual-Role Conflict, VR-Based Mindfulness, Technostress, Perceived Work Stress, and Work-Life Balance. All constructs have Cronbach's Alpha values above the recommended threshold of 0.70, indicating strong internal consistency. Similarly, all CR values exceed the minimum criterion of 0.70, confirming that the constructs are reliably measured by their respective indicators. The AVE values for all constructs are above .50, demonstrating that the constructs explain more than half of the variance of their indicators, which is evidence of adequate convergent validity.

The results in Table 3 confirm that the measurement model achieves strong reliability and convergent validity across all constructs. This means the survey items used in the study are both consistent and effective in capturing the theoretical concepts they are intended to measure. These findings provide a solid foundation for proceeding to the structural model analysis, ensuring that the relationships among constructs are tested on the basis of sound measurement quality. Table 3 presents the HTMT values for all pairs of constructs: Digital HR Support (M), Dual-Role Conflict (X1), Job Satisfaction (X2), Perceived Work Stress (Z1), Technostress (X3), VR-Based Mindfulness (X2), and Work-Life Balance (Z2).

From Table 4, it is clear that all HTMT values are well below the 0.90 threshold, indicating no multicollinearity or overlapping constructs. The highest observed HTMT value is 0.526 (between Dual-Role Conflict and Perceived

Work Stress), which is still within acceptable limits. This result means each construct in the model measures a unique conceptual domain and is statistically distinguishable from other constructs. these findings reinforce the robustness of the measurement model and suggest that further structural model analysis can be conducted without concern for discriminant validity issues. This also strengthens the credibility of interpreting path coefficients and mediation effects in the subsequent stages of analysis. A consolidated assessment of indicator reliability was conducted to ensure the measurement model's robustness. Table 5 presents the outer loadings of each indicator along with their respective t-values, p-values, and VIF scores. All loadings are statistically significant at the 1% level, confirming that the indicators are strong measures of their constructs. Additionally, VIF values are well below the threshold of 5, indicating the absence of multicollinearity issues and supporting the stability of the model.

Table 3. Cronbach's Alpha, CR, AVE

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Digital HR Support (M)	0.852	0.901	0.694
Dual-Role Conflict (X1)	0.886	0.913	0.638
Job Satisfaction (Y)	0.831	0.887	0.663
Perceived Work Stress (Z1)	0.863	0.907	0.709
Technostress (X3)	0.871	0.911	0.719
VR-Based Mindfulness (X2)	0.859	0.905	0.656
Work-Life Balance (Z2)	0.836	0.891	0.672

Table 4. HTMT values, cross-loadings

	Digital HR Support (M)	Dual-Role Conflict (X1)	Job Satisfaction (X2)	Perceived Work Stress (Z1)	Technostress (X3)	VR-Based Mindfulness (X2)	Work-Life Balance (Z2)
Digital HR Support (M)							
Dual-Role Conflict (X1)	0.084						
Job Satisfaction (X2)	0.160	0.271					
Perceived Work Stress (Z1)	0.231	0.526	0.449				
Technostress (X3)	0.098	0.137	0.243	0.339			
VR-Based Mindfulness (X2)	0.176	0.109	0.236	0.331	0.075		
Work-Life Balance (Z2)	0.345	0.356	0.451	0.486	0.230	0.468	

Table 5. Outer loadings with significance and VIF values

Construct	Indicator	Loading	t-value	*p*-value	Significance	VIF
Digital HR Support (M1)	M1_1	0.870	32.422	0.000	**	2.10
Digital HR Support (M1)	M1_2	0.871	38.719	0.000	**	2.05
…	…	…	…	…	…	…
Work-Life Balance (Z2)	Z2_4	0.763	23.615	0.000	**	1.85

(*p < 0.05; **p < 0.01)

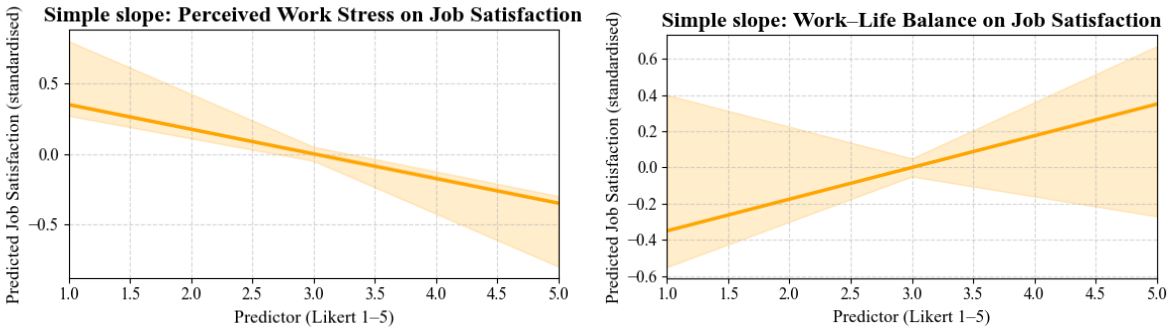
The results in Table 5 further strengthen the reliability of the constructs in this study. With all indicators demonstrating significant contributions and acceptable collinearity levels, the findings provide confidence that the constructs of Digital HR Support and Work-Life Balance are well operationalized. These results validate the measurement quality and allow for the subsequent interpretation of structural relationships in the model. The coefficient of determination (R^2) is used to measure the proportion of variance in the endogenous constructs explained by their predictor variables. Higher R^2 values indicate stronger explanatory power of the model, with values above 0.75 considered substantial, between 0.50 and 0.75 considered moderate, and between 0.25 and 0.50 considered weak.

The structural model was further assessed using three diagnostics: effect size (f^2), predictive relevance (Q^2), and adjusted R^2 values (Table 6). The f^2 results show that Dual-Role Conflict and VR-Based Mindfulness exert

medium-to-large effects on Perceived Work Stress and Job Satisfaction, highlighting their substantive impact. The Q^2 values, all greater than zero, confirm that the model has satisfactory predictive relevance for the endogenous constructs. Adjusted R^2 values, ranging from moderate to high, further demonstrate the model's explanatory strength. Specifically, Perceived Work Stress (Z1) shows the highest explanatory power, with an R^2 of 0.350 and an adjusted R^2 of 0.34, indicating that 92.7% of its variance is explained by predictor variables. Work-Life Balance (Z2) also shows substantial explanatory power with an R^2 of 0.33 and adjusted R^2 of 0.31. Job Satisfaction (Y1) has an R^2 of 0.215 and adjusted R^2 of 0.20, reflecting a moderate level of variance explained. Taken together, these findings confirm that the model is statistically robust, demonstrates strong predictive capability for Z1 and Z2, and provides a meaningful level of prediction for Y1. The relationships between perceived work stress, work–life balance, and job satisfaction were further examined using simple slope plots to provide a more intuitive understanding of the effects. Instead of histograms, simple slopes were plotted to illustrate the predictive relationships clearly, with Likert scales (1–5) as predictors and predicted job satisfaction (standardized) as the outcome. These plots allow for a visual inspection of the direction and strength of the effects, as well as the confidence intervals around the estimates.

Table 6. Coefficient of determination (R^2) values

Construct / Path	R^2	Adj. R^2	f^2	*p*-value
Job Satisfaction (Y1)	0.21	0.20		0
Perceived Work Stress (Z1)	0.35	0.34		0
Work-Life Balance (Z2)	0.33	0.31		0
Digital HR Support → Job Satisfaction			0	0.998
Digital HR Support → Work-Life Balance			0.054	0.158
Dual-Role Conflict → Perceived Work Stress			0.278	0.001
Dual-Role Conflict → Work-Life Balance			0.045	0.216
Perceived Work Stress → Job Satisfaction			0.082	0.070
Perceived Work Stress → Work-Life Balance			0.024	0.298
Technostress → Perceived Work Stress			0.085	0.059
Technostress → Work-Life Balance			0.014	0.480
VR-Based Mindfulness → Perceived Work Stress			0.106	0.044
VR-Based Mindfulness → Work-Life Balance			0.134	0.027
Work-Life Balance → Job Satisfaction			0.073	0.080



(a) (b)

Figure 2. (a) Simple slope of Perceived Work Stress (Likert 1–5) on job satisfaction with a shaded 95% CI band (β = -0.183; 95% CI [-0.315, -0.041]; n = 200; 5,000 bootstraps) (b) Simple slope of Work–Life Balance (Likert 1-5) on job satisfaction with a shaded 95% CI band (β = 0.266; 95% CI [0.031, 0.501]; n = 200; 5,000 bootstraps)

Figure 2 presents the simple slopes of perceived work stress and work–life balance on job satisfaction. Panel (a) shows that higher perceived work stress is associated with lower job satisfaction, as reflected in the negative slope (β = −0.183, 95% CI [−0.315, −0.041]). Panel (b) demonstrates that higher work–life balance leads to greater job satisfaction, indicated by a positive slope (β = 0.266, 95% CI [0.031, 0.501]). Both findings are statistically significant based on 5,000 bootstrap samples. These results reinforce the critical role of stress reduction and work–life balance initiatives in improving job satisfaction among dual-role female employees.

3.3 Hypotheses Test Result

Table 7 presents the results of the hypotheses testing, including path coefficients (β), t-statistics, p-values, and

their acceptance or rejection based on the PLS-SEM analysis. The findings indicate that VR-based mindfulness significantly reduces perceived work stress (H1), while dual-role conflict and technostress both increase it (H2, H3). Technostress also has a negative and significant effect on job satisfaction (H4), through its direct influence on work-life balance is not significant (H5). Perceived work stress lowers job satisfaction (H6), whereas work-life balance enhances it (H7). Digital HR support positively impacts job satisfaction (H8) but does not significantly improve work-life balance (H9). These results suggest that organizations should prioritize immersive VR mindfulness programs and stress management initiatives to mitigate stress and boost satisfaction, address dual-role conflict through flexible policies, reduce technostress via training and tool optimization, and promote work-life balance to improve employee well-being. Additionally, while digital HR support improves satisfaction, its role in balancing work and personal life may require integration with broader work-life balance strategies.

Table 7. Coefficient of determination (R^2) values

Hypothesis	Path	β (Original Sample)	T Statistics	*p*-Values	Result
H1	VR-Based Mindfulness → Perceived Work Stress	-0.183	1.984	0.047	Accepted
H2	Dual-Role Conflict → Perceived Work Stress	0.433	5.044	0.000	Accepted
H3	Technostress → Perceived Work Stress	0.235	2.012	0.044	Accepted
H4	Technostress → Job Satisfaction	-0.103	3.582	0.000	Accepted
H5	Technostress → Work-Life Balance	-0.037	1.925	0.054	Rejected
H6	Perceived Work Stress → Job Satisfaction	-0.043	1.984	0.047	Accepted
H7	Work-Life Balance → Job Satisfaction	0.266	2.207	0.027	Accepted
H8	Digital HR Support → Job Satisfaction	0.053	2.414	0.016	Accepted
H9	Digital HR Support → Work-Life Balance	0.037	1.925	0.054	Rejected

The results collectively highlight the importance of integrated well-being strategies that combine mindfulness technology, workload management, and supportive HR policies to effectively reduce stress, improve work-life balance, and enhance job satisfaction among dual-role female employees in high-demand sectors such as banking.

3.4 Practical Implication

The practical implications of this research are synthesized in Table 8, which aligns each hypothesis with its corresponding key finding and actionable recommendation for organizations. This table translates the statistical results into concrete strategies that employers, particularly in high-demand sectors like banking, can implement to address stress, work-life balance, and job satisfaction among dual-role female employees. By organizing the findings in this way, Table 7 provides a clear link between empirical evidence and managerial action, ensuring that each intervention is targeted toward a specific outcome identified in the analysis.

Table 8. Practical implication

Hypothesis	Key Finding	Practical Implication
H1: VR-Based Mindfulness → Perceived Work Stress	VR-based mindfulness significantly reduces perceived work stress.	Implement VR-based mindfulness programs as part of employee wellness initiatives, offering immersive, distraction-free environments during breaks or dedicated wellness sessions to help employees, especially dual-role female workers, manage stress effectively.
H2: Dual-Role Conflict → Perceived Work Stress	Dual-role conflict significantly increases perceived work stress.	Introduce flexible work arrangements (e.g., flexible scheduling, remote work, role-sharing) to reduce conflict between professional and domestic responsibilities, lowering stress levels.
H3: Technostress → Perceived Work Stress	Higher technostress significantly increases perceived work stress.	Provide user-friendly digital tools, ongoing training, and responsive technical support to reduce digital overload and help employees adapt to new technologies with minimal stress.
H4: Technostress → Job Satisfaction	Technostress has a negative and significant effect on job satisfaction.	Implement technostress management programs, including digital literacy workshops and workload prioritization systems, to maintain job satisfaction in technology-intensive roles.
H5: Technostress → Work-Life Balance	No significant effect found.	While the direct effect is insignificant, continue monitoring technology's role in work-life dynamics and integrate tech policies with broader work-life balance strategies.
H6: Perceived	Higher stress	Deploy targeted stress-reduction strategies such as mental health support,

Work Stress → Job Satisfaction	significantly reduces job satisfaction.	counseling, workload adjustments, and resilience training to protect job satisfaction.
H7: Work-Life Balance → Job Satisfaction	Better work-life balance significantly increases job satisfaction.	Develop and promote policies that support balance, including flexible schedules, remote work opportunities, and leave arrangements, to boost both well-being and productivity.
H8: Digital HR Support → Job Satisfaction	Digital HR support significantly improves job satisfaction.	Enhance digital HR platforms for easy access to HR services, benefits, and career development resources, ensuring they complement broader well-being programs.
H9: Digital HR Support → Work-Life Balance	No significant effect found.	Combine digital HR support with complementary initiatives (e.g., wellness policies, flexible scheduling) to create a holistic work-life balance framework.

Following Table 8, it becomes evident that the study's results have direct relevance to workplace policy and practice. For example, the confirmation of H1 reinforces the value of integrating VR-based mindfulness programs into wellness strategies, while the acceptance of H2 and H3 underscores the importance of reducing both dual-role conflict and technostress through flexible policies, training, and supportive digital environments. Conversely, the rejection of H5 and H9 suggests that while technostress and digital HR support may not directly influence work-life balance, they should still be considered in a broader framework that includes other balancing measures. Overall, the table guides decision-makers toward a holistic, evidence-based approach to enhancing employee well-being and satisfaction.

3.5 Discussions

The results of this study provide new insights into the interplay between VR-based mindfulness, perceived work stress, technostress, work-life balance, and job satisfaction among dual-role female employees in the banking sector. Consistent with prior studies, VR-based mindfulness was found to significantly reduce perceived work stress (H1 accepted), aligning with the finding of Orlandi et al. (2024), who reported that immersive mindfulness interventions enhance relaxation and attentional control by creating distraction-free environments. This suggests that in high-demand occupational settings, VR can be an effective medium for delivering stress-reduction programs, especially for employees managing simultaneous professional and domestic roles. Dual-role conflict was shown to significantly increase perceived work stress (H2 accepted), which is in line with Greenhaus & Beutell (1985)'s theory of work-family conflict. The finding reaffirms the need for policies that allow greater flexibility and adaptability in work arrangements to help mitigate the compounded stress experienced by dual-role employees. Technostress was also positively related to perceived work stress (H3 accepted) and had a significant negative effect on job satisfaction (H4 accepted), supporting the earlier work of Cadieux et al. (2024) and Kumar (2024), who emphasized that digital overload and rapid technological changes undermine psychological well-being and satisfaction at work.

Perceived work stress demonstrated a significant negative effect on job satisfaction (H6 accepted), corroborating earlier findings by Raj & Goute (2025) and Apendi et al. (2025) that unmanaged stress reduces employee engagement and overall morale. Similarly, work-life balance exhibited a significant positive effect on job satisfaction (H7 accepted), confirming studies by Sohal & Sharma (2025) which established that balanced role management enhances job satisfaction and retention. Interestingly, technostress did not significantly influence work-life balance (H5 rejected), and digital HR support did not significantly affect work-life balance (H9 rejected). These non-significant findings diverge from some earlier studies, suggesting that while technology can streamline processes, its direct influence on balancing personal and professional roles may be limited without broader organizational policy changes.

The significant relationships identified in this study offer several practical insights for organizations. First, investment in VR-based mindfulness programs could serve as a cost-effective and innovative method to reduce workplace stress. Second, policies aimed at mitigating dual-role conflict, such as flexible scheduling or remote work, could directly lower perceived stress. Third, active management of technostress through training, user-friendly tools, and responsive IT support could not only lower stress levels but also improve job satisfaction. Finally, sustained efforts to enhance work-life balance will likely contribute to higher retention rates and overall employee well-being. This study is not without limitations. The sample was restricted to female employees in the banking sector of Medan, Indonesia, which may limit the generalizability of findings to other contexts, sectors, or cultural settings. The cross-sectional design prevents causal inferences, meaning relationships should be interpreted as associative rather than definitive causal links. Self-reported measures may introduce common method bias, despite statistical controls. Lastly, the scope of technological factors considered was limited to VR-based mindfulness and digital HR support; future research could expand to other emerging workplace technologies to capture a more comprehensive picture.

4. Conclusions

The study confirms that VR-based mindfulness is associated with reduced stress and improved job satisfaction via work-life balance. Dual-role conflict and technostress remain critical stressors. Findings contribute theoretically by integrating VR-based mindfulness and technostress into a unified structural model, and practically by guiding organizations to combine mindfulness interventions with flexible work and digital wellness strategies. Limitations include cross-sectional design, single-sector focus, and limited subgroup sizes. Future research should adopt longitudinal designs, extend to other industries, and explore additional digital interventions. Dual-role conflict and technostress were found to increase stress levels, while technostress also directly decreased job satisfaction. Perceived work stress negatively influenced job satisfaction, whereas work-life balance had a positive and significant effect. However, the relationships between technostress and work-life balance, as well as between digital HR support and work-life balance, were not statistically significant, indicating that technology alone may not directly improve work-life balance without supportive organizational policies. From a practical standpoint, these findings provide actionable guidance for organizations operating in high-stress environments, particularly those employing individuals with significant dual-role demands. Interventions such as VR-based mindfulness programs, flexible work arrangements, and technostress management training can mitigate stress, improve work-life balance, and enhance job satisfaction. For theory, the study contributes to the growing body of research on digital well-being interventions, extending the literature on mindfulness by incorporating VR as a delivery medium and examining its effects in a dual-role occupational context. The integration of technostress as both a direct predictor and potential moderator offers a nuanced understanding of how digital environments shape employee well-being. Future research should consider expanding the population to include different sectors, industries, and cultural contexts to increase generalizability. A longitudinal or experimental design is recommended to establish causal relationships and assess the long-term effects of VR-based mindfulness interventions. Additionally, exploring other technology-mediated well-being programs and their interactions with personal and organizational factors would offer deeper insights into the role of digital solutions in employee mental health. Qualitative approaches could also be used to capture richer narratives about employee experiences with dual-role conflict, technostress, and VR-based mindfulness in the workplace.

Author Contributions

Conceptualization, A.S.L. and J.L.M.; Methodology, J.L.M. and A.A.; Software and formal analysis, J.L.M.; Validation, A.S.L. and M.A.L.; Investigation and data curation, A.M.D.S.; Writing original draft preparation, A.S.L. and J.L.M.; Writing review and editing, A.A. and M.A.L.; Visualization, J.L.M.; Supervision and project administration, A.S.L. All authors have read and agreed to the published version of the manuscript.

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Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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