

Defensive Routines as a Coping Mechanism Linking Technostress and Job Control to Technology-Enabled Performance

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Submitted:
2026-07-14

Revised:
2026-07-20

Published:
2026-08-13

Keywords:
Coping Strategies, Defensive Routines, Job Control, Technostress, Technology-Enabled Performance

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This article is under:



How to cite:
Kamil, F., & Lastiati, A. (2026). Defensive Routines as a Coping Mechanism Linking Technostress and Job Control to Technology-Enabled Performance. *Bulletin of Counseling and Psychotherapy*, 8(2).
<https://doi.org/10.51214/002026082158000>

Published by:
Kuras Institute

E-ISSN:
2656-1050

ABSTRACT: Digital payment operations require continuous monitoring and rapid response, exposing employees to repeated alerts, system changes, and error-sensitive tasks. Over time, these demands may deplete attentional resources, heighten concerns about mistakes or skill obsolescence, and encourage self-protective coping. However, little is known about whether defensive routines transmit the effects of technology-related job demands and job control on technology-enabled performance in high-reliability service settings. Guided by the Job Demands–Resources model and the transactional theory of stress and coping, this study examined the relationships among technostress creators, job control, defensive routines, and technology-enabled performance. Survey data were collected from 163 employees in Greater Jakarta who worked in information technology or digital payment operations, routinely used operational systems, and had direct experience with monitoring, incident handling, system changes, or escalation. Partial least squares structural equation modeling showed that technostress creators were positively associated with defensive routines, whereas job control was negatively associated with defensive routines. Job control was positively associated with technology-enabled performance, while defensive routines were negatively associated with technology-enabled performance. Defensive routines provided a significant indirect pathway between technostress creators and technology-enabled performance, with no significant direct association, and partially mediated the positive association between job control and technology-enabled performance. These findings support the interpretation of defensive routines as a maladaptive coping pattern through which sustained technology-related demands may weaken effective technology use. Job control, by contrast, may support performance both directly and by reducing defensive routines.

INTRODUCTION

Digital payment operations depend on interconnected applications, continuous transaction monitoring, rapid incident response, and timely escalation. Although these technologies can improve processing speed and service reliability, they also expose employees to cognitive overload,

pressure to remain available, and continual demands for adaptation. Prolonged exposure to digitally intensive work may contribute to mental fatigue, concern about errors, difficulty disengaging from work, and poorer psychological well-being (Dragano & Lunau, 2020). Consistent with this concern, a systematic review linked occupational techno stressors with strain and adverse mental-health outcomes (Borle et al., 2021). Technology characteristics such as complexity, intrusiveness, and unreliability may further increase overload and work–home conflict (Ayyagari et al., 2011). Evidence from another technology-intensive setting also indicates that employees may appraise similar technological demands as either challenges or hindrances, producing different behavioral and performance consequences (Califf et al., 2020).

Five technostress creators represent demanding features of digital work: techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty (Ragu-Nathan et al., 2008). Evidence from Indonesia indicates that technology-related stress is associated with lower employee performance (Brilianti et al., 2023) and reduced work engagement among e-commerce employees (Zamralita et al., 2023). Technostress has also been identified among computer-using employees in administrative and professional occupations, indicating that its relevance extends across digitally mediated work settings (Limaheluw et al., 2025). Among remote workers, technostress creators were associated with burnout and symptoms of anxiety and depressed mood (Consiglio et al., 2023). However, their consequences are not uniform because different combinations of technostressors may produce different patterns of burnout and performance outcomes (Pflügner et al., 2024). In real-time payment operations, these demands may take the form of simultaneous alerts and accelerated workloads, complex analytical tools, extended availability, frequent system changes, and concerns that existing skills may become obsolete.

Technostress is shaped by appraisal and coping, not only by exposure to technology. The transactional theory of stress and coping defines stress as a response to demands appraised as taxing or greater than available resources (Lazarus & Folkman, 1984). Strain and coping choices can carry techno-stressors into adverse work outcomes (Gaudio et al., 2017), while behavioral disengagement has been linked longitudinally to technology-related strain (Hauk et al., 2019). Proactive and reactive coping also differ in their effects on IT-enabled productivity (Pirkkalainen et al., 2019). Employees who perceive technology as a threat to competence, control, or error-free performance may therefore choose responses that reduce discomfort but impede learning.

Defensive routines are one such response. These recurring behaviors protect employees from embarrassment, criticism, or perceived threat while constraining learning and open discussion (Argyris, 1990). In digital operations, they may appear as withheld concerns, restricted root-cause analysis, personally safe choices, or delayed feedback about system changes. Such behavior is consequential where incident resolution depends on timely disclosure and coordinated action. This logic is consistent with evidence that psychological safety supports interpersonal risk taking and team learning (Edmondson, 1999). Yang et al. (2025) further showed that defensive routines mediate the association between technostress creators and technology-enabled performance.

Job control provides a contrasting work resource. Technostress creators require sustained cognitive and emotional effort, whereas job control allows employees to influence priorities, methods, and decisions. Decision latitude has long been associated with lower mental strain under demanding work conditions (Karasek, 1979). The Job Demands-Resources model extends this logic by treating resources as supports for goal attainment, motivation, adaptation, and demand buffering (Bakker & Demerouti, 2007, 2017). A meta-analysis of work-related ICT use likewise found that autonomy is associated with stronger engagement and lower burnout, whereas availability pressure and work-life conflict operate as demands (Baumeister et al., 2021). Indonesian evidence also links job autonomy with work engagement (Suryowibowo & Syakarofath, 2024). In payment operations, job control means discretion within procedures, authority limits, and service-risk controls rather than unrestricted autonomy.

Technology-enabled performance captures how effectively digital tools support efficiency, accuracy, coordination, and service quality. Technostress creators have been associated with lower technology-enabled performance (Tarafdar et al., 2015), whereas job resources have been linked to stronger performance in financial services (Nuutinen et al., 2022). Among information technology employees in Jakarta, perceived organizational support was related to individual performance partly through work engagement (Haropis & Zamralita, 2023). Together, these findings suggest that digital demands and resources may influence performance through psychological and behavioral mechanisms rather than through a uniform direct effect (Califf et al., 2020; Pflügner et al., 2024). From a broader behavioral perspective, technical improvements alone may be insufficient to enhance performance, as the effectiveness of organizational systems and controls is also shaped by employee behavior and the conditions under which they are implemented and used (Lastiati, 2026).

Three issues remain unresolved. Research rarely examines employees who maintain real-time payment services, frequently relies on broad outcomes such as strain or general performance, and seldom models job control and defensive routines together. Indonesian findings also show that digital stress does not predict every outcome consistently; for example, it was unrelated to turnover intention directly or through burnout in one study (Puspita & Zamralita, 2023). Although stress has been modeled as a mediator between work conditions and performance (Manurung, 2024), the behavioral process linking technology-specific demands to technology-enabled performance remains unclear. Addressing this process is also relevant to workplace psychological practice because support for coping cannot substitute for adequate work design and decision latitude.

Rationale of the Study

Real-time payment operations combine intensive technology-related demands with limited tolerance for errors and service disruption. Repeated alerts, continual system changes, and expectations of extended availability can deplete employees' cognitive and emotional resources (Borle et al., 2021). In operational settings where errors are visible and may trigger criticism, employees may withhold concerns, avoid acknowledging problems, or delay help-seeking to protect themselves from embarrassment or perceived incompetence (Argyris, 1990). Such defensive routines may provide short-term psychological protection but restrict problem disclosure, organizational learning, and coordinated incident response. Examining job control in this context is important because discretion over task priorities, analytical procedures, and initial operational decisions may enable employees to respond more constructively to technology-related demands. This study therefore examines whether technostress creators and job control are associated with technology-enabled performance directly and indirectly through defensive routines.

Study Aim and Hypothesis

This study integrated the Job Demands-Resources model with the transactional theory of stress and coping. It proposed that technostress creators would increase defensive routines (H1), whereas job control would reduce them (H2). Technostress creators were expected to reduce technology-enabled performance (H3), while job control was expected to improve it (H4), and defensive routines were expected to reduce performance (H5). Finally, defensive routines were proposed to mediate the effects of technostress creators (H6) and job control (H7) on technology-enabled performance.

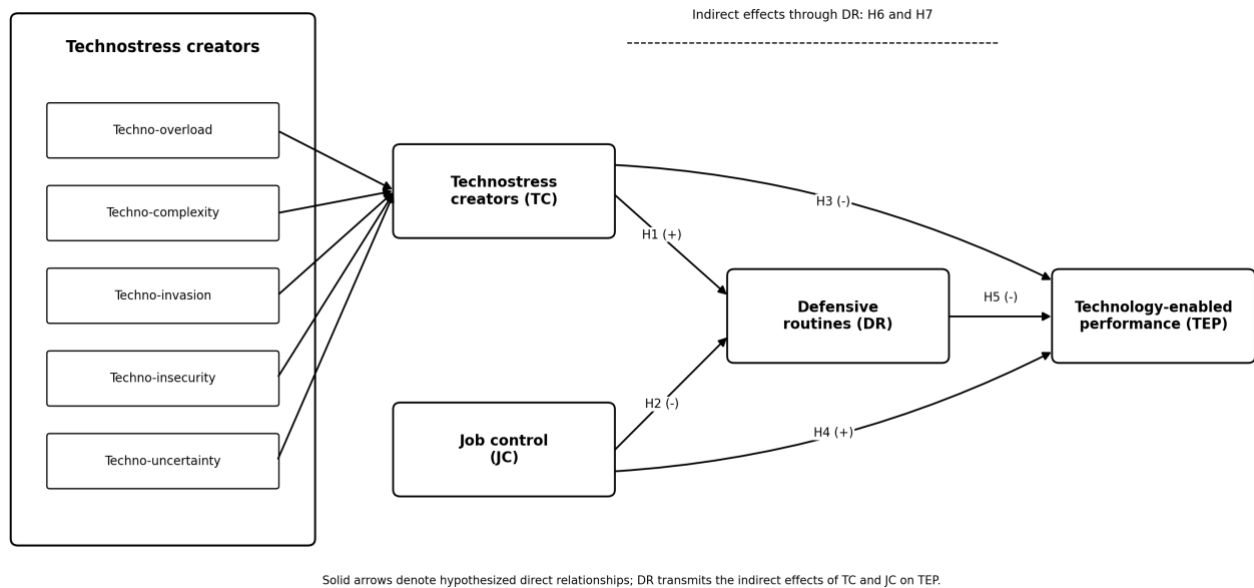


Figure 1. Conceptual model Solid arrows indicate direct hypotheses; the paths through defensive routines indicate the proposed indirect effects

METHODS

Design

This cross-sectional study surveyed employees in digital payment operations in Greater Jakarta, Indonesia. Eligible participants worked in information technology operations, application operations, monitoring, system support, service delivery, security, governance, or related functions and used operational applications, dashboards, ticketing systems, logs, or comparable tools. Purposive sampling was used because no complete sampling frame was available and participation required direct experience with monitoring, incident handling, system changes, escalation, or similar operational tasks.

Procedure

Data were collected through an online questionnaire using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Respondents received information about the study purpose, voluntary participation, and confidentiality before completing the questionnaire. A response was included in the analysis only when the participant met the following criteria: (a) worked in an information technology or digital-payment operational function, including application operations, monitoring, system support, service delivery, security, governance, or a related role; (b) routinely used operational applications, dashboards, ticketing systems, logs, or comparable tools; (c) had direct experience with monitoring, incident handling, system changes, escalation, or related operational tasks; and (d) completed all mandatory questionnaire items. The final analytic sample comprised 163 responses that met all four criteria.

Participants

The final sample consisted of 163 employees. Most participants were male (79.1%), aged 25–35 years (78.5%), held a bachelor's degree (85.3%), and had more than two years of work experience (82.8%). Work arrangements were almost evenly distributed between shift work (50.3%) and office-hour schedules (49.7%). Most respondents worked in technical operations and monitoring roles (62.0%). Table 1 presents the participants' demographic and occupational characteristics.

Table 1. Participant Characteristics

Characteristic	n	%	Characteristic	n	%
Gender			Work experience		
Male	129	79.1	<6 months	4	2.5
Female	34	20.9	6 months–2 years	24	14.7
Age			>2–5 years	60	36.8
<25 years	13	8.0	>5 years	75	46.0
25–29 years	60	36.8	Work arrangement		
30–35 years	68	41.7	Shift	82	50.3
36–40 years	17	10.4	Office hours	81	49.7
>40 years	5	3.1	Primary job area		
Highest education			Technical operations and monitoring	101	62.0
Senior high school	1	0.6	Service, support, and delivery	40	24.5
Diploma	11	6.7	Governance, security, and business support	22	13.5
Bachelor's degree	139	85.3			
Master's degree	12	7.4			

Instruments

The questionnaire measured four constructs. Technostress creators comprised 12 items covering techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty, adapted for digital operations from established measures (Ragu-Nathan et al., 2008; Yang et al., 2025). Six items measured discretion over decisions, follow-up actions, priorities, work methods, and operational steps. Five items assessed defensive routines through restricted root-cause discussion, withheld opinions, self-protective choices, defensive explanations, and delayed feedback. Eight items measured technology-enabled performance through speed, accuracy, work volume, coordination, procedural consistency, monitoring and prioritization, target attainment, and reduced incident duration or risk.

Technostress creators were modeled as a reflective-formative higher-order construct: items reflected five lower-order dimensions in the first stage, and the dimension scores formed the higher-order construct in the second stage. Job control, defensive routines, and technology-enabled performance were modeled reflectively. The questionnaire was reviewed for clarity and contextual fit before distribution.

Data Analysis

PLS-SEM was conducted in SmartPLS 4 (Ringle et al., 2024). Reflective constructs were evaluated using outer loadings, Cronbach's alpha, composite reliability, average variance extracted, and the heterotrait-monotrait ratio (Henseler et al., 2015). The formative higher-order construct was assessed through collinearity, outer weights, and outer loadings (Hair et al., 2024). The structural model was examined using R-squared values, effect sizes, path coefficients, and bootstrapped direct and specific indirect effects, with $p < .05$ as the significance criterion. As a supplementary analysis, PLS multigroup analysis compared office-hour and shift employees and employees with up to five years versus more than five years of work experience. Measurement invariance of composite models (MICOM) was assessed before comparing direct and indirect effects. Configural and compositional invariance were established, but equality of construct means and variances was incomplete; group differences were therefore interpreted under partial measurement invariance (Hair et al., 2024).

RESULTS AND DISCUSSION

Results

Technology-enabled performance had the highest mean ($M = 3.692$, $SD = 0.852$), followed by job control ($M = 3.505$, $SD = 0.850$). Technostress creators were moderate overall ($M = 3.299$, $SD = 0.956$), with techno-overload and techno-uncertainty being the most prominent dimensions. Defensive routines were also moderate ($M = 2.886$, $SD = 0.897$), indicating that self-protective behavior was present but not dominant. The simultaneous reporting of relatively high job control and moderate defensive routines suggests that employees experienced discretion in performing their work without being entirely free from self-protective responses. Moderate technostress creators, particularly techno-overload and techno-uncertainty, provide a relevant context for examining why defensive routines remained present despite employees' reported job control.

Table 2 reports the measurement model. Composite reliability and Cronbach's alpha exceeded .70, and average variance extracted exceeded .50. JC5 and TEP5 were retained despite loadings below .70 because their constructs remained reliable and convergently valid, and both indicators captured substantively relevant aspects of job control and procedural consistency. Table 3 reports the eight highest heterotrait-monotrait ratios; all were below .85.

Table 2. Convergent validity and construct reliability

Construct	Dimension/item	Outer loading	CR	AVE	Cronbach's alpha
Technostress creators	Techno-overload	0.754	0.878	0.590	0.831
	Techno-complexity	0.838			
	Techno-invasion	0.757			
	Techno-insecurity	0.758			
	Techno-uncertainty	0.727			
Job control	JC1	0.742	0.883	0.558	0.842
	JC2	0.756			
	JC3	0.741			
	JC4	0.770			
	JC5	0.683			
	JC6	0.785			
Defensive routines	DR1	0.719	0.877	0.589	0.825
	DR2	0.754			
	DR3	0.767			
	DR4	0.822			
	DR5	0.769			
Technology-enabled performance	TEP1	0.717	0.906	0.546	0.881
	TEP2	0.743			
	TEP3	0.803			
	TEP4	0.765			
	TEP5	0.677			
	TEP6	0.716			
	TEP7	0.719			
	TEP8	0.767			

Note. CR = composite reliability; AVE = average variance extracted. For technostress creators, CR, AVE, and Cronbach's alpha are reported as stage-two aggregate diagnostics. Formative adequacy was evaluated primarily through variance inflation factors, outer weights, and outer loadings.

Table 3. Highest HTMT Ratios for Discriminant Validity

Construct Pair	HTMT	Construct Pair	HTMT
Techno-overload - techno-complexity	.746	Techno-invasion - techno-complexity	.733
Techno-uncertainty - techno-complexity	.741	Techno-complexity - defensive routines	.711
Techno-insecurity - techno-complexity	.736	Techno-uncertainty - techno-insecurity	.690
Techno-uncertainty - techno-invasion	.733	Techno-overload - techno-insecurity	.682

Note. The eight highest ratios are reported; all remaining values were lower than .682, and all ratios were below .85.

The five dimensions formed technostress creators without collinearity concerns (VIF = 1.550-1.935). Techno-overload and techno-invasion had significant relative weights. The remaining weights were nonsignificant, but all five outer loadings were significant and ranged from .727 to .838. The dimensions were therefore retained for their absolute contribution and distinct conceptual content.

The model explained 52.8% of the variance in defensive routines and 43.4% of the variance in technology-enabled performance. As shown in Table 4, H1, H2, and H4-H7 were supported, whereas H3 was not. Technostress creators were related to performance only through defensive routines. Job control had both a direct association with performance and an indirect association through lower defensive routines.

Table 4. Structural model and hypothesis testing

Hypothesis	Path	Direct effect (β /t-value)	Indirect effect (β /t-value)	Effect size (f^2)	Result
H1	TC $\rightarrow$ DR	0.591***/11.926	—	0.699	Supported
H2	JC $\rightarrow$ DR	-0.305***/5.335	—	0.185	Supported
H3	TC $\rightarrow$ TEP	-0.005/0.056	—	<0.001	Not supported
H4	JC $\rightarrow$ TEP	0.419***/5.770	—	0.247	Supported
H5	DR $\rightarrow$ TEP	-0.351***/3.901	—	0.103	Supported
H6	TC $\rightarrow$ DR $\rightarrow$ TEP	—	0.208***/3.474	—	Supported
H7	JC $\rightarrow$ DR $\rightarrow$ TEP	—	0.107***/3.304	—	Supported

Note. TC = technostress creators; JC = job control; DR = defensive routines; TEP = technology-enabled performance; β = standardized path coefficient; f^2 = effect size. *** $p < .001$. Values without asterisks are not significant.

Partial measurement invariance was established for both grouping variables. Work arrangement differentiated only the path from job control to defensive routines: the negative association was stronger among office-hour employees ($\beta = -.428$) than among shift employees ($\beta = -.184$; $p = .033$). No other direct or indirect effect differed significantly by work arrangement, and no structural path differed across work-experience groups. One possible explanation is that office-hour employees may have greater flexibility to translate job control into adjustments in task sequencing, coordination, and problem solving. In shift-based operations, fixed response windows, handover requirements, and continuity demands may constrain the practical use of formally available control.

Discussion

Technostress creators were the strongest predictor of defensive routines. Employees experiencing techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty reported a greater tendency to withhold concerns and adopt self-protective responses. This finding is consistent with evidence that employees may respond to technology-related demands through coping strategies that do not necessarily resolve the underlying stressors. Gaudio et al. (2017) demonstrated that strain and coping mechanisms transmit the effects of technostressors to adverse work outcomes, while Hauk et al. (2019) longitudinally linked behavioral disengagement with technology-related strain. Similarly, Pirkkalainen et al. (2019) showed that proactive and reactive coping produce different consequences for IT-enabled productivity. Evidence from Indonesia also indicates that digital stress is associated with lower employee performance and work engagement (Brilianti et al., 2023; Zamralita et al., 2023). Taken together, these findings suggest that persistent technology-related demands may encourage protective coping patterns that restrict open problem solving and adaptive technology use.

The nonsignificant direct path from technostress creators to technology-enabled performance does not indicate that technology-related demands were irrelevant. One possible explanation is that employees in critical operations maintain immediate performance through standardized procedures, peer coordination, and operational discipline, even when such demands encourage psychologically protective behavior. Previous research suggests that the consequences of technostress depend on the resources and appraisals through which employees respond. Saleem et al. (2021) showed that training and creative self-efficacy condition the technostress–performance relationship, while Califf et al. (2020) distinguished challenge and hindrance responses to technology demands. In the present study, defensive routines represented a significant indirect pathway through which technostress creators were associated with lower technology-enabled performance.

Job control was positively associated with technology-enabled performance, both directly and indirectly through reduced defensive routines. Discretion to reprioritize work, select appropriate analytical steps, and make initial decisions within defined operational boundaries may help employees translate digital information into timely action. This finding is consistent with the role of decision latitude in demanding work environments (Karasek, 1979) and with the Job Demands–Resources perspective, which positions job resources as supports for adaptation and performance (Bakker & Demerouti, 2017). Related evidence from Indonesia has linked job autonomy with work engagement (Suryowibowo & Syakarofath, 2024) and organizational support with employee performance through engagement among information technology employees (Haropis & Zamralita, 2023). The complementary mediation suggests that job control supports technology-enabled performance not only by facilitating effective action directly but also by reducing self-protective behaviors that may restrict problem disclosure and adaptive responses.

The multigroup result qualifies the main finding regarding job control. Office-hour employees may have greater scope to translate discretion into task reprioritization, coordination, and adjustments to work methods, whereas shift-based work is more tightly structured around service continuity, handover procedures, escalation rules, and fixed response windows. Research on shift work has similarly identified limited job control and supervisory support as salient psychosocial stressors (Fischer et al., 2019). In this context, formally available control may be insufficient to reduce defensive coping unless employees also have usable escalation authority and timely access to supervisory support. Because no other structural path or indirect effect differed significantly across work-arrangement groups, the finding may reflect differences in the practical usability of job control rather than broad differences in the coping process of shift and office-hour employees.

Defensive routines were negatively associated with technology-enabled performance despite their moderate mean. In payment operations, withholding concerns and restricting root-cause

analysis can delay escalation, weaken error detection, and limit adaptation. Consistent with Argyris (1990), such routines may provide short-term protection from criticism, embarrassment, or perceived incompetence, but they also restrict the information sharing and interpersonal risk taking required for reliable service. These findings complement evidence that psychological safety facilitates open communication and team learning (Edmondson, 1999) by showing how defensive coping may obstruct these processes in technology-intensive operations.

Persistent problem avoidance, reluctance to disclose operational concerns, and fear of negative evaluation should not be interpreted solely as signs of technical incompetence or poor performance. Instead, they may reflect threat appraisal and avoidant coping (Lazarus & Folkman, 1984). Practitioners responsible for employee well-being may use these behaviors as possible indicators of the need for psychosocial support, while recognizing that individual-level assistance cannot compensate for excessive digital demands or decision authority that is formally available but difficult to exercise in practice (Bakker & Demerouti, 2017).

Taken together, the findings identify a behavioral pathway linking technology-related job demands and job control to technology-enabled performance. Rather than exerting a significant direct effect, technostress creators were associated with lower performance indirectly through increased defensive routines. Job control, by contrast, supported performance both directly and by reducing these self-protective behaviors. The model therefore integrates technology-related demands, job control within operational constraints, and maladaptive coping in a framework that can be examined in other technology-intensive and high-reliability service contexts.

Implications

Theoretically, the findings support the interpretation of defensive routines as a maladaptive coping mechanism through which technology-specific demands are associated with lower technology-enabled performance. They also show that job control operates through two complementary routes: it is directly associated with performance and indirectly associated with performance through reduced defensive routines. This distinction helps explain why technology-related demands may not immediately reduce observable performance even when they encourage self-protective coping that may carry psychological and behavioral costs.

Practically, organizations can reduce avoidable technology-related demands by managing alert volume, coordinating system changes, maintaining usable documentation, and establishing clear decision and escalation boundaries. For shift employees, formally available control should be made practically usable through explicit incident authority, adaptable response protocols, and timely access to supervisory support. Practitioners responsible for employee well-being may regard persistent avoidance, reluctance to disclose operational concerns, and fear of negative evaluation as possible indicators that psychosocial assessment may be appropriate. Individual-level support should complement, rather than substitute for, improvements in digital demands, decision authority, and work design.

Limitations and Further Research

The cross-sectional and self-report design limits causal inference and may leave the estimated relationships vulnerable to common-method bias. The use of purposive sampling and the concentration of respondents in Greater Jakarta also limit generalizability beyond comparable digital-payment and technology-intensive operational settings. In addition, the study operationalized defensive routines as a behavioral coping response but did not directly assess related psychological conditions or behaviors, such as anxiety, burnout, psychological safety, counseling use, or help-seeking.

Future research should use longitudinal and multisource designs that combine employee reports with supervisor assessments and objective operational indicators, such as escalation delays,

incident-resolution time, and error recurrence. Such designs could clarify whether defensive routines emerge before psychological strain, develop in response to it, or reinforce it over time. Further studies could also examine psychological safety, digital competence, system usability, leadership support, and accessible psychosocial support as antecedents, moderators, or complementary resources. Replication across other high-reliability services and with larger shift-work samples would help determine when formally available job control can be translated into reduced defensive routines under tightly structured operational conditions.

CONCLUSION

Defensive routines provided an indirect pathway linking technostress creators to lower technology-enabled performance, whereas job control was positively associated with performance both directly and indirectly through reduced defensive routines. These findings support the interpretation that self-protective coping may offer short-term protection from criticism or perceived incompetence while restricting the disclosure, learning, and constructive problem solving required for effective technology use. Reliable digital operations therefore depend on manageable technology-related demands, clear and usable decision authority, and work practices that encourage early disclosure and adaptive problem solving. The stronger negative association between job control and defensive routines among office-hour employees further suggests that formally available autonomy is beneficial only when it can be exercised within the practical constraints of the work arrangement. Because the evidence is cross-sectional and self-reported, the findings indicate associations and should not be interpreted as causal relationships.

ACKNOWLEDGMENTS

The authors thank the employees who voluntarily participated in this study.

AUTHOR CONTRIBUTIONS STATEMENT

FK: Conceptualization, methodology, investigation, formal analysis, data curation, visualization, and writing—original draft preparation. AL: Supervision, validation, and writing—review and editing. Both authors reviewed and approved the final manuscript.

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