

Algorithmic Nudging and Employee Well-being: A Mixed-Methods Study on the Double-Edged Sword of AI-Driven Management in the Hybrid Work Era

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ABSTRACT

Algorithmic nudging through artificial intelligence-driven management has emerged as a transformative force in contemporary hybrid workplaces, offering unprecedented opportunities for personalized performance optimization, while simultaneously raising critical concerns about employee autonomy and psychological well-being. This mixed-methods study examined 87 white-collar professionals from Indonesian technology, financial services, and consulting firms to elucidate the complex relationship between algorithmic nudging, job burnout, perceived threats, and workforce well-being. Drawing on self-determination theory and conservation of resources theory, this study integrated in-depth qualitative interviews (n=32) with quantitative burnout assessments using the Maslach Burnout Inventory. The results revealed a curvilinear relationship whereby moderate algorithmic nudging implementation demonstrated positive effects on competence satisfaction and task clarity, whereas intensive surveillance and real-time algorithmic interventions paradoxically increased emotional exhaustion and cynicism by undermining autonomy and relatedness. Person-job fit emerged as a critical moderator, with individuals in roles aligned with algorithmic management exhibiting 34% lower burnout than their misaligned counterparts. This study identified three primary mechanisms through which algorithmic nudging influences well-being: resource depletion (through psychological pressure), autonomy suppression (through constrained decision-making), and relatedness erosion (through surveillance-induced isolation). Contextual factors, including organizational transparency, employee agency in system design, and hybrid work flexibility, substantially buffered the negative effects. These findings suggest that algorithmic nudging represents a double-edged sword that requires calibrated implementation, genuine employee participation in system governance, and human-centric safeguards to maximize productivity gains while protecting psychological well-being in the hybrid work era.

Keywords: Algorithmic Management, Employee Well-Being, Hybrid Work, Burnout, AI-Driven Nudging

INTRODUCTION

The contemporary organizational landscape is undergoing profound transformation driven by the proliferation of artificial intelligence and algorithmic management systems. Whereas traditional management relies on human judgment, intuition, and periodic performance evaluations, algorithmic management practices (AMPs) increasingly govern critical workplace functions including task allocation, performance monitoring, behavioral evaluation, and reward distribution. These systems leverage real-time data collection, machine learning algorithms, and sophisticated behavioral analytics to nudge employees toward organizationally desired behaviors and outcomes. Algorithmic nudging a subset of algorithmic management that employs subtle, personalized interventions to influence employee decisions and actions represents a qualitatively distinct approach to organizational control, operating through explicit coercion but the intelligent architectural design of choice environments (Ahmed 2026).

The prevalence of algorithmic nudging has accelerated dramatically within the past five years, particularly as organizations have transitioned to hybrid work arrangements. Companies such as Uber have deployed badge-based gamification to incentivize autonomous drivers to extend work hours without explicit mandates, whereas Google has utilized algorithmic nudges to encourage healthier dietary choices in employee cafeterias. Deliveroo and Amazon employ algorithmic surveillance and notification systems to optimize delivery speed

and warehouse productivity. These implementations signal a broader organizational trend toward algorithmic governance, wherein data-driven decision-making systems replace or augment managerial discretion. McKinsey's research demonstrates that 72% of global organizations implemented some form of AI-driven performance management or employee monitoring, up to 32% in 2019. In the Indonesian context, Microsoft's research indicates that 84% of employees express a preference for hybrid work arrangements, yet only 38% of Indonesian organizations have comprehensively implemented algorithmic performance management systems, suggesting a significant gap between technological capability and organizational adoption.

The emergence of hybrid work, wherein employees alternate between remote and in-office arrangements, fundamentally alters the feasibility and desirability of algorithmic management. In traditional office environments, managers directly observe employee activities and engagement. In contrast the hybrid model requires technological mediation for performance assessment, task coordination, and behavioral monitoring. This technological necessity accelerated the adoption of algorithmic management. The Cisco 2024 Workplace Index reports that hybrid work has increased employee productivity by 53.4% and work quality by 56.4% in Indonesian organizations; however, 60.8% of hybrid workers reported elevated stress levels due to diminished social connections and boundary blurring between work and personal life. Paradoxically, algorithmic systems designed to optimize hybrid work coordination often exacerbate these stressors through intensive surveillance, real-time performance tracking, and algorithmic task assignment, which undermines employee autonomy (Ngonini 2025).

A hybrid work environment presents unique psychological challenges. Employees experience reduced face-to-face interaction with colleagues, attenuated organizational culture transmission, and difficulty in distinguishing between work and leisure time. In this context, algorithmic nudging systems offer ostensible benefits: personalized task scheduling aligned with individual productivity rhythms, intelligent resource allocation that optimizes team collaboration across distributed settings, and real-time behavioral prompts that maintain performance standards without direct managerial oversight. Yet simultaneously, these same systems intensify surveillance concerns, erode the psychological contract between employer and employee, and create what researchers term "anxious freedom" a condition wherein employees experience paradoxical constraints despite formal flexibility. The double-edged nature of algorithmic nudging becomes particularly acute in hybrid arrangements, wherein employees lack opportunities for informal interaction to build trust, calibrate expectations, and develop psychological safety with management systems.

Despite the profound organizational significance of algorithmic nudging, empirical research examining its impact on employee well-being remains fragmented and theoretically underdeveloped. Existing research has focused primarily on productivity outcomes, efficiency metrics, and organizational performance, with substantially fewer studies examining the psychological and welfare consequences. The limited well-being research has yielded contradictory findings: some studies report burnout increases of 23-31% among employees subject to intensive algorithmic monitoring, while others document engagement improvements and enhanced job satisfaction through gamification and personalized development support. This contradictory evidence suggests that algorithmic nudging's effects are context-dependent and moderated by organizational, individual, and implementation characteristics, which have not been sufficiently examined in the extant literature.

Furthermore, the theoretical frameworks applied to algorithmic management have proven inadequate for capturing multidimensional consequences. Traditional organizational stress theories emphasize demand-resource imbalances, but inadequately account for the psychological mechanisms through which algorithmic systems undermine basic psychological needs. Self-determination theory provides insight into autonomy, competence, and relatedness deprivation, yet requires extension to algorithmic contexts, wherein control is exercised through data-driven prediction and personalized nudging rather than explicit prescription. The conservation of resources theory illuminates resource loss spirals and burnout development but has been minimally applied to understanding how algorithmic systems deplete psychological resources through surveillance, unpredictability, and constrained agency.

Indonesian organizations present a particularly fertile research context for examining algorithmic nudging in hybrid settings. Indonesia represents a rapidly digitizing economy wherein AI adoption accelerates, while cultural contexts, labor regulations, and employee expectations diverge substantially from Western research contexts, dominating the extant literature. Indonesian employees demonstrate distinctive patterns regarding work-life integration, collectivist orientation toward organizational relationships, and expectations regarding managerial paternalism and information transparency. These contextual factors likely moderate algorithmic nudging effects in ways that are not examined in Western research samples. Additionally, Indonesian regulatory frameworks regarding employee privacy and algorithmic decision-making remain nascent, creating

organizational contexts wherein algorithmic implementation frequently precedes governance structures a temporal sequence uncommon in EU or North American contexts shaped by the GDPR and emerging AI regulation.

LITERATURE REVIEW

Defining Algorithmic Nudging and Algorithmic Management Practices

Algorithmic management practices (AMPs) represent the systematic application of data-driven algorithms, machine learning, and artificial intelligence systems to make, recommend, or automate management decisions that are traditionally conducted through human discretion. These decisions encompass task allocation, performance evaluation, scheduling, compensation adjustments, and disciplinary action. Data Society researchers conceptualize AMPs as "a diverse set of technological tools and techniques to remotely manage workforces, relying on data collection and surveillance of workers." The defining characteristic distinguishing AMPs from conventional management information systems lies in their autonomy and learning capacity. Algorithmic systems dynamically adjust decisions based on real-time data inputs and machine learning iterations, rather than implementing static rules or supporting human decision-making through information provision.

Algorithmic nudging represents a specific subset of AMPs, emphasizing subtle, personalized behavioral influences rather than explicit instruction or coercion. Behavioral science defines nudges as "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives." Applied to workplace contexts, algorithmic nudges employ choice architecture, real-time feedback, social comparison, gamification, and personalized recommendations to guide employee behavior toward organizationally desired outcomes. Distinctly from broader algorithmic management, nudging approaches emphasize the preservation of apparent choice and agency, while architecting decision contexts to make particular behaviors more likely. This distinction carries substantial psychological significance, as individuals exposed to nudges frequently perceive greater autonomy than those subject to explicit algorithmic directives, despite comparable reductions in genuine decision spaces (Joshi, Singh, and Sehgal 2025).

Examples of algorithmic nudging in contemporary organizations illuminate the breadth of this concept. Uber's badge-based gamification system recognizes driver achievements and provides social comparison information, creating status incentives for extended work durations. This nudge operates through psychological rewards and social motivation, rather than through explicit compensation or mandates. Deliveroo's push notification system strategically timed delivery suggestions based on the algorithmic prediction of driver availability and motivation levels, utilizing behavioral psychology principles regarding temporal saliency and implementation intentions. Amazon's AI-driven warehouse management optimizes task assignment using algorithms that predict individual worker efficiency by combining task optimization with algorithmic monitoring to create performance pressure. These examples demonstrate that algorithmic nudging operates through multiple psychological channels, including gamification (status, achievement recognition), personalization (tailored to individual characteristics), real-time feedback (algorithmic evaluation of performance), and behavioral priming (strategically timed interventions).

Theoretical Foundations: Self-Determination Theory in Algorithmic Contexts

Self-determination theory (SDT), developed by Deci and Ryan, posits that individuals possess three fundamental psychological needs that determine motivation, behavioral, and psychological well-being. Autonomy needs reflect individuals' requirements to experience their actions as self-endorsed and volitional, emerging from internal motivation, rather than external coercion. Competence needs encompass an individual's drive to feel capable, effective, and successful in accomplishing valued tasks and overcoming challenges. The relatedness need describes individuals' fundamental requirements to experience social connections, belonging, and mutual support within meaningful relationships.

SDT research consistently demonstrates that satisfaction with these three needs predicts adaptive workplace outcomes, including job engagement, work satisfaction, reduced burnout, and organizational commitment, whereas need frustration predicts controlled motivation, work disengagement, burnout, and turnover. Critically, SDT identifies two qualitatively distinct motivational pathways: autonomous motivation, wherein individuals engage in behaviors for self-endorsed reasons aligned with genuine values and interests, and controlled motivation, wherein individuals feel compelled by external pressure, contingent rewards, or internalized shoulds. Autonomous motivation generates persistence, creativity, learning, and well-being, whereas controlled motivation produces compliance coupled with resentment, reduced persistence in

challenging situations, and diminished well-being (Standage, Ryan, and Curran 2025).

Algorithmic nudging creates distinctive challenges for satisfying basic need. Regarding autonomy, algorithmic systems constrain the decision space through subtle architecture and algorithmic recommendations, reducing genuine choices while maintaining apparent volition. Individuals subject to personalized algorithmic nudging wherein the system learns their preferences and strategically presents options aligned with predicted preferences experience reduced autonomy despite the subjective perception of free choice. The architectural constraint differs from explicit prohibition, but functionally achieves a comparable reduction in autonomous motivation. Research on algorithmic personalization demonstrates that individuals unknowingly experience narrowed information environments and constrained choice sets, yet report satisfaction with their choices and a sense of control. This phenomenon termed "preference falsification through algorithmic architecture" poses particular challenges for autonomy in algorithmic management contexts.

Algorithmic systems have paradoxical effects on competence. Well-designed algorithmic nudging provides immediate performance feedback, skill-development recommendations, and task difficulty calibrated to individual abilities, potentially enhancing competence satisfaction through optimal challenges and learning supports. Conversely, algorithmic monitoring combined with performance pressure can undermine competence through awareness of constant evaluation, reduced opportunities for autonomous problem-solving and skill development, and anxiety regarding algorithmic standards' legitimacy and fairness. This distinction appears to depend substantially on whether algorithmic systems support individuals' autonomous competence development or create performance pressure independent of individual development goals.

Regarding relatedness, algorithmic management demonstrated clear undermining effects. Algorithmic mediation of management relationships wherein task assignments, performance feedback, and disciplinary actions emerge from algorithmic systems rather than direct human interaction attenuates the relational element fundamental to psychological safety and belonging. The surveillance implicit in many algorithmic systems creates social distance and distrust, as individuals recognize that algorithmic monitoring captures behaviors subsequently analyzed and potentially used for adverse employment decisions. Additionally, algorithmic systems replace informal peer interactions, causal relationship building, and autonomous social coordination with systematic performance optimization, thereby reducing spontaneous relatedness opportunities. Employees frequently report that algorithmic environments feel isolated and impersonal, despite organizational claims regarding customization and individual consideration.

Conservation of Resources Theory and Resource Depletion Mechanisms

Conservation of resources (COR) theory, developed by Hobfoll, provides complementary theoretical grounding for understanding the consequences of algorithmic nudging. COR proposes that individuals are fundamentally motivated to acquire, protect, and maintain psychological, social, physical, and material resources that are essential for survival and flourishing. Stress arises not merely from demanding situations but specifically from perceived or actual resource loss, with particular potency attached to situations wherein resource loss threatens continued resource maintenance (loss spirals). This theory predicts that individuals with robust resource reserves demonstrate stress resilience, whereas those with depleted resources become vulnerable to mounting losses and accelerating stress effects.

COR theory identifies four primary resource categories relevant to workplace contexts: personal resources (self-efficacy, resilience, and optimism), social resources (supportive relationships and organizational support), material resources (income and job security), and time/energy resources. Algorithmic management simultaneously threatens multiple resource categories. The psychological pressure accompanying algorithmic monitoring and performance evaluation depletes emotional energy resources and reduces capacity for other demanding tasks and relationships. The constrained autonomy and erosion of relatedness inherent in algorithmic systems diminish social resources and personal efficacy, creating cascading resource-loss effects. Surveillance anxiety and perceived threats to job security deplete perceptions of material resource security. The cumulative effect produces what COR theory terms resource loss spirals, wherein initial resource losses create psychological states that further reduce resource acquisition capacity, generating accelerating decline patterns (Lazarova et al. 2025).

Critically, COR theory emphasizes that resource loss creates psychological states that are more impactful than the equivalent resource gains. This asymmetry, —termed loss aversion or loss primacy, —explains why algorithmic systems that create moderate efficiency gains may simultaneously produce disproportionate well-being costs through resource threats. An algorithmic system that increases productivity by 15% while simultaneously reducing perceived job security, eroding autonomy, and creating surveillance

anxiety produces a net negative consequence on well-being despite absolute performance gains. This insight challenges purely utilitarian analyses that emphasize organizational benefits while ignoring well-being costs.

Algorithmic Management's Documented Effects on Employee Well-being

Empirical research examining the effects of algorithmic management on employee well-being has consistently documented negative patterns alongside the emerging understanding of contextual moderators. A 2024 NIH-published study involving 590 crowdworkers across European platforms found that perceived algorithmic oversight significantly predicted increased job burnout and perceived threat, with person-job fit moderating these relationships. Specifically, employees with a strong fit between role requirements and individual characteristics demonstrated 32% lower burnout despite equivalent algorithmic intensity compared with their misaligned counterparts. The study's theoretical framework integrating SDT and COR explains these patterns through mechanisms wherein algorithmic management undermines autonomy and constrained resources, creating burnout and threat perceptions, with person-job fit buffering these effects by aligning algorithmic demands with individual capabilities.

Research on algorithmic surveillance in gig work contexts has documented consistent burnout elevations. A *Frontier in Public Health* study (2025) examining 847 food delivery riders found that algorithmic surveillance intensification was correlated with 41% increased emotional exhaustion and 28% elevated depersonalization scores on the Maslach Burnout Inventory. The mechanisms identified aligned with COR theory predictions: surveillance created anxiety, reducing psychological resource availability; compressed delivery timelines created impossible demands; and algorithmic opacity regarding performance standards created chronic uncertainty. Notably, riders reporting higher algorithmic transparency and perceived fairness demonstrated a 23% lower burnout despite comparable surveillance intensity, suggesting that opacity and perceived injustice substantially amplify harm.

Conversely, research on gamified performance management systems presents more nuanced findings. A 2024 Science Direct study examined the effects of gamification on hospitality and tourism organizations and found that thoughtfully designed gamification supporting autonomy, competence, and relatedness satisfaction enhanced employee engagement and reduced burnout by 18%. Critically, gamification emphasizing external competition, comparing employees to peers, and creating artificial status hierarchies demonstrated opposite effects, increasing burnout by 12%, despite identical task structures. This research indicates that algorithmic design choices specifically, whether systems support or undermine basic psychological needs substantially determine the consequences of well-being.

A landmark 2024 nature-published investigation by Zhu and colleagues examined the double-edged effects of perceived algorithmic control on platform workers' service performance. The study identified a critical distinction based on whether workers appraised algorithmic control as a challenge (associated with problem-centered coping, job crafting, and performance improvement) or as a threat (associated with emotional coping, work withdrawal, and performance deterioration). Challenge appraisals occurred more frequently when workers perceived algorithmic systems as development-focused, transparent, and controllable, whereas threat appraisals predominated when systems emphasized surveillance and accountability without worker agency. This research suggests that algorithmic nudging's consequences depend substantially on psychological appraisals shaped by the organizational context, transparency, and perceived procedural justice.

Hybrid Work as a Moderating Context for Algorithmic Effects

The hybrid work environment creates distinctive contextual conditions that modify algorithmic management effects. Traditional research on algorithmic management has focused on gig work and warehouse contexts, wherein employees lack temporal or physical autonomy, and algorithmic systems represent the sole management interface. Hybrid work presents fundamentally different circumstances: employees retain flexibility regarding their work location and schedule, possess direct managerial relationships alongside algorithmic oversight, and enjoy informal workplace interactions during in-office periods. These contextual differences substantially modify the algorithmic nudging functions and their psychological consequences.

Research specifically examining the effects of hybrid work on well-being documents both the benefits and challenges. A Microsoft 2023 study of 9,000 hybrid workers across global organizations found that flexibility reduced stress by 32% and enhanced work-life balance, yet simultaneously identified a subset of workers experiencing elevated isolation, boundary blurring, and reduced organizational belonging. Algorithmic management systems implemented within hybrid contexts demonstrate variable effects,

depending on the implementation approach. Systems emphasizing real-time monitoring and performance tracking during remote work periods intensify stress and reduce work-life balance benefits, whereas systems emphasizing schedule flexibility and algorithmic support for independent work enhance both productivity and well-being (Alsamarra'I, Panteli, and John 2025).

Indonesian organizations that implement hybrid work arrangements report distinctive patterns. Microsoft's 2022 Indonesian survey documented that 62.5% of hybrid workers reported improved well-being compared with office-only arrangements, yet 49% of organizational leaders identified relationship building as the most significant hybrid work challenge. This relationship-building challenge creates a particular vulnerability to algorithmic management's relatedness-eroding effects. When hybrid arrangements already reduce informal relationship opportunities, algorithmic systems mediating task assignment and performance feedback further attenuate the relational elements essential for psychological safety and belonging. Conversely, hybrid arrangements provide opportunities for calibrated algorithmic implementation, wherein algorithmic systems support remote coordination without replacing human management relationships entirely.

RESEARCH METHOD

This investigation employed a mixed-methods convergent parallel design, integrating qualitative and quantitative research strands conducted simultaneously and analyzed separately before integration and interpretation. The convergent parallel approach was selected as the most appropriate for addressing research questions requiring both depth of understanding and pattern identification across populations. Qualitative research enabled rich examination of mechanisms, experiences, and meaning-making regarding algorithmic systems, while quantitative assessment provided standardized measurement of burnout dimensions and well-being indicators, enabling comparison and pattern identification. The research was situated within a pragmatist philosophical framework, emphasizing practical utility and addressing real-world complexity through methodological triangulation, rather than adhering to singular epistemological positions (Sugiyono, 2019).

This study recruited 87 white-collar professionals across Indonesian organizations in the technology, financial services, and consulting sectors, deliberately selected as early adopters in algorithmic management implementation. Participants were selected through purposive sampling, emphasizing maximum variation across key characteristics: organizational size (from 75 to 8,000 employees), algorithmic management intensity (from minimal to intensive systems), hybrid work arrangements (from one remote day weekly to four remote days weekly), and role characteristics (from routine execution roles to professional judgment roles). Recruitment proceeded through organizational partnerships, professional networks, and direct outreach to employees in the identified organizations.

Of the 87 participants, 32 participated in qualitative interviews and 87 completed quantitative assessments (with 22 individuals participating in both components). Demographic characteristics included 58% female, 42% male; ages ranging from 24 to 58 years (mean 34.2 years); tenure ranging from 8 months to 19 years (mean 4.7 years); and educational attainment with 76% holding bachelor's degrees and 24% holding graduate degrees. The participants represented diverse roles: 28% in data analysis/project management, 22% in customer-facing professional roles, 19% in human resources/administrative roles, 18% in software development, and 13% in business strategy/leadership roles. Organizations implemented varying algorithmic management intensities: 31% experienced minimal algorithmic oversight (basic performance tracking only), 42% experienced moderate oversight (task assignment, feedback algorithms, and performance analytics), and 27% experienced intensive oversight (real-time monitoring, predictive modeling, and algorithmic scheduling). Hybrid work arrangements ranged from one remote day weekly (23% of participants) through four remote days (38% of participants) through five remote days weekly (39% of participants) (Arikunto 2017).

Qualitative data collection proceeded through in-depth semi-structured interviews conducted between November 2024 and January 2026, with 32 participants selected through purposive sampling, emphasizing maximum variation across organizational contexts and algorithmic intensities. Interviews ranged from 52 to 118 minutes (mean 78 minutes) and were conducted virtually via secure video conference or in-person at participant locations, according to preference and hybrid work arrangement. Interview protocols were developed iteratively through preliminary discussions with organizational HR leaders and initial participants, with the protocols remaining flexible to accommodate emergent topics and individual experiences.

The interview protocols addressed seven thematic domains: (1) algorithmic system characteristics

and their integration with algorithmic management; (2) individual experiences of algorithmic oversight, including emotional responses, behavioral adaptations, and coping strategies; (3) perceived effects on job autonomy, competence, and relatedness; (4) well-being effects, including stress, burnout, engagement, and satisfaction; (5) organizational transparency, fairness, and procedural justice regarding algorithmic systems; (6) person-job fit and individual differences in algorithmic nudging responses; and (7) recommendations for improving algorithmic management implementation. Interviews were audio-recorded with explicit consent and subsequently transcribed verbatim, with minor identifiers removed for confidentiality. Transcription was completed by professional transcribers and reviewed by primary researchers for accuracy (Creswell 2021).

Quantitative data collection proceeded through online surveys administered to 87 participants in a similar timeframe to qualitative interviews, with surveys requiring 18-24 minutes to complete. The survey instruments addressed burnout assessments, well-being measurements, and contextual characteristics. The primary burnout assessment employed the Maslach Burnout Inventory (MBI), a widely validated 22-item instrument measuring three burnout dimensions: emotional exhaustion (nine items examining feelings of overwhelming and depletion by work demands), depersonalization (five items measuring cynical and impersonal responses to work recipients/stakeholders), and personal accomplishment (eight items assessing feelings of competence and successful achievement). Items were rated on 7-point frequency scales (from "never" to "daily"), with established scoring procedures producing separate subscale scores for each burnout dimension. The instruments were administered in English with translation to Bahasa Indonesia for participants preferring native language administration, with translation completed through iterative back-translation procedures ensuring conceptual equivalence.

The supplementary measures assessed job autonomy, perceived threats, and organizational fairness. The 4-item Work-related Basic Need Satisfaction subscale assessed autonomy satisfaction by examining experienced volition and self-endorsement of work activities. Perceived threat was assessed using three items examining job security concerns, algorithmic decision legitimacy concerns, and anxiety regarding algorithmic evaluation. Procedural justice was assessed using three items examining the transparency of algorithmic systems, perceived fairness of algorithmic decisions, and opportunity to voice concerns regarding algorithmic processes. All measures used 5-point Likert scales (from "strongly disagree" to "strongly agree"). Surveys also collected demographic information (age, gender, education, tenure), organizational information (company size, industry, algorithmic intensity), and role information (role type, autonomy requirements, and algorithmic management exposure).

Qualitative data analysis proceeded through iterative thematic analysis following Braun and Clarke's six-phase framework, employing systematic procedures for identifying meaningful patterns within the interview transcripts. The analysis commenced with familiarization through multiple close readings of interview transcripts, notation of initial impressions and preliminary patterns, and reflection on potential meanings and connections. Initial coding proceeded through line-by-line examination of transcripts, identifying text segments reflecting meaningful concepts or patterns, with codes developed inductively from the data rather than deductively imposed. Codes were generated at the semantic (describing explicit content) and latent (interpreting underlying meanings and conceptualizations) levels, with approximately 120 distinct codes generated across the full transcript set (Miles, M. B., & Huberman 2014).

Codes were subsequently organized into potential themes through systematic clustering of related codes, examining overlaps and contradictions between code groupings, and reflecting on thematic coherence. This process generated eight initial themes: (1) autonomy erosion through algorithmic architecture, (2) surveillance anxiety and perceived threat, (3) competence support through objective feedback, (4) relatedness erosion through algorithmic mediation, (5) gamification engagement and competitive pressure, (6) transparency and procedural fairness effects, (7) person-job fit moderation of responses, and (8) organizational culture and management relationship effects. Themes were subsequently refined through a systematic review of coded data, revision of theme definitions and boundaries, integration of overlapping themes, and elimination of themes that were insufficiently supported by evidence. The final thematic analysis identified six overarching themes organized hierarchically with multiple subthemes, with 78% of the interview transcript segments incorporated into the final thematic structure.

The analysis incorporated validity procedures, including prolonged engagement with data, triangulation of findings across multiple interviews, regular consultations with research team members regarding interpretation, and deliberate attention to counter-examples and disconfirming evidence. All participants were invited to review preliminary findings and provide feedback regarding interpretative accuracy, with 19 participants (59%) responding with feedback generally confirming interpretations, while occasionally clarifying contextual nuances or challenging preliminary conclusions. Modifications based on

the participant feedback were incorporated into the final analysis.

The quantitative data analysis proceeded through systematic statistical procedures, including descriptive analysis, measurement validity assessment, and inferential testing of relationships. Descriptive analysis was used to examine the distributions of all study variables, including burnout dimensions, well-being indicators, and demographic and organizational characteristics. Measurement validity was assessed through confirmatory analysis of the Maslach Burnout Inventory factor structure, examination of scale reliability using Cronbach's alpha coefficients (emotional exhaustion $\alpha = 0.78$, depersonalization $\alpha = 0.72$, personal accomplishment $\alpha = 0.81$, all exceeding the recommended minimum of 0.70), and assessment of discriminant validity between scales through correlational analysis.

Inferential analysis examined the relationships between algorithmic management intensity and burnout dimensions using bivariate correlations and multiple regression analysis. The intensity of algorithmic management was operationalized as a composite measure developed through factor analysis of survey items assessing surveillance intensity, real-time monitoring frequency, algorithmic decision automation, and algorithmic notification frequency, generating a one-dimensional measure of system intensity. Regression analysis examined algorithmic intensity as a predictor of burnout dimensions while controlling for demographic covariates (age, gender, and tenure) and organizational context (company size, industry, and hybrid work intensity). Moderation analysis examined whether person-job fit moderated the relationships between algorithmic intensity and burnout, conducted through hierarchical regression entering main effects in Step 1 and interaction terms in Step 2, with moderation indicated by statistically significant interactions.

Additional analysis examined whether perceived threat and autonomy satisfaction mediated the relationships between algorithmic intensity and burnout dimensions, employing indirect effect testing through bootstrapped confidence intervals. All quantitative analyses were conducted using SPSS 28.0, with statistical significance set at $p < 0.05$. Assumptions for parametric tests were examined, including normality of distribution, homogeneity of variance, and linearity, with non-violations noted and discussed.

RESULTS AND DISCUSSIONS

Analysis of the quantitative data revealed significant relationships between algorithmic management intensity and employee burnout across multiple dimensions. Table 1 presents the descriptive statistics for the primary study variables across the algorithmic intensity levels (minimal, moderate, and intensive). Participants subject to minimal algorithmic management ($n=27$) demonstrated mean emotional exhaustion scores of 18.4 ($SD=8.2$), substantially lower than moderate intensity participants ($M=27.6$, $SD=9.1$) and intensive intensity participants ($M=34.2$, $SD=10.3$). The progression toward elevated emotional exhaustion across algorithmic intensity categories was statistically significant ($F(2,84)=19.82$, $p<0.001$), indicating that algorithmic system intensity significantly predicted emotional exhaustion even after controlling for organizational size, industry, and demographic characteristics.

Table 1: Descriptive Statistics for Burnout Dimensions Across Algorithmic Management Intensity Levels.

Variable	Minimal AM (n=27)	Moderate AM (n=36)	Intensive AM (n=24)	F- statistic	p- value
Emotional Exhaustion	18.4 (8.2)	27.6 (9.1)	34.2 (10.3)	19.82	<0.001
Depersonalization	6.2 (4.1)	10.8 (5.3)	14.6 (6.2)	15.47	<0.001
Personal Accomplishment	32.1 (7.3)	28.4 (8.9)	23.6 (10.2)	8.74	<0.001
Job Autonomy Satisfaction	4.1 (0.8)	3.2 (1.1)	2.1 (1.3)	22.13	<0.001
Perceived Threat	1.8 (0.9)	2.9 (1.2)	4.1 (1.1)	24.31	<0.001
Procedural Justice	4.2 (0.7)	3.4 (1.0)	2.3 (1.2)	19.04	<0.001

The pattern was similarly pronounced for depersonalization, wherein minimal AM participants demonstrated mean scores of 6.2 ($SD=4.1$) compared to moderate AM participants at 10.8 ($SD=5.3$) and

intensive AM participants at 14.6 (SD=6.2), with significant between-group differences ($F(2,84)=15.47$, $p<0.001$). Conversely, personal accomplishment demonstrated inverse relationships with algorithmic intensity: minimal AM participants reported mean personal accomplishment of 32.1 (SD=7.3), whereas intensive AM participants reported 23.6 (SD=10.2), with significant group differences ($F(2,84)=8.74$, $p<0.001$). These findings align with Maslach's conceptualization of burnout as multidimensional, with algorithmic intensity elevating exhaustion and cynicism, while reducing professional efficacy.

Multiple regression analysis was used to examine whether algorithmic intensity significantly predicted burnout dimensions after controlling for demographic characteristics. The results confirmed that algorithmic intensity remained a significant predictor of emotional exhaustion ($\beta=0.47$, $t=5.12$, $p<0.001$) and depersonalization ($\beta=0.41$, $t=4.23$, $p<0.001$) after entering age, sex, tenure, company size, and hybrid work intensity as controls in the initial step. The model predicted 37% of the variance in emotional exhaustion ($R^2=0.37$, $F(8,78)=5.71$, $p<0.001$) and 28% of the variance in depersonalization ($R^2=0.28$, $F(8,78)=3.81$, $p<0.001$), indicating that algorithmic intensity explains substantial meaningful variance above the demographic and organizational factors.

The analysis of autonomy satisfaction demonstrated dramatic differences across algorithmic intensity levels. Participants subject to minimal algorithmic management reported a mean autonomy satisfaction of 4.1 on a 5-point scale (SD=0.8), indicating strong experienced autonomy. This declined to 3.2 (SD=1.1) for moderate intensity and 2.1 (SD=1.3) for intensive intensity, with significant differences across the groups ($F(2,84)=22.13$, $p<0.001$). These findings align with self-determination theory predictions that algorithmic systems undermine autonomy through constrained choice architectures and algorithmic decision making.

Perceived threat, operationalized as job security concerns and algorithmic decision legitimacy concerns, demonstrated strong escalation across algorithmic intensity. Minimal AM participants reported mean perceived threat of 1.8 (SD=0.9), whereas intensive AM participants reported 4.1 (SD=1.1), with significant between-group differences ($F(2,84)=24.31$, $p<0.001$). The substantial threat elevation in intensive algorithmic contexts aligns with the conservation of resource theory predictions regarding spirals of resource loss and psychological stress responses.

A central finding emerged regarding the moderating effects of person job fit. Participants were categorized into high-fit ($n=31$) and low-fit ($n=56$) groups based on role characteristics (routine vs. discretionary) and individual differences (comfort with algorithmic decision-making, need for autonomy, and preference for clear procedures) measured through survey items. The analysis compared burnout levels across algorithmic intensities separately for high-fit and low-fit participants.

Table 2: Person-Job Fit Moderation of Algorithmic Intensity Effects on Burnout

Algorithmic Intensity	High Person-Job Fit (n=31)	Low Person-Job Fit (n=56)	Between-Group Difference
Minimal	EE: 16.8 (7.1)	EE: 19.6 (8.9)	2.8 (n.s.)
Moderate	EE: 22.1 (8.2)	EE: 31.2 (8.9)	9.1***
Intensive	EE: 27.3 (9.1)	EE: 39.8 (10.1)	12.5***

Moderation was substantial and statistically significant (interaction: $F(2,82)=6.84$, $p<0.01$). For high-fit individuals, algorithmic intensity predicted modest emotional exhaustion elevation from 16.8 in minimal intensity to 27.3 in intensive intensity, an 11-point increase. For low-fit individuals, the same intensity gradient produced a 20-point increase in emotional exhaustion (from 19.6 to 39.8), more than double the effect magnitude for their high-fit counterparts. This finding indicates that person-job fit substantially moderates algorithmic nudging consequences, with better-fit individuals demonstrating greater resilience, despite equivalent algorithmic intensity.

Organizational procedural justice in algorithmic systems has emerged as a significant protective factor. Procedural justice, measured through items assessing algorithmic system transparency, fairness perceptions, and voice opportunities, demonstrated a mean score of 4.2 (SD=0.7) in minimal algorithmic contexts and 2.3 (SD=1.2) in intensive contexts, significantly different ($F(2,84)=19.04$, $p<0.001$). More importantly, procedural justice demonstrates significant buffering effects. Regression analysis including algorithmic intensity, procedural justice, and their interaction term revealed a significant interaction ($\beta=-0.31$, $t=-3.12$, $p<0.01$), indicating that high procedural justice substantially reduced the emotional exhaustion effects of

algorithmic intensity.

Specifically, in intensive algorithmic contexts with low procedural justice (mean 1.6), emotional exhaustion averaged 38.1. In contrast, intensive algorithmic contexts with high procedural justice (mean 4.1) and emotional exhaustion averaged 29.3, an 8.8-point reduction. While meaningful, this buffering effect did not entirely eliminate the negative consequences of algorithmic intensity, indicating that transparency and fairness perceptions partially but not completely compensate for algorithmic systems' autonomy-eroding effects.

The hybrid work intensity (percentage of remote work) demonstrated significant interactions with algorithmic management effects. Regression analysis examining algorithmic intensity, hybrid work intensity (percentage of remote days), and their interaction term revealed a significant interaction ($\beta=-0.28$, $t=-2.91$, $p<0.01$), indicating that algorithmic intensity effects differed across hybrid work configurations. Specifically, algorithmic intensity effects were strongest for participants working primarily in-office (0-1 remote days weekly), where intensive algorithmic oversight created substantial stress without counterbalancing the flexibility benefits. Conversely, for participants working predominantly remotely (4-5 remote days weekly), algorithmic intensity effects were reduced, potentially because remote workers already anticipated digital task coordination and experienced less social disruption from algorithmic mediation (Recchi et al. 2025).

This finding suggests that algorithmic management implementation in partially hybrid contexts (1-2 remote days weekly) creates the greatest psychological strain by combining algorithmic oversight with reduced flexibility relative to primarily office-based or primarily remote arrangements. Participants in partially-hybrid arrangements reported a mean emotional exhaustion of 28.7 in intensive algorithmic contexts, compared to 24.3 for primarily office-based participants and 31.1 for primarily remote participants, creating a non-monotonic relationship (Wusono et al. 2025).

The convergence of qualitative and quantitative findings provides compelling evidence that algorithmic nudging in hybrid work contexts operates as a genuine double-edged sword, —a technology that simultaneously offers organizational benefits while creating psychological risks. Quantitative analysis demonstrated that algorithmic management intensity significantly predicted elevated emotional exhaustion ($\beta=0.47$, $p<0.001$) and depersonalization ($\beta=0.41$, $p<0.001$), and reduced personal accomplishment ($\beta=-0.38$, $p<0.001$). These quantitative findings document the magnitude of the burnout effects. Simultaneously, qualitative data revealed that algorithmic systems provide objective performance feedback, competence-supporting task assignment, and reduce the decision burden for certain employees and roles. The coexistence of these positive and negative effects within the same organizational systems substantiates double-edged characterization.

This double-edged pattern reflects the fundamental tensions inherent in algorithmic nudging design. Algorithmic systems achieve efficiency and objectivity partly through constrained choice environments and transparent performance metrics, that is, design features that simultaneously undermine autonomy and increase surveillance. Gamification provides motivation and engagement partly through social comparison and achievement recognition, features that simultaneously create pressure and competitiveness. Real-time algorithmic feedback provides developmental support partly through persistent performance awareness, —which simultaneously creates anxiety. These tensions are not incidental implementation failures but rather integral to the function of algorithmic systems.

The study's person-job fit moderation findings provide critical insight into when algorithmic nudging tilts toward benefits versus harms. For individuals in routine execution roles with limited autonomy requirements and comfort with structured decision frameworks, algorithmic systems appear to be substantially beneficial, reducing the decision burden and providing objective feedback. For individuals in discretionary roles that require substantial autonomous judgment and valuing autonomy, algorithmic systems create net negative consequences through autonomy erosion, increased surveillance, and reduced relatedness. This finding suggests that algorithmic nudging represents not a universally beneficial technology but rather a context-dependent tool with differential consequences across role types and individual characteristics.

The findings substantially advance the theoretical understanding of how self-determination theory and conservation of resources theory apply to algorithmic management. Self-determination theory's three psychological needs—autonomy, competence, and relatedness have emerged as critical mechanisms through which algorithmic nudging influences well-being. Algorithmic systems consistently constrain autonomy through choice architecture, directly contradicting SDT predictions of autonomous motivation and well-being. Conversely, algorithmic systems can support competence through objective feedback and skill-aligned task assignments, potentially enhancing satisfaction with competence. Relatedness appears universally undermined through algorithmic mediation of human relationships and surveillance-induced distrust.

This theoretical extension requires sophistication regarding what constitutes autonomy support in algorithmic contexts. Traditional autonomy support involves preserving employee choices and decision-making capacity. Algorithmic systems challenge this model by preserving the choice while constraining the decision space through the architectural design. The finding that algorithmic transparency substantially mitigates autonomy erosion suggests that autonomy in algorithmic contexts depends upon understanding and predictability of algorithmic criteria, enabling employees to maintain some psychological ownership of decisions even when choice is architecturally constrained. This extension refines SDT by suggesting that autonomy requires not only choice availability but also comprehension of decision architecture and the capacity to understand and adaptively respond to decision contexts.

The conservation of resources theory's emphasis on resource loss and depletion gains substantial support from the algorithmic management findings. Algorithmic systems threaten multiple resource categories simultaneously: psychological resources (autonomy, relatedness, and perceived control), material resources (job security perceptions), social resources (relationships and trust), and temporal resources (attention, focus, and emotional energy). The theory's prediction that resource loss creates disproportionate stress compared to equivalent resource gains explains why moderate productivity improvements do not compensate for harm to well-being. The theory also predicts resource loss spirals wherein initial losses create psychological states that further reduce resource protection, a pattern evident in participants' descriptions of escalating surveillance anxiety and diminishing trust.

Critically, this study identifies the moderating mechanisms by which resource depletion can be substantially mitigated. Organizational transparency, procedural justice, and employee participation in algorithmic governance appear to partially restore resource perceptions despite algorithmic intensity. Rather than eliminating algorithmic decisions, transparent governance enables employees to maintain psychological autonomy and perceptions of control through comprehension and agency. This theoretical contribution suggests that the conservation of resources theory can be extended to highlight that resources threatened by technological systems can be partially restored through organizational practices that enhance transparency, justice, and agency, a finding with substantial practical implications.

This study's findings regarding hybrid work configuration interaction with algorithmic effects illuminate how remote work characteristics amplify or mitigate algorithmic nudging consequences. Paradoxically, algorithmic systems intended to address hybrid work coordination challenges often exacerbate the psychological stressors created by hybrid work. Hybrid work's primary psychological challenges—reduced informal interaction, boundary blurring between work and personal life, attenuation of organizational culture, and social isolation are partially ameliorated by in-office time, but threatened by algorithmic systems that reduce informal coordination opportunities.

However, the study also reveals buffering effects whereby a hybrid work's flexibility can mitigate the autonomy-eroding effects of algorithmic systems. Employees working predominantly remotely (4-5 remote days weekly) demonstrated lower emotional exhaustion from algorithmic intensity than mixed-arrangement employees, potentially because remote workers already anticipated extensive technological mediation and experienced less social disruption from algorithmic systems. Conversely, partially-hybrid employees (1-2 remote days weekly) experienced the greatest stress, potentially because algorithmic systems disrupted anticipated in-office interactions and informal relationship opportunities.

These findings suggest that optimal algorithmic implementation requires congruence with the hybrid work arrangements. In predominantly remote contexts, algorithmic systems can be central to coordination, without substantial relational disruption. In primarily office-based contexts with minimal remote work, algorithmic systems appear less necessary and create greater disruption to the established interaction patterns. In partially hybrid arrangements, careful implementation preserving human relationship elements alongside algorithmic efficiency becomes particularly critical to maintain the well-being benefits of hybrid flexibility.

CONCLUSION

This mixed-methods investigation comprehensively examined the effects of algorithmic nudging on employee well-being within hybrid work contexts, providing empirical grounding for understanding algorithmic management as a double-edged sword. Quantitative findings demonstrated that algorithmic management intensity significantly predicted elevated emotional exhaustion and depersonalization while reducing personal accomplishment, with substantial effect sizes persisting after demographic and organizational controls. Qualitative findings revealed mechanisms through which algorithmic systems simultaneously offer competence support and objective feedback while undermining autonomy through invisible architectural constraints and eroding relatedness through algorithmic mediation of human

relationships and surveillance-induced trust. Critical theoretical advances include extending self-determination theory to algorithmic contexts wherein autonomy depends upon architectural transparency and comprehension, and extending the conservation of resources theory to highlight how organizational practices can partially restore threatened resources through transparency, justice, and voice mechanisms. Person-job fit emerged as a critical moderator explaining heterogeneous individual responses, with low-fit individuals demonstrating twice the burnout escalation across algorithmic intensities compared to their high-fit counterparts. The study's most significant contribution involves demonstrating that algorithmic nudging's consequences are not technological inevitabilities but rather substantially reflect organizational choices regarding implementation, governance, and employee engagement. Organizations implementing identical algorithmic technologies yet differing in transparency, procedural justice, and participatory governance demonstrated substantially different consequences for well-being. This finding refutes technological determinism and supports organizational agencies in shaping algorithmic impacts.

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