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REVIEW ARTICLE

Balancing Care and Code: Exploring Algorithmic Influences on Nurses' Job Happiness

Equilibrando la atención y el código: Explorando las influencias algorítmicas en la felicidad laboral de las enfermeras

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Abstract The research has primarily focused on productivity and profitability, overlooking essential inquiries into the impact of algorithms on autonomy, trust, and well-being. This conceptual paper presents a paradigm to clarify the influence of algorithmic management on job satisfaction among nursing staff in Malaysia. Drawing on literature from 2020 to 2024, it integrates perspectives from the Job Demands–Resources model, Self-Determination Theory, and sociotechnical systems theory. The framework identifies algorithmic management as a critical factor affecting perceived autonomy, fairness, and trust in AI systems, which in turn shape job satisfaction. Organizational support and digital literacy are proposed as potential moderators that may either strengthen or weaken these relationships. The paper contributes to three key domains: theoretically, it extends existing debates by situating algorithmic management and job happiness within the Malaysian healthcare sector; practically, it provides managers and policymakers with a conceptual framework to assess the unintended effects of digitalization on frontline caregivers; and methodologically, it outlines avenues for future empirical research, offering guidance for studies aimed at reconciling efficiency with compassion in nursing.

Keywords algorithmic management, nurses, job satisfaction, job happiness, perceived autonomy, trust in AI systems.

Resumen La investigación se centró en la productividad y la rentabilidad, descuidando las indagaciones esenciales sobre el impacto de los algoritmos en la autonomía, la confianza y el bienestar. Este documento conceptual presenta un paradigma para aclarar la influencia de la gestión algorítmica en la satisfacción laboral del personal de enfermería en Malasia. Utilizando la literatura de 2020 a 2024, combina perspectivas del modelo de Demandas-Recursos Laborales, la Teoría de la Autodeterminación y las perspectivas de sistemas sociotécnicos. El enfoque identifica la gestión algorítmica como un factor crucial que afecta la autonomía percibida, la justicia y la confianza en los sistemas de IA, lo que a su vez influye en la satisfacción laboral. El apoyo organizacional y la alfabetización digital se presentan como posibles moderadores que pueden potenciar o disminuir estas interacciones. El documento contribuye a tres dominios fundamentales. En teoría, amplía los debates existentes al situar la gestión algorítmica y la felicidad laboral en el sector sanitario malasio. Proporciona a los gestores y responsables políticos un marco conceptual para evaluar los efectos inesperados de la digitalización en los cuidadores de primera línea. Esto, desde el punto de vista metodológico, propone vías para futuras investigaciones empíricas, ofreciendo orientación para investigaciones que puedan fundamentar soluciones que concilien la eficiencia con la compasión en enfermería.

Palabras clave gestión algorítmica, enfermeros, satisfacción laboral, felicidad laboral, autonomía percibida, confianza en los sistemas de IA.

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PUBLIS EDITORIAL

Introduction

The accelerated digitisation of healthcare has generated novel opportunities and problems for frontline personnel, particularly nurses. Algorithmic management, characterised by the utilisation of data-driven systems for the allocation, oversight, and assessment of work, has gained prominence in hospitals and clinics (Galière, 2021; Kellogg et al., 2020). Although global research has highlighted the efficiency benefits of these systems, their impact on nurses' job happiness and well-being remains under explored (Parent-Rocheleau & Parker, 2021). In Malaysia, where nurses constitute the predominant segment of healthcare professionals, the adoption of algorithmic systems is still developing, prompting enquiries on how these technologies transform the caregiving experience.

The problem is not solely technological but profoundly human. Scholars contend that the integration of algorithms into professional sectors frequently undermines conventional concepts of autonomy, justice, and trust (Meijerink & Bondarouk, 2021, Tan et al., 2023). In nursing, these aspects are intricately linked to occupational contentment, which includes both job happiness and overall psychological well-being (Ramlan & Hashim, 2021). Research in Malaysia indicates that job happiness among nurses is adversely affected by workload constraints, emotional fatigue, and retention issues (Al-Dubai et al., 2020, Ismail et al., 2022). Algorithmic systems may serve as both facilitators and sources of stress, contingent upon their design and implementation.

Numerous experts have observed that algorithmic management is seldom impartial, frequently perpetuating managerial paradigms that prioritise efficiency at the expense of well-being (Wood et al., 2021). The implementation of inflexible scheduling algorithms or performance monitoring systems can undermine the autonomy and professional discretion of nurses, whose professional identity is founded on compassion and patient care (Brougham & Haar, 2021). Conversely, when employed judiciously, algorithms can alleviate administrative burdens, optimise shift assignments, and improve equity in job distribution (Huang et al., 2022). This contradiction emphasises the necessity of conceptual frameworks that transcend efficiency measures to consider human well-being in technology-driven organisations.

In the Malaysian context, research on algorithmic management is scarce, nonetheless, pertinent studies on digital health and occupational well-being offer significant insights. Nurani et al. (2023) discovered that the adoption of digital health in Malaysian hospitals enhanced information flow, although also induced stress stemming from technology-related expectations. A study by Yusoff and Hussain (2021) indicated that the work-life balance of Malaysian nurses is significantly influenced by organisational practices, which may be further exacerbated by algorithmic scheduling. These findings indicate that the impact of algorithms on job happiness cannot be comprehended independently of wider organisational and cultural settings.

This study is theoretically based on three perspectives. The Job Demands–Resources (JD-R) model offers a valuable framework for analysing how algorithms modify demands (e.g., heightened monitoring, intensified workload) and resources (e.g., equitable scheduling, transparent workload) in nursing (Bakker & Demerouti, 2017, modified by Lesener et al., 2020). Self-Determination Theory introduces a psychological aspect, highlighting the significance of autonomy, competence, and relatedness in relation to job happiness (Ryan & Deci, 2020). The sociotechnical systems perspective emphasises that technological change is inextricably linked to its organisational and human context (Trist, 1981, modified in Cagliano et al., 2021). Incorporating these viewpoints enables us to understand the effects of algorithmic management on both performance and nurses' job happiness. This inquiry's significance is heightened by recent governmental initiatives in Malaysia. The Ministry of Health has recognised the pivotal role of nurses in fulfilling national health objectives and the pressing necessity to tackle retention and well-being concerns (Ministry of Health Malaysia, 2022). The impetus for digital health transformation, expedited by the COVID-19 pandemic, has integrated algorithmic tools into routine nursing practice (Che et al., 2021). The concurrent constraints of digitalisation and workforce sustainability need an examination of the intersection between algorithms and the human aspects of nursing.

This concept paper aims to establish a paradigm that elucidates the influence of algorithmic management on nurses' job happiness and well-being in Malaysia. The concept identifies algorithmic management as a pivotal element affecting perceived autonomy, justice, and confidence in AI systems, with organisational support and digital literacy serving as moderating factors. The study advances three domains by presenting theoretical propositions for empirical validation. Initially, it expands current discussions on algorithmic management by contextualising them within the Malaysian healthcare framework. Secondly, it offers managers and policymakers a conceptual framework to foresee and alleviate the unintended repercussions of digitisation on nurses. Third, it delineates prospective research avenues that can guide methods to reconcile efficiency with compassion in nursing.

Algorithmic management denotes the utilisation of computational systems to assign, oversee, and assess work tasks, frequently supplanting or enhancing conventional supervisory roles (Kellogg et al., 2020). In healthcare, this encompasses applications such as digital rostering, predictive patient flow models, and automated performance dashboards.

Research indicates that although these systems can enhance decision-making efficiency, they simultaneously raise issues with transparency, accountability, and employee autonomy (Galière, 2021; Wood et al., 2021).

From a Malaysian viewpoint, the digitisation of healthcare is advancing inconsistently, with certain institutions implementing AI-based triage and scheduling technologies, but others continue to depend predominantly on manual systems (Che et al., 2021). Recent studies indicate that algorithmic technologies may alleviate administrative duties while concurrently increasing nurses' feelings of surveillance and performance pressure (Tan et al., 2023). The dual impact underscores the duality of algorithmic systems: they can improve efficiency while compromising human experience.

Job happiness among nurses includes contentment, emotional wellness, and involvement (Ramlan & Hashim, 2021). It has been associated with retention, patient safety, and service quality on a global scale (Brougham & Haar, 2021). Nurses in Malaysia frequently experience stress due to excessive workloads, extended shifts, and restricted prospects for career progression (Ismail et al., 2022; Yusoff & Hussain, 2021). Al-Dubai et al. (2020) identified burnout as a significant factor contributing to job dissatisfaction among Malaysian nurses, whereas Nurani et al. (2023) highlighted that digital transitions have added new dimensions of stress associated with technology adoption.

While job happiness has been extensively researched about conventional organisational elements, there is a paucity of Malaysian studies that specifically connect it with digitisation or algorithmic systems. This gap underlines the necessity for conceptual frameworks that incorporate technology-driven factors into current models of nurse well-being.

Autonomy is fundamental to job happiness and professional identity in nursing (Ryan & Deci, 2020). Algorithmic systems can restrict autonomy by standardising decisions, enforcing inflexible timelines, or prioritising metrics over judgement (Parent-Rocheleau & Parker, 2021). Conversely, algorithms that offer decision assistance instead of control can enhance autonomy by alleviating mundane responsibilities, so allowing nurses to concentrate on patient care (Huang et al., 2022).

Confidence in artificial intelligence is equally essential. Nurses are more inclined to embrace algorithmic technologies when they view them as transparent, equitable, and consistent with professional standards (Meijerink & Bondarouk, 2021). In Malaysia, trust concerns regarding digital health adoption have been noted, with inadequate training and unclear system design fostering mistrust (Nurani et al., 2023). Organisational support and sufficient digital literacy training may serve as essential facilitators in fostering trust.

The Job Demands–Resources (JD-R) paradigm conceptualises algorithms as generating both new demands (e.g., monitoring, increased workload) and new resources (e.g., equitable scheduling, transparent workload distribution) (Lesener et al., 2020). The Self-Determination Theory (SDT) framework introduces a psychological dimension, highlighting that the fulfilment of autonomy, competence, and relatedness is fundamental to workplace pleasure (Ryan & Deci, 2020). The sociotechnical systems perspective emphasises that technology must be evaluated in conjunction with organisational structures, cultural norms, and human values (Cagliano et al., 2021). This study provides a framework in which algorithmic management influences perceived autonomy, fairness, and confidence in AI, subsequently affecting job happiness. Moderating factors such as organisational support and digital literacy contextualise these interactions, especially within Malaysia's distinctive healthcare environment.

The adoption of algorithmic management in health care settings has drawn growing attention, however its effects on nurses' job happiness remain insufficiently theorised. This research provides a conceptual framework that connects algorithmic systems with job happiness and pleasure, utilising contemporary literature and situating it within the context of Malaysia's healthcare sector.

The platform fundamentally revolves around algorithmic management, which includes scheduling algorithms, digital performance monitoring, and automated workload distribution. Research indicates that these methods are frequently implemented to enhance productivity, although they may inadvertently impact workers' perceptions of autonomy and justice (Galière, 2021; Wood et al., 2021). The implementation of algorithmic tools in Malaysian hospitals has been inconsistent, with certain institutions experiencing enhanced workflow coordination, whereas others express apprehensions regarding excessive standardisation of treatment (Che et al., 2021; Tan et al., 2023).

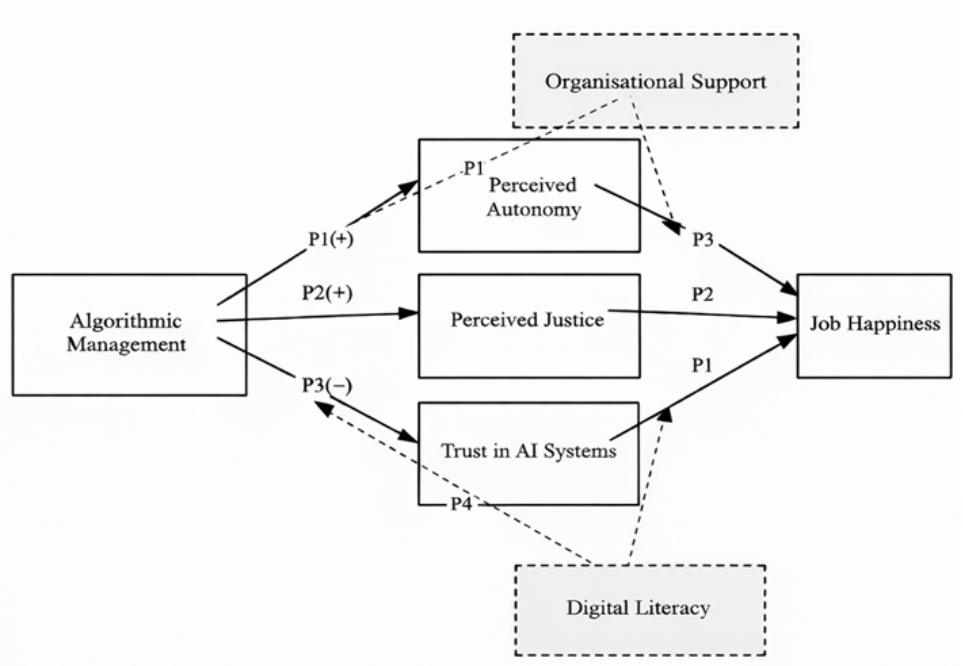
The initial category of relationships within the framework pertains to perceived autonomy. Research based on Self-Determination Theory underscores that autonomy is fundamental to job happiness (Ryan & Deci, 2020). Nonetheless, algorithmic systems frequently limit autonomy via inflexible protocols or obscure decision-making procedures (Parent-Rocheleau & Parker, 2021). In Malaysian nursing practice, where professional discretion is essential for patient care, the equilibrium between algorithmic control and human judgement is crucial (Ismail et al., 2022). A secondary construct is perceived equity or justice. Algorithms are frequently seen as impartial decision-makers, nonetheless,

biases ingrained in their design or execution might perpetuate disparities (Kellogg et al., 2020). Nurses' opinions of equity in scheduling or task distribution significantly affect their morale and job happiness (Ramlan & Hashim, 2021). If algorithms can guarantee equitable workload distribution, they may improve worker satisfaction, otherwise, they risk exacerbating discontent.

The third construct is confidence in AI systems, which influences nurses' acceptance or resistance to algorithmic techniques. Trust develops when systems exhibit transparency, reliability, and alignment with professional ideals (Meijerink & Bondarouk, 2021). Conversely, a deficiency of trust might exacerbate stress and resistance to digitalisation, as evidenced by Malaysian studies on digital health uptake (Nurani et al., 2023). The approach incorporates two contextual moderators. Organisational support—encompassing training, participative decision-making, and managerial responsiveness—can mitigate the adverse effects of algorithmic systems on job happiness (Yusoff & Hussain, 2021). Similarly, digital literacy affects nurses' interactions with algorithmic tools: individuals with advanced literacy may regard algorithms as beneficial, whereas those with poor digital competencies may see them as intimidating (Huang et al., 2022).

Results and discussion

The proposed framework (Figure 1) highlights algorithmic management as a crucial factor influencing nurses' job happiness in Malaysia, functioning through three psychosocial mechanisms: perceived autonomy, perceived justice, and trust in AI systems. In this arrangement, algorithmic management signifies the growing dependence on digital platforms for scheduling, work distribution, and performance evaluation. These technologies can enhance operational efficiency while also jeopardising the professional autonomy historically granted to nurses. Previous research demonstrates that autonomy is fundamental to maintaining motivation and well-being in high-pressure settings (Deci & Ryan, 2020, Nordin et al., 2022). In Malaysian hospitals, where nurses frequently manage substantial workloads with constrained resources, reduced autonomy due to algorithmic



Propositions:

P1: Algorithmic management negatively impacts nurses' job happiness by reducing perceived autonomy

P2: Algorithmic management positively affects nurses' job happiness through enhanced perceptions of justice

P3: Trust in AI systems mediates the relationship between algorithmic management and job happiness

P4: Organisational support moderates the relationship (positive moderation)

P5: Digital literacy moderates the relationships (positive moderation)

Figure 1. Theoretical Framework: Algorithmic Influences on Nurses' Job Happiness.

supervision may intensify stress and lower job happiness (Omar & Ismail, 2021).

The second pathway, perceived fairness, denotes the degree to which algorithmic decisions are regarded as transparent and just. Evidence indicates that opaque or biassed algorithmic judgements might evoke feelings of injustice and animosity among healthcare personnel (Zhou et al., 2021, Karim et al., 2023). Malaysian nursing research corroborates this worry, highlighting that views of equity significantly forecast organisational commitment and retention (Rahman et al., 2022). Trust in AI systems is a crucial factor, since nurses' readiness to depend on algorithmic tools is contingent upon their perceived reliability and congruence with patient care values (Siau & Wang, 2020, Alwi & Hashim, 2024). In the absence of trust, the use of technology becomes superficial, resulting in inefficiencies and emotional dissonance.

The approach emphasises the moderating influence of organisational support and digital literacy. Organisational support, including managerial acknowledgement, equitable task allocation, and opportunities for professional advancement, has been consistently associated with resilience and happiness among Malaysian nurses (Hamid et al., 2021; Lim et al., 2023). Similarly, digital literacy influences whether nurses perceive technology as an empowering asset or an onerous obligation. Research indicates that sufficient digital training and proficiency in health informatics might mitigate technostress, allowing personnel to incorporate algorithms into care delivery more efficiently (Cheng et al., 2022; Tan & Khalid, 2024).

This research expands the existing scholarship on algorithmic management by extending it to the healthcare sector, where emotional labour and ethical care issues are critical. Current research predominantly focusses on algorithmic management within platform-based employment, including ride-hailing and logistics (Wood et al., 2021; Lee et al., 2022). This study focusses on nursing in Malaysia, emphasising the specific relationship between patient well-being and staff satisfaction. The integration of the Job Demands–Resources model and Self-Determination Theory enhance the comprehension of how algorithmic structures influence psychological requirements. The framework illustrates that autonomy and justice are not merely abstract notions but are intricately woven into the daily experiences of nurses managing digital operations.

The approach provides hospital administrators with actionable insights. The efficacy of algorithmic tools is contingent not only upon their technical robustness but also on the socio-organizational context in which they are used. Hospitals should consequently enhance technological implementations with activities that bolster organisational support, including feedback systems and equitable workload policies. Customised digital literacy initiatives for nurses may alleviate resistance and anxiety, converting algorithms into facilitators of enhanced care instead of sources of estrangement. Attention to fairness and openness in algorithmic decisions—such as shift scheduling or performance evaluation—can enhance trust and diminish turnover intentions among nursing personnel (Khalid & Zainal, 2023).

The framework emphasises the need for norms regulating the ethical application of algorithmic management in healthcare at the policy level. Malaysia's healthcare sector, already contending with worker shortages and increasing patient demands, necessitates regulatory frameworks that harmonise efficiency with employee welfare. Policymakers may establish criteria to ensure algorithmic accountability, including regular bias audits and requesting participation from healthcare experts prior to the institutionalisation of digital systems (Aziz et al., 2022). Moreover, investments in digital training within healthcare institutions will mitigate disparities in access and literacy, therefore preserving job happiness while promoting national digital health initiatives.

Conclusions

This concept paper proposes a framework for examining the influence of algorithmic management on nurses' job happiness in Malaysia. This study utilises the Job Demands–Resources model, Self-Determination Theory, and sociotechnical systems perspectives to establish algorithmic management as a pivotal factor influencing perceived autonomy, justice, and trust in AI systems, thus affecting nurses' job happiness. The framework additionally identifies organisational support and digital literacy as significant modifiers that can either mitigate or exacerbate the effects of algorithmic processes. This work has three primary contributions. Theoretically, it enhances scholarship by contextualising algorithmic management within the healthcare sector, where human well-being is inherently connected to professional satisfaction. It offers managers and healthcare leaders a perspective to foresee the unexpected repercussions of digital reforms on frontline carers. It underscores the necessity for regulatory monitoring to guarantee that technological adoption improves rather than undermines the welfare of healthcare professionals. As Malaysian healthcare institutions advance in their digitisation efforts, this paradigm provides a pertinent basis for empirical investigation. Subsequent study ought to evaluate the assertions presented below, employing both qualitative and quantitative methodologies to elucidate the intricate experiences of nurses in various hospital environments. By harmonising efficiency with compassion, the incorporation of algorithmic systems can serve as both a means of operational optimisation and a conduit for maintaining the well-being and resilience of the nursing profession.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Statement on the use of AI

The authors acknowledge the use of generative AI and AI-assisted technologies to improve the readability and clarity of the article.

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