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The Role of Big Data, Artificial Intelligence, and Robotics in Human Resource Management: A Diversity, Equity, and Inclusion Perspective[a]

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Abstract

This study contributes to the academic discourse by bridging technological advancements with diversity, equity, and inclusion (DEI) practices in HRM. The integration of artificial intelligence (AI) and robotics within human resource management (HRM) is driving a significant transformation in workplace operations. These technologies offer substantial benefits in terms of operational efficiency, decision-making, and innovation, but their application also presents challenges, particularly in the domains of (DEI). AI-powered tools can enhance HR functions by enabling data-driven decision-making and promoting objectivity in recruitment and promotions, thus mitigating biases based on demographic characteristics. However, ethical concerns, including algorithmic biases, and the potential for job displacement due to automation require careful consideration. Organisations must address these challenges through targeted reskilling initiatives, robust monitoring systems, and a strategic commitment to DEI principles. Ensuring that AI and robotics complement human expertise and support an inclusive work environment is crucial for maximising their positive impact. By integrating DEI principles into technological adoption, organisations can create fairer, more equitable workplaces, thus fostering innovation while advancing workplace fairness.

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1. Introduction

Technological advancements in artificial intelligence (AI), robotics, and big data have profoundly transformed how organisations manage their human resources. Human resource management (HRM) benefits greatly from big data since it offers insights on employee engagement, performance, and behaviour (Sarti and Torre, 2019). Robotics and artificial intelligence have automated routine jobs, allowing human resources professionals to focus on more important initiatives such as talent development and employee well-being. These technologies have expedited recruitment procedures, expanded training programs, and facilitated performance reviews, leading to more efficient and data-driven decision-making in human resources (Ekuma, 2023). By exploring practical applications and associated risks, this study aims to provide actionable insights for organizations seeking to balance innovation with equity.

Through a systematic analysis of existing literature and case studies, this research contributes to a deeper understanding of how HRM practices can evolve to integrate DEI principles effectively while leveraging technological advancements. Addressing both opportunities and challenges, the study provides a roadmap for creating more inclusive, innovative, and equitable workplaces.

This article investigates how technological improvements affect people management within firms, with a focus on diversity, equality, and inclusion (DEI). As firms aim to establish workplaces in which every person is valued and respected, DEI initiatives play an important role in creating equity and inclusion. The research investigates how emerging technologies influence the execution and efficacy of these DEI projects, hence assisting in the creation of more inclusive environments in today's quickly changing workplace scene. Technology can help DEI initiatives by minimizing bias in recruiting and promotion procedures with AI-powered tools that evaluate potential employees by considering skills and qualifications rather than demographic variables (Hays-Thomas, 2022). Furthermore, big data analytics can assist detect gaps in employee treatment and opportunity, permitting enterprises to address root causes and encourage a more diverse and equitable workplace. Organizations' approaches to diversity, equality, and inclusion (DEI) are changing as a result of the incorporation of artificial intelligence into HRM procedures such as hiring, training, talent development, and leadership (Evseeva et al., 2021). Artificial intelligence is streamlining processes, reducing biases, and promoting inclusivity in the workplace (Budhwar et al., 2022). Furthermore, using artificial intelligence in workforce management enhances corporate governance practices, emphasising the importance of ethical considerations and transparency (Cui, Xu and Razzaq, 2022).

While technological advancements provide advantages for human management, they often pose obstacles. Concerns regarding the influence of automation on job displacement and the necessity for personnel to upskill in order to adapt to new technology are undoubtedly key considerations for organizations (Li, 2022; Morandini et al., 2023). Additionally, the ethical implications of artificial intelligence in decision-making processes and the potential for algorithmic biases require careful monitoring to ensure fair treatment and equity in the workplace (Pang and Zhang, 2021).

Advances in technology like big data, automation, and artificial intelligence are changing how businesses handle their employees. Significant potential to strengthen diversity, equality, and inclusion (DEI) initiatives and promote more inclusive and equitable workplaces are presented by these developments. Nevertheless, they also present difficulties that need to be resolved in order to preserve equity and respect moral principles in personnel management.

2. Enhancing People Management: Incorporating Big Data, AI, and Robotics

Artificial intelligence and robotics are becoming increasingly widespread in human resource management, posing both benefits and concerns. AI tools are used in a variety of HR operations, including recruitment, onboarding, performance assessment, training, talent management, pay systems, culture development, and leadership (Evseeva et al., 2021). While artificial intelligence can enhance the performance of human resource management processes like recruitment, training, payroll, talent acquisition, and retention, it is noted that artificial intelligence cannot entirely replace the human element in people management (Nawaz, 2019). Furthermore, the integration of artificial intelligence with human capabilities can result in more effective solutions for people management (Bibi, 2019). Extensive research has been conducted on the role of artificial intelligence in human resource management, particularly examining its impact on businesses, employees, and the overall evolution of HR practices in the AI-driven era (Islami and Sopiah, 2022). Scholars have acknowledged AI as a valuable tool for improving and streamlining HR processes, enhancing the efficiency and cost-effectiveness of recruitment, employee placement, and staff management and retention (Cain, Thomas, and Alonso Jr, 2019). Additionally, the evolution of human resource management in the age of artificial intelligence involves examining future trends and shifts in HR practices, with a particular emphasis on talent management driven by AI technology across various industries (Liu, Li, and Xia, 2021). Moreover, the integration of robotics into human resource management is transforming leadership and management approaches, especially in the hospitality sector, where the use of service robots is anticipated to have a significant impact on leadership dynamics and people management practices (Xu, Stienmetz, and Ashton, 2020).

Robots' evolution and advancements in artificial intelligence enable socially intelligent human-robot interactions that redefine leadership in sectors like hotel management (Dautenhahn, 2007). Furthermore, the use of robotics in healthcare management is predicted to increase, indicating a growing trend towards utilising advanced technologies in human resource management practices (Eşkin Bacaksız et al., 2020). The integration of artificial intelligence and robotics into human resource management is fundamentally transforming traditional practices, providing new avenues for increased efficiency and innovation. While artificial intelligence contributes to the enhancement of various HR functions, the human element remains indispensable in decision-making processes. The convergence of AI, robotics, and human expertise holds significant potential for the future of people management, wherein these advanced technologies complement and augment human-driven practices, fostering more effective and adaptive HR strategies.

3. Leveraging Big Data, AI, and Robotics to Advance DEI in People Management

The incorporation of big data and artificial intelligence into human resource management has significantly transformed recruitment practices and decision-making processes. By analyzing large-scale datasets, organizations are able to identify trends and patterns within candidate demographics, facilitating the recruitment of a more diverse pool of applicants. This approach has been shown to enhance the representation of underrepresented groups in the hiring process (GOV.UK, 2020). AI-driven recruitment improves the quality of hires, increases operational efficiency, and minimizes administrative tasks (Chen, 2023). The use of AI technologies, such as machine learning, in recruitment, particularly for resume screening and candidate evaluation, is becoming increasingly widespread (Zhang, 2022). AI-driven resume screening tools have been implemented to mitigate bias in the hiring process by assessing candidates based on qualifications and skills, rather than subjective factors (Tambe, Cappelli, & Yakubovich, 2019). For instance, Vodafone's HR transformation, leveraging AI-driven talent acquisition and skills-based management, has significantly enhanced operational effectiveness and innovation. Key results include a 26% increase in new hires, a 19% improvement in hiring diversity, and a reduction in candidate cycle times from 24 to 12 days. Additionally, the company's net promoter scores have risen from -15 to +47.8, demonstrating the effectiveness of AI tools in optimising recruitment processes and driving organisational performance. This case highlights the broader impact of AI and hyper-automation in enhancing operational efficiency, fostering innovation, and promoting workforce inclusivity (Prause, 2023).

Research also indicates that AI screening can help reduce unconscious bias in recruitment, leading to more diverse hiring outcomes (Vivek, 2023). For instance, Türkiye’s Career Gate platform serves as the central portal for job and internship applications within ministries and their affiliates, with voluntary participation from private sector employers. It allows organisations to accept applications and carry out evaluations while standardising the application procedure for public job advertisements. Applicants' personal information and academic credentials are validated by the platform using official public databases connected to the Turkish e-government system. It also guarantees that only eligible applications may move forward, and for internships, the system ensures anonymity by concealing the names, genders, and addresses of applicants to lessen gender prejudice (Atay et al., 2023; OECD Economics Department Working Papers, 2023). Furthermore, the use of artificial intelligence in recruitment has been shown to ethically enhance the role of recruiters (Hunkenschroer & Luetge, 2022). AI-enabled recruitment practices streamline processes and improve decision-making; however, it is crucial to address potential biases and ethical concerns associated with AI-driven hiring tools (Hunkenschroer & Kriebitz, 2022). Ensuring that human rights principles, such as validity, autonomy, non-discrimination, privacy, and transparency, are upheld in AI hiring practices is essential for maintaining ethical standards (Hunkenschroer & Kriebitz, 2022).

Technology has significantly enhanced access and inclusion, particularly through the facilitation of remote work, which has expanded opportunities for individuals with disabilities and caregivers (Thompson, 2018). Studies have shown that remote work can improve job satisfaction and productivity for employees with disabilities (Disability Rights UK, 2023). Additionally, AI-powered language translation tools have contributed to inclusivity in global

teams by overcoming language barriers and improving communication (Tambe, Cappelli, & Yakubovich, 2019). These tools allow for real-time translation of conversations and documents, promoting collaboration among team members from diverse cultural backgrounds. Research has demonstrated the positive effects of AI translation tools on cross-cultural communication and team cohesion (Chang, Hung, & Hsieh, 2012). By utilizing technologies such as video conferencing and collaboration platforms, organizations have fostered more inclusive work environments that accommodate a wide range of needs. These innovations have not only enhanced accessibility but also supported diversity and inclusion within the workplace. Moreover, big data analytics have played a crucial role in data-driven decision-making by identifying patterns of bias and discrimination (Tambe, Cappelli, & Yakubovich, 2019).

Organizations can proactively address issues related to bias and discrimination in HR processes by utilizing data analytics. Research indicates that data-driven decision-making can result in more equitable and inclusive practices in areas such as recruitment and talent management (Dixon-Fyle et al., 2020). Furthermore, AI-enabled Management Information Systems (MIS) can assist managers in making more informed and strategic decisions about employee promotions (Gangwar et al., 2024). These systems can analyse historical data, market trends, and employee performance to provide recommendations and insights, helping to ensure that promotion decisions are based on merit and aligned with organisational goals (Gangwar et al., 2024). In addition, robotics process automation (RPA) has increasingly been adopted in HR functions to streamline administrative tasks and alleviate the workload of HR professionals. By automating repetitive activities like data entry and payroll processing, RPA enables HR teams to dedicate more time to strategic initiatives, including diversity, equity, and inclusion (DEI) efforts. Studies have highlighted the efficiency improvements and cost savings achieved through the implementation of RPA in HR operations (Mohamed et al., 2022).

4. Navigating Challenges: Big Data, Artificial Intelligence, and Robotics in DEI within People Management

AI-powered recruitment, utilising big data and resume screening technologies, can enhance the efficiency of hiring processes and help mitigate bias. However, several challenges must be addressed when implementing these technologies. A primary concern is algorithmic bias, where algorithms designed to screen resumes may inadvertently reinforce existing biases. For instance, if the algorithm is trained on biased data, it may exclude qualified candidates who do not align with the preferred demographic profile (Renier et al., 2021). Another issue is the digital divide, which may limit access to the technology required for AI-driven resume screening, potentially leading to a lack of diversity in candidate pools and perpetuating existing disparities in the workforce (Azubuike, Adegboye, & Quadri, 2020). Additionally, privacy concerns arise when handling sensitive personal data from resumes. Employers must ensure compliance with privacy laws and regulations, safeguarding personal information throughout the recruitment process (Guan, Feng, & Islam, 2023).

The potential for discrimination and privacy violations in data collection and analysis within artificial intelligence and data-driven decision-making represents a significant concern. Beretta et al. (2021) highlight the importance of effectively using data annotation grounded in Bayesian inferences to identify discriminatory risks. The study emphasizes that practices related to data collection, transparency, and explainability are crucial in addressing and mitigating bias and discrimination within AI systems. It is noted that removing protected attributes from data

could exacerbate discrimination, hinder bias detection, and underscore the critical need for ethical data management practices (Beretta et al., 2021).

The risk of perpetuating biases in artificial intelligence algorithms due to biased training data poses a significant threat to fair decision-making processes in areas such as recruitment, performance evaluations, and promotions (Hall and Ellis, 2023). Research has shown that algorithms trained on biased data can result in discriminatory outcomes, such as gender bias in recruitment (Renier et al., 2021). Notable examples include Amazon's gender-biased hiring algorithm, Google Photos' racially biased auto-tagging tool, sensors in self-driving cars, and decision-support systems used by judges, all of which illustrate the widespread issue of algorithmic bias in AI systems. In Amazon's case, the biased hiring algorithm favoured male candidates, reflecting the gender disparities in the tech industry, and exacerbating these inequalities by disadvantaging female applicants (Chang, 2023). Similarly, Google Photos' auto-tagging tool exhibited racial bias by misclassifying people of colour, primarily due to the predominantly white dataset used for training, which led to misidentifications that reinforced racial stereotypes (Chhillar and Aguilera, 2022). In the legal system, decision-support tools used by judges have been shown to perpetuate racial biases. These systems, which rely on historical data that mirrors systemic biases in the criminal justice system, may reinforce disparities in sentencing and contribute to the overrepresentation of certain demographic groups in the prison population (Angwin et al., 2016). Addressing algorithmic bias presents a significant governance challenge. To mitigate and ideally prevent these biases, mechanisms must be put in place, including diversifying training datasets, ensuring transparency and accountability in algorithmic decision-making, and continuously monitoring and evaluating AI systems for fairness and equity (Rawal et al., 2021).

Another key challenge is the digital divide and issues related to accessibility, which intensify inequalities due to disparities in technological access and digital literacy. This issue is particularly evident in remote work environments, where individuals from marginalized communities may experience exclusion (Azubuike, Adegboye, & Quadri, 2020). Furthermore, privacy and data security concerns are critical, especially regarding the ethical use of employee data in artificial intelligence decision-making processes. Additionally, research on the ethical risks of AI decision-making highlights the importance of addressing technological uncertainty, incomplete data, and potential management errors to effectively mitigate ethical risks (Guan, Feng, & Islam, 2023).

Algorithmic bias in artificial intelligence recruitment is a significant issue that can harm individuals and society (Chang, 2023). Moreover, the use of artificial intelligence in recruitment has raised ethical concerns. Decision support systems that utilise artificial intelligence for resume screening pose technical, managerial, legal, and moral challenges that organisations must address (Lacroux and Martin-Lacroux, 2022). It's critical to ensure fairness, inclusivity, and accountability in AI-based recruitment algorithms (Zhou et al., 2022). To prevent discriminatory practices, companies must navigate the ethical implications of using artificial intelligence in hiring processes (Hofeditz et al., 2022).

5. Utilising Technology to Promote Diversity, Equity, and Inclusion in People Management: Key Approaches and Initiatives

There are several key strategies that can be employed to harness technology for advancing diversity, equity, and inclusion (DEI) in people management. First, it is essential to emphasize fairness, transparency, and accountability in Artificial Intelligence (AI) algorithms and decision-making processes to enhance the equity of machine learning systems (Freeman, Rahman, and Batarseh, 2021). This requires ensuring that AI systems operate as intended and are free from vulnerabilities throughout their lifecycle. Regular audits and robust monitoring of these systems are critical to identifying and addressing biases, thereby supporting fairer decision-making (Mehrabi et al., 2021; Hohma et al., 2023). Additionally, organisations should consider engaging domain experts to evaluate potential biases within AI systems (Silberg and Manyika, 2019). Digital inclusion initiatives are also vital in promoting DEI within people management. By investing in digital literacy programs and expanding access to technology, companies can help bridge the digital divide and ensure all employees have equal opportunities to utilise technology (Ferrara, 2023).

Furthermore, the implementation of flexible work policies, such as remote work and flexible scheduling, that accommodate diverse needs and preferences, can significantly enhance workplace inclusivity (John-Mathews, Cardon, and Balagué, 2022). Cultivating an organisational culture centered on inclusivity is another essential factor in advancing DEI in people management. Offering training programs focused on unconscious bias and inclusive leadership for both employees and managers can contribute to fostering a more inclusive work environment (Wael et al., 2023). Additionally, incorporating DEI metrics into performance evaluations and reward systems can incentivise inclusive behaviors and underscore the importance of diversity and inclusion within the organisation (Tóth et al., 2022). Employing multifaceted inclusive recruitment strategies can effectively maximise sociodemographic diversity among applicants (Carter et al., 2023). Lastly, bridging the digital divide remains a critical issue to ensure recruitment efforts are accessible to individuals who may face technological barriers (Piatak, Dietz, and McKeever, 2018).

As technological advancements continue to accelerate, it becomes increasingly critical to prioritise digital literacy programs that ensure equitable access to technology. These initiatives, which may take the form of training sessions, workshops, or online courses, are essential for equipping individuals with the skills needed to navigate and utilise technology effectively (Kalmus et al., 2022). In parallel, reskilling initiatives play a vital role in helping workers adapt to new roles as technology evolves. Employee skill-upgrading programs like this are especially crucial in sectors that are undergoing automation and digital change. Employees can transition into in-demand sectors by participating in reskilling programs that provide them the chance to learn new skills like data analysis, artificial intelligence, or digital marketing (Tamayo et al., 2023). Additionally, by training workers for new employment prospects, reskilling initiatives help to reduce labour displacement and support organisational growth and staff retention (Morandini et al., 2023; Reynolds, 2023). Implementing thorough reskilling programs guarantees a more trained and flexible staff as businesses embrace technological change, improving overall operational effectiveness and creating a more welcoming and equal workplace. Furthermore, digital literacy programs should aim to bridge the digital divide by ensuring that all individuals, regardless of socio-economic status, race, ethnicity, or gender,

have equal access to technological resources (Warschauer, 2003, pp. 17–33). Such efforts can foster inclusivity, diversity, and social equity by enabling individuals to fully participate in the digital landscape.

The benefits of digital literacy extend beyond access; they also contribute to improved employability, enhanced communication, and greater community engagement. Additionally, digital literacy plays a key role in helping individuals safeguard themselves against cyber threats and misinformation, empowering them to make informed decisions and maintain online security. Given these extensive advantages, it is imperative to prioritise digital literacy programs and ensure their accessibility to all individuals, regardless of their background (Iles and Yolles, 2002). Moreover, the adoption of flexible work policies that cater to a variety of needs, such as remote work and flexible scheduling, can further promote inclusivity within the workplace. By investing in digital literacy initiatives alongside flexible work arrangements, organisations can create a more inclusive environment that accommodates the diverse needs of their workforce, ultimately advancing a culture of diversity, equity, and inclusion in people management. Shore, Cleveland, and Sanchez (2018) emphasize the critical role of such training programs in cultivating diverse and inclusive workplaces.

6. Conclusion

In conclusion, the integration of artificial intelligence (AI) and robotics within human resource management (HRM) marks a transformative shift from traditional practices, unlocking new opportunities for operational efficiency and innovation (Sarti and Torre, 2019). While AI has the potential to enhance various HR functions, the human component remains indispensable in the decision-making process. The interplay between AI, robotics, and human expertise offers a promising outlook for HRM, where these technologies complement and elevate human resource practices. These technological advancements, however, present both opportunities and challenges, particularly concerning diversity, equity, and inclusion (DEI) (Hays-Thomas, 2022).

Technologies such as big data facilitate the collection and analysis of vast amounts of employee-related data, allowing organisations to make more informed, data-driven decisions regarding performance, engagement, and behaviour (Cain, Thomas, and Alonso Jr, 2019). AI-powered tools can also help mitigate biases in recruitment and promotion processes by enabling more objective evaluations of candidates based on their skills and qualifications rather than demographic characteristics (Zhang, 2022). However, these benefits come with challenges that must be addressed. The potential for job displacement due to automation highlights the importance of reskilling and upskilling initiatives to ensure that employees can adapt to new technologies and avoid being displaced from the workforce (Beretta et al., 2021).

Organisations must invest in targeted training programs to equip their workforce with the necessary skills to thrive in an increasingly automated landscape (Kalmus et al., 2022). Moreover, ethical concerns surrounding the use of AI in decision-making processes add complexity to the issue. Algorithmic biases have the potential to perpetuate existing inequalities and unfair treatment, making it essential for organisations to establish robust monitoring and oversight mechanisms to identify and mitigate these biases, ensuring equitable treatment for all employees (Guan, Feng, and Islam, 2023).

In summary, while technological advancements, particularly in the fields of artificial intelligence (AI), machine learning, and automation, offer substantial opportunities to enhance Human Resource Management practices and foster Diversity, Equity, and Inclusion (DEI), organisations must adopt a cautious and responsible approach to ensure these developments benefit all stakeholders. Emerging technologies hold the promise of streamlining HR processes, improving efficiency, and reducing operational costs, yet their integration must be carefully managed to avoid unintended consequences, particularly in terms of job displacement, workforce polarisation, and algorithmic bias. Addressing challenges such as job displacement, promoting employee upskilling, and tackling algorithmic biases will allow organisations to fully harness the potential of these technologies, creating more inclusive and equitable work environments (Silberg and Manyika, 2019).

A central concern in implementing AI and automation in HR processes is the potential for job displacement. As automation increases, certain job functions may become obsolete, leading to workforce reductions. To mitigate this risk, organisations must prioritise employee upskilling and reskilling programs, ensuring that their workforce is prepared to take on new roles that technology may create. For example, reskilling initiatives that focus on areas like data analysis, AI management, and digital communication can empower employees to transition into new positions, rather than facing displacement. Moreover, upskilling programs foster long-term career growth, ensuring employees are equipped with the competencies needed to thrive in an evolving technological landscape.

Furthermore, organizations must address the ethical challenges posed by algorithmic bias. Algorithms, if not carefully designed, can perpetuate existing biases, leading to discriminatory outcomes in hiring, promotions, and talent management. Therefore, it is critical that organizations incorporate fairness as a fundamental design principle in their technological frameworks. Algorithms and machine learning models should be regularly audited for potential biases, and any detected inequalities should be corrected promptly. This may involve diversifying training datasets, adopting explainable AI techniques, and ensuring transparency in decision-making processes. Without such safeguards, AI-driven HR processes could unintentionally reinforce structural inequalities and exclusionary practices, undermining the very goals of DEI.

Moreover, organizations must ensure that their data inputs and decision-making processes are transparent and accountable. For instance, it is important to consider not only the demographic data used in algorithms but also the social and cultural contexts that influence the interpretation of that data. Scrutiny of data inputs allows for a deeper understanding of how biases can emerge, enabling organizations to make informed adjustments to mitigate their impact. This focus on data ethics and transparency helps ensure that HR technology serves as a tool for fairness, rather than exacerbating existing disparities.

Beyond technological and ethical considerations, organisations must invest in comprehensive training programs to support employees in adapting to and engaging with these new technologies. Training should focus not only on technical skills but also on promoting awareness of DEI principles in the context of technological adoption. Employees should be trained to understand the potential biases inherent in AI systems and the ways they can be mitigated. Additionally, training programs that emphasise inclusive leadership, empathy, and cultural competence can help ensure that organisations' DEI goals are reflected not only in their

technological systems but also in their organisational culture. These efforts contribute to a more equitable workplace by fostering an environment where all employees feel valued, heard, and empowered to contribute.

By embedding DEI principles into the technological adoption process, organizations can create a work environment where innovation and inclusivity go hand in hand. The integration of AI and automation can drive operational effectiveness by improving the efficiency of HR processes, reducing costs, and enabling more data-driven decision-making. Simultaneously, it can contribute to a more inclusive, diverse, and just workplace by ensuring that technological systems are designed to support fairness, equity, and respect for all employees. This dual commitment—towards both innovation and inclusivity—ensures that technological advancements serve as instruments of positive change, advancing both operational excellence and social responsibility.

This study emphasises the importance of embedding DEI principles into the technological adoption process. Organisations must ensure that these advancements support inclusive practices, fostering innovation while prioritising fairness and equity. By addressing ethical concerns and investing in skill development, businesses can unlock the full potential of AI and robotics to enhance organisational performance and workplace inclusivity. This research contributes to the academic and practical discourse by providing a comprehensive framework for integrating emerging technologies into HRM with a focus on DEI principles.

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Data Availability

This study did not utilize any data; therefore, the data availability statement is not applicable.

Declaration of Computing Interest

The authors declare that they have no competing interests related to this research

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