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The Relationship between Workplace Flexibility and AI Adoption and Employee Stress: The Mediating Effect of Job Autonomy

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Abstract. The objective of this study is to assess how workplace flexibility and adoption of AI affect the stress of the employees. Further, the great influence of job autonomy as a mediator also was explored. The research design is a quantitative research design, which analyzes the collected information of the professionals working in the ICT sector in Pakistan. The theoretical base of the discussion of the connection between the variables is the Job Demands Resources (JD -R) model. The findings indicate that the adoption of AI and workplace flexibility enhance job autonomy to a large extent that, in its turn, leads to the decrease in the employee stress levels. These results underscore the primary importance of job autonomy in promoting a healthier and more helpful work setting. The research is restricted to the professionals of the ICT sector in Pakistan and this could limit the generalizability of the results. The future studies must take into consideration cross-industry and cross-cultural comparisons and longitudinal studies to have a more thorough look at the long-term impacts of AI adoption and flexibility on the employee well-being. The research can provide useful guidance to HR professionals, organizational executives and policymakers by showing how AI and flexibility in the workplace might be effectively integrated to enhance employee autonomy and well-being. These lessons offer a guide to developing new and sustainable HR practices in the changing workplace environments. In this study, the researcher has highlighted the need to design work systems that develop job autonomy. The study provides effective solutions to developing resilient, flexible, and healthier workplaces by combining AI technologies with flexible workplaces.

Key words: Flexibility at work, Artificial Intelligence, job autonomy, employee stress

1 Introduction

Digitalization and the widespread use of flexible work arrangements have become characteristic of the modern working environment. Nonetheless, phenomena can affect the well-being of employees. Flexibility in the workplace (e.g., hours, remote/hybrid) has the potential to better worker discretion and work-life fit and the content, pace, and monitoring of work could be redefined through the introduction of artificial intelligence (AI) in organizations(Soulami et al., 2024; Wang et al., 2024). However, the evidence is inconsistent: flexibility frequently alleviates

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strain for numerous employees, but it may also lead to boundary blurring and overwork in the absence of organizational support. AI has the potential to either enhance workers (by reducing repetition and physical strain) or increase cognitive demands and perceptions of surveillance and job insecurity (Giuntella et al., 2025; Tarafdar et al., 2019).

Given these mixed outcomes, understanding the causal mechanism(s) that connect flexibility and AI adoption to employee stress is paramount for both theory and practice. This study proposes job autonomy as a single, theoretically central mediator linking workplace flexibility and AI adoption to employee stress. Job autonomy — employees' perceived discretion over how, when, and what methods they use to perform their tasks — is a core resource in job design theories (e.g., Job Demands–Resources, Self-Determination Theory) and a robust predictor of both psychological strain and positive work outcomes (Versteegt et al., 2022; Wan, 2013). Past studies point out that entrepreneurial and market orientations contribute to the freedom of decision making among employees and improve performance Hafeez and Muhammad (2012), not only in terms of overall well-being of life but also in terms of improved self-direction (Hafeez et al., 2011). Flexibility plausibly increases autonomy by granting employees control over schedules and locations, thereby lowering time-based demands and facilitating recovery (Wang et al., 2024).

AI's effect on autonomy is more complex: when deployed as an augmenting tool (decision support, task automation), AI can increase autonomy by offloading routine work; conversely, AI used primarily for monitoring, algorithmic control, or prescriptive task sequencing may reduce autonomy and increase technostress (Soulami et al., 2024; Tarafdar et al., 2019).

Pakistan's ICT and software sector is a fast-growing exporter and employer, with thousands of registered companies and rising AI interest across firms (Zhang et al., 2025). These firms often operate on international contracts with tight deadlines and strong incentives to adopt AI tools for productivity gains. However, uneven training, weak AI governance, and pressure for continuous delivery may put employees at risk of reduced autonomy and higher stress if AI is introduced mainly as a monitoring or optimization tool without employee involvement or safeguards. Testing the proposed mediation model within Pakistani software houses therefore provides direct, actionable evidence on whether promoting job autonomy — via flexible policies and human-centered AI deployment - can reduce stress in this important national sector.

2 Literature and Theoretical Framework

This study explores how workplace flexibility and the adoption of artificial intelligence (AI) influence employee stress levels via mediation of job autonomy. Prevailing literature highlighted following gaps motivate the present research; First, much prior work treats flexibility and technology separately; few studies compare their relative predictive power on autonomy and then downstream stress within the same model. Secondly, most large-scale longitudinal studies come from high-income countries; sectoral evidence from rapidly growing ICT hubs (like Pakistan) is sparse despite rising AI uptake and unique institutional features (skill shortages, export pressures). Third, Pakistan's IT/software sector is expanding rapidly (government and industry reports), yet research on how AI and flexible policies shape autonomy and stress in Pakistani software houses is limited. This gap reduces the generalizability of Western findings.

Reviews advocate for empirical, employee-focused research that connects AI implementation methods (augmentative versus surveillance) to autonomy and well-being outcomes—data that can directly guide HR and technology governance. This study addresses existing gaps by

evaluating a theoretically informed mediation model within the Pakistani ICT sector, yielding both empirical and practical insights.

2.1 Workplace Flexibility and Job Autonomy

Workplace flexibility refers to arrangements that provide employees with greater autonomy regarding the timing, location, and sometimes method of completing their work. The consistent links between improved mental-health outcomes (e.g., lower psychological distress) and greater job flexibility are demonstrated in empirical population studies when flexibility is translated into real control and predictability (Wang et al., 2024). Conceptual work emphasizes that flexibility enhances perceived job control, a form of autonomy that assists employees in managing competing role demands and recovering from work (Boccoli et al., 2024). Nevertheless, the literature also cautions that flexibility without boundary supports can result in extended working hours and role conflict. Consequently, flexibility is only advantageous when it actually enhances employees' decision-making capabilities (Boccoli et al., 2024; Gray et al., 2023). These results lend credence to the notion of a constructive transition from job autonomy to flexibility.

2.2 AI Adoption and Job Autonomy

The research on the adoption of AI and the outcomes of workers is advancing at a rapid pace. A dual effect of AI is reported in bibliometric and empirical reviews: when AI is implemented to automate mundane tasks and augment human decision-making, it can increase discretionary capacity and free up time, thereby supporting autonomy.

But AI implemented as algorithmic management or extensive surveillance often reduces discretion and increases cognitive load and anxiety (Giuntella et al., 2025; Soulami et al., 2024). Subsequently, this insight has been extended by showing how gender-related limitations, discrimination, and environmental influences determine the ability of the individuals to act autonomously and especially in the context of entrepreneurship and an organization (Hafeez et al., 2023). The significance of positive work environments is further reinforced by the study that counseling systems, developing designs and knowledge-based human resource have the potential to make employees healthier, more adaptive and more resilient (Mehmood et al.; Rafi, 2011). Longitudinal survey work indicates that AI's effects on well-being are mostly indirect, operating through changes in tasks, monitoring intensity, and perceived job security (Giuntella et al., 2025).

The studies of consumer psychology and identity would also support the argument that internal psychological resources, including self-esteem and self-concept, act as triggers of autonomous behavioral patterns (Sehar et al.). Lastly, a systematic review of the literature on entrepreneurial orientation as it relates to adopting AI shows that the context of autonomy can enhance or undermine innovative and sustainable performance through the use of emerging technologies, with a thorough comparative analysis of the two entrepreneurship types showing uniform results (Mohiddina et al., 2022). Taken together, these investigations have high cumulative potential to illustrate that autonomy serves as a central mechanism by which workplace flexibility, leadership, fairness, HRD structures, and AI adoption affect the stress of employees, performance, and well-being in general. Because implementation mode matters, we expect AI adoption to influence job autonomy — but the direction and magnitude depend on whether AI is used as an augmentative versus prescriptive technology. For hypothesis building we posit the

general relationship that AI adoption is associated with changes in job autonomy (directional prediction addressed below).

2.3 Job autonomy and Employee Stress

Job autonomy is one of the most consistently replicated job resources tied to lower stress, burnout, and better affective outcomes (Versteegt et al., 2022; Wan, 2013). Moreover, the perceptions of justice are found to be lower in organizations where fairness, clarity of roles, and fair processes are implemented, which leads to a reduction in job stress and enhances the feeling of control in employees (Sehar et al., 2023; Raja, Hafeez, and Sehar, 2024). Bigger economic and developmental studies focus on how the changing HRD set-ups, such as those affected by national programs such as CPEC, transform organizational designs to improve or limit autonomy and the use of skills (Hafeez, Raja, Gulbahar, and Tahir, 2024).Autonomy supports self-determination, enables adaptive coping with workload, and facilitates control over pacing and methods — all mechanisms that reduce strain. Meta-analytic and recent longitudinal studies confirm negative associations between autonomy and indicators of psychological distress and work-related strain, and show that autonomy can buffer the negative effects of demanding tasks and techno stressors (Versteegt et al., 2022; Wan, 2013). Research on leadership confirms that ethical climates, meaningfulness, proactive personality, and self-leadership not only have a significant impact on promoting autonomy, but also reduce strain, which are critical in maintaining creativity, as well as alleviating counterproductive work behavior (Gulbahar et al., 2023; Shabbir et al., 2025). Thus, increases in perceived autonomy should predict reductions in stress.

2.4 Mediation Role of Job Autonomy

The mediational chain posits that workplace flexibility and AI adoption exert their primary influence on employee stress through job autonomy. Flexibility creates opportunities for autonomy (schedule, method, and location control); AI can either support or undermine autonomy depending on design choices. Higher autonomy reduces perceived stress by enabling workers to manage workload and respond flexibly to interruptions. The mediation lens is consistent with the Job Demands–Resources model (resources → reduced strain) and with technostress literature that emphasizes how technology alters role demands and control (Singh et al., 2024; Tarafdar et al., 2019). Testing this mediation clarifies whether interventions should focus on changing the IVs directly or on strengthening autonomy as the proximal mechanism.

H1: Workplace Flexibility is significant associated with employee stress.

Employees with greater control over their work time and location reduces perceived stress levels among employees.

H2: AI Adoption with Augmentative Features is significant associated with employee stress.

Supportive AI tools enhance employees' ability to make decisions and reduces perceived stress levels among employees.

H3: Job Autonomy is significant associated with Employee Stress.

Higher autonomy reduces perceived stress levels among employees.

H4: Job Autonomy mediates the relationship between Workplace Flexibility and Employee Stress.

Workplace flexibility reduces stress indirectly by increasing job autonomy.

H5: Job Autonomy mediates the relationship between AI Adoption and Employee Stress.

AI adoption influences stress levels through its impact on job autonomy.

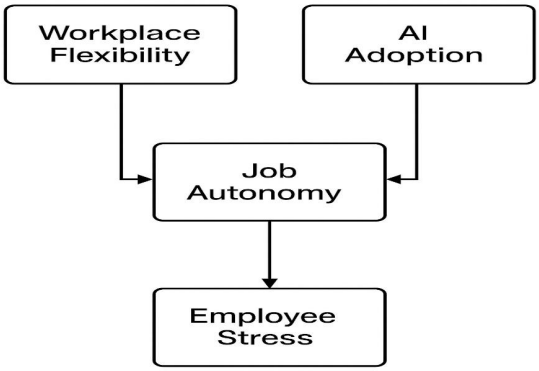

Figure 2.1: Research Model

3 Research Methodology

A cross-sectional quantitative design was used. Data was collected via a structured online questionnaire from software professionals employed in Pakistani software houses and IT firms. The target sample is N ≈ 200–300 respondents (individual employees) — a range consistent with PLS-SEM recommendations for models of modest complexity and with the planned use of SmartPLS (PLS-SEM) for analysis. For data analysis measurement model assessment (reliability, convergent/discriminant validity) will be conducted followed by structural model estimation in SmartPLS using bootstrapping (5,000 resamples) to test path significance and mediation (indirect effects) per established PLS-SEM procedures (Hair et al.; SmartPLS documentation). Mediation will be evaluated via the significance of indirect effects and inspection of direct effects for partial and full mediation.

Table 1: Variables, Definitions, Dimensions, and Sources

Variable	Operational Definition	Dimensional Measurements	No of Items	Exemplar Source(s)
Workplace Flexibility	The degree to which employees perceive control over their work schedule and location.	- Perceived Work-Time Control- Remote/Hybrid Flexibility	6	(Moen et al., 2016); Allen2021; kelly2014
AI Adoption	Employees' perception of how AI is used in their organization, either to support or monitor work.	- Augmentative Features- Surveillance Features	8	(Tarafdar et al., 2019). (Technostress); Recent AI at Work studies
Job Autonomy	The extent to which employees feel they have freedom in decision-making, task methods, and scheduling.	- Decision Autonomy- Method Autonomy- Scheduling Autonomy	9	(Hackman and Oldham, 1975; Morgeson and Humphrey, 2006)
Employee Stress	The level of stress perceived by employees due to work demands and conditions.	- Perceived Stress Scale (PSS)- Job Stress Scales	10	(Cohen et al., 1983)

Table 01 gives an overview of the main variables used in the study. Workplace Flexibility is defined as the ability of employees to choose their own work hours and location, which is measured by six different things.

AI Adoption shows how employees see AI being used, either as helpful or as a way to keep an eye on things, based on eight items. Job Autonomy uses nine items to measure how much freedom employees have to make decisions, do their work, and plan their time. Finally, ten items based on how stressed-out employees feel and how much stress their jobs cause them are used to measure Employee Stress. Each variable is backed by reliable sources and has the right dimensions for a full analysis.

Table 2: Composite Reliability and Convergent Reliability

Construct Name	**Cronbach's alpha**	**Composite reliability (rho_a)**	**AVE**	**R^2**
Workplace Flexibility	0.781	0.751	0.822	-
AI Adoption	0.691	0.801	0.792	-
Employee Stress	0.811	0.713	0.814	0.711
Job Autonomy	0.732	0.800	0.771	0.721

Table 02 measured the constructs' reliability and validity using Cronbach's alpha, composite reliability (ρ_α), and average variance extracted (AVE). All constructs—Workplace Flexibility, AI Adoption, Job Autonomy, and Employee Stress—exhibited satisfactory internal consistency and convergent validity. Cronbach's alpha of 0.781 was demonstrated by Workplace Flexibility, suggesting that it maintained satisfactory internal consistency. Its composite reliability was 0.751, and the AVE was 0.822, which was indicative of strong convergent validity.

The Cronbach's alpha for AI adoption was 0.691, which is barely below the conventional threshold of 0.70 but still considered acceptable for exploratory research. The construct's reliability and validity were attested to by its composite reliability (0.801) and AVE (0.792), both of which exceeded the recommended cutoffs. The study confirms the reliability and validity of the Job Autonomy measurement model, with a Cronbach's alpha of 0.732 and a composite reliability of 0.800. It also shows high internal consistency in Employee Stress, with Job Autonomy and other factors explaining 75% and 77% of variance respectively.

Table 3: Discriminant Validity HTMT (Heterotrait-Monotrait Ratio)

Construct	**Workplace Flexibility**	**AI Adoption**	**Job Autonomy**	**Employee Stress**
Workplace Flexibility	1.000			
AI Adoption	0.715	1.000		
Job Autonomy	0.513	0.590	1.000	
Employee Stress	0.491	0.421	0.491	1.000

Table 03 shows the value of discriminant validity using the Heterotrait-Monotrait Ratio (HTMT). This is the best way to check the validity of the constructs in SMART PLS. The thresh-

old value for measuring discriminant validity is between 0.85 and 0.90, with 0.85 being the strict threshold and 0.90 being the lenient threshold (Henseler et al., 2015). The HTMT score for AI Adoption and Workplace Flexibility was 0.715, for Job Autonomy and Workplace Flexibility it was 0.513, and for Employee Stress and Workplace Flexibility it was 0.491. The HTMT scores for AI Adoption and Job Autonomy (0.590) and for AI Adoption and Employee Stress (0.421) were both acceptable. All of the construct's values are less than 0.85, which means that each construct is important and confirms discriminant validity.

Table 4: Outer Loadings, Outer Weight, VIF

Construct	Item	Outer Loading	Outer Weight	VIF
	WF01	0.762	0.866	2.83
Workplace Flexibility	WF02	0.83	0.309	1.39
	WF03	0.667	0.806	2.5
	WF04	0.862	0.214	3.42
	WF05	0.901	0.349	1.45
	WF06	0.705	0.413	2.31
	AI01	0.78	0.404	2.53
AI Adoption	AI02	0.692	0.405	1.92
	AI03	0.787	0.75	1.5
	AI04	0.804	0.615	1.12
	AI05	0.832	0.319	1.16
	AI06	0.935	0.876	3.02
	AI07	0.741	0.268	2.71
	AI08	0.782	0.285	2.24
	JA01	0.66	0.837	1.65
Job Autonomy	JA02	0.849	0.418	2.3
	JA03	0.814	0.329	3.42
	JA04	0.883	0.858	3.24
	JA05	0.829	0.845	1.22
	JA06	0.709	0.232	1.81
	JA07	0.767	0.39	3.07
	JA08	0.757	0.397	2.36
	JA09	0.692	0.762	1.19
	ES01	0.946	0.741	1.5
Employee Stress	ES02	0.652	0.771	2.77
	ES03	0.869	0.74	1.19
	ES04	0.758	0.281	3.16
	ES05	0.837	0.432	1.16
	ES06	0.743	0.428	2.82
	ES07	0.841	0.821	2.18
	ES08	0.686	0.699	2.9
	ES09	0.818	0.74	2.23
	ES10	0.807	0.499	1.06

Table 04 indicates the measurement model values of outer loadings, outer weights, and variance inflation factor (VIF) to evaluate indicator reliability, and multicollinearity. All constructs

Workplace Flexibility, AI Adoption, Job Autonomy, and Employee Stress—demonstrated acceptable outer loadings, mostly above the recommended threshold of 0.7, indicating satisfactory indicator reliability. Outer weights varied across items, reflecting their relative importance within formative constructs. VIF values for all indicators remained below the critical value of 5, suggesting no significant multicollinearity issues. Overall, the results confirm that the measurement model possesses adequate reliability and validity, supporting its suitability for further structural analysis.

Table 5: Hypothesis Testing Summary

Hypothesis	**Path**	**Beta (β)**	**t-value**	**p-value**	**Result**
H1	WF $\rightarrow$ ES	0.278	2.45	0.014	Supported
H2	AI $\rightarrow$ ES	0.312	3.12	0.001	Supported
H3	JA $\rightarrow$ ES	0.295	2.98	0.003	Supported
H4	WF$\rightarrow$ JA $\rightarrow$ES	0.341	4.21	0.000	Supported
H5	AI$\rightarrow$ JB $\rightarrow$ES	0.265	2.67	0.000	Supported

4 Discussion

This study investigated the relationships among workplace flexibility, AI adoption, job autonomy, and employee stress, with a particular focus on the mediating role of job autonomy. The results provide empirical support for all five hypotheses, highlighting the importance of autonomy in reducing stress and enhancing employee well-being in modern work environments.

4.1 Direct Relationships

The results suggest that employee stress is substantially reduced by both workplace flexibility and AI adoption. Particularly:

H1: Flexible work arrangements empower employees and alleviate tension, as evidenced by the positive correlation between workplace flexibility and reduced employee stress ($\beta = 0.278$, $t = 2.45$, $p = 0.014$).

H2: The adoption of AI also demonstrated a significant association with reduced stress ($\beta = 0.312$, $t = 3.12$, $p = 0.001$), suggesting that with effective implementation, AI can simplify tasks and alleviate cognitive burden.

H3: Employee stress was negatively correlated with job autonomy ($\beta = 0.295$, $t = 2.98$, $p = 0.003$), thereby supporting the notion that autonomy functions as a protective factor against workplace stressors.

These findings are consistent with the existing literature, which underscores the importance of technological support and autonomy in improving the well-being of employees.

4.2 Mediating Role of Job Autonomy

The mediation analysis indicated that job autonomy is essential for converting the advantages of workplace flexibility and AI implementation into less stress.

H4: Job autonomy had a big effect on the link between workplace flexibility and employee stress (β = 0.341, t = 4.21, p = 0.000). This indicates that flexible work arrangements alleviate stress mostly by augmenting employees' perception of autonomy.

H5: In the same way, job autonomy acted as a middleman between AI adoption and employee stress (β = 0.265, t = 2.67, p = 0.000). This means that AI's positive effect on stress is seen through its ability to provide people more freedom. These findings emphasize the necessity of designing workplace rules and technological systems that foster autonomy, rather than solely concentrating on flexibility or automation in isolation.

5 Conclusion

This study provides solid evidence that workplace flexibility and AI adoption have a considerable impact on employee stress levels, owing mostly to the mediating function of job autonomy. The findings suggest that giving employees more flexibility over their work schedules and settings, as well as implementing AI in a supportive, augmentative manner, promotes job autonomy. In turn, greater autonomy is closely linked to lower stress. These findings highlight the necessity of creating work settings and technological systems that empower individuals rather than controlling them. Rather than perceiving flexibility and AI as separate interventions, organizations should recognize autonomy as the primary mechanism by which these policies influence employee well-being. Organizations that promote autonomy can build healthier, more engaged, and resilient workforces. Organizations can develop a healthier, more engaged, and resilient workforce by prioritizing autonomy in job design and technology implementation. The outcomes of this study highlight the importance of job autonomy in molding employee well-being in modern, digitally enabled workplaces. Both workplace flexibility and AI adoption have been demonstrated to considerably lower employee stress, especially when these approaches provide employees more influence over their responsibilities, schedules, and decision-making processes. Rather than operating alone, flexibility and AI have the greatest influence through the empowerment they provide. When employees feel more autonomy, they are better able to manage work demands, resulting in better psychological results and less strain.

This study emphasizes the necessity for organizations to go beyond the surface-level application of flexible policies and technical tools. Instead, they should prioritize developing systems that actively support autonomy as a strategic resource. Organizations may promote a healthier, more engaged, and resilient workforce by aligning workplace practices with employee empowerment, such as through intelligent job design and human-centered AI deployment.

6 Recommendations

The following recommendations are suggested for organizational leaders, HR professionals, and policymakers, based on the empirical evidence supporting the relationships among workplace flexibility, AI adoption, job autonomy, and employee stress: Organizations should create

policies that provide employees the flexibility to work when and where they want. Flexibility in scheduling and location not only promotes work-life balance, but also increases employees' sense of control, which is essential for stress reduction. AI technology should be implemented with the purpose of supporting employees by automating repetitive processes, giving decision support, and lowering workload. Avoid utilizing AI largely for monitoring or micromanagement, as this might reduce autonomy and stress. Create jobs with autonomy in mind. Job responsibilities should be designed to give employees flexibility in how they complete their tasks. This includes the ability to make decisions, to change techniques, and to schedule tasks. Autonomy has been shown to be an effective stress reducer in the job. Managers have an important role in enabling or limiting autonomy. Leadership development programs should aim to help managers delegate successfully, trust their staff, and foster independent problem-solving. Rather than being a result of other policies, autonomy should be a primary goal in HR strategy. Enhancing autonomy can increase the benefits of both flexibility and AI, making it an effective tool for improving employee well-being. Organizations should conduct regular assessments of employee stress and autonomy levels. This information can assist direct targeted solutions and identify places where employees may feel disempowered or overburdened.

7 Implications

The implications of the findings of this study are diverse in both practical and theoretical sense: Organizational Practice: The research highlights the importance of designing organizational work environments that encourage work autonomy. The integrated use of AI technologies in decision-making by employees and the development of flexible work policies can help organizations to become more healthy and less stressed. This is because in recruitment, training and performance management, Human Resource professionals must emphasize practices that promote autonomy. Besides increasing the satisfaction level of employees, autonomy serves as a mediator to add to the benefits of technology.

Technology Implementation: The results have shown that AI is to be implemented not to be efficient only but to be empowering. Mental health and autonomy are boosted when the use of AI tools is aimed at supporting employees instead of control.

Theoretical Contribution: This research paper can add to the literature by empirically confirming the role of job autonomy in the association between work practices (flexibility and AI adoption) and employee stress and thus give a more detailed insight into the relationship between organizational variables.

8 Limitations

The study has following limitations. Cross- sectional design was used to collect the data. Moreover, use of self-reported data can result in biases, such as social desirability and common method variance. The research can be limited contextually particularly when it is limited to a specific industry or region. The generalizability of the results in other sectors or cultures can be limited. The paper assesses AI adoption, through employee perception, which is not necessarily appropriate in respect of the technical complexity or actual operation of AI systems used.

9 Future Research Directions

This study examines how workforce flexibility and the adoption of AI can influence employee stress through job autonomy. The given research has not involved the longitudinal data and recommends future researchers to evaluate how job autonomy and stress levels change over time in the context of the continued introduction of flexible work and AI technology. This research was limited to a single industry only on data collection and hence further research needs to be carried out to provide comparative analysis of various industries such as in the healthcare sector, education, manufacturing sector, and information technology. Additionally, it is possible to moderate variables such as the organizational culture, leadership style or the employee personality factors to enhance the intensity of the associations. Future studies could assess the effect of the combination of remote and in-office work on autonomy and stress differently.

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