administrative sciences

MDPI

Article

Digital Connectivity at Work: Balancing Benefits and Risks for Engagement, Technostress, and Performance

Giorgia Bondanini [1,2,*], Martin Sanchez-Gomez [3,4], Nicola Mucci [5,6] and Gabriele Giorgi [1,2]

[1] Department of Health and Life Science, European University of Rome, Via Degli Aldobrandeschi, 190, 00163 Rome, Italy; gabriele.giorgi@unier.it
[2] Business & Health Laboratory, European University of Rome, Via Degli Aldobrandeschi, 190, 00163 Rome, Italy
[3] Faculty of Health Sciences, Valencian International University, 46002 Valencia, Spain; martin.sanchez.g@professor.universidadviu.com or martin.gomez@unir.net
[4] Faculty of Health Sciences, Universidad Internacional de La Rioja (UNIR), 26006 Logroño, Spain
[5] School of Occupational Medicine, University of Florence, Largo Brambilla, 3, 50134 Florence, Italy; nicola.mucci@unifi.it
[6] Department of Experimental and Clinical Medicine, University of Florence, Largo Brambilla, 3, 50134 Florence, Italy
* Correspondence: giorgia.bondanini@unier.it

Abstract

Background: The COVID-19 pandemic has accelerated the adoption of smart working and digital connectivity, transforming workplace interactions. While this shift offers flexibility and autonomy, it also raises concerns about workload management, psychological health, and work–life balance. Method: This study utilized a sample of 1185 employees from a multinational company operating in Italy to examine the impact of digital connectivity on work engagement, technostress, and job performance, framed within the Job Demands-Resources (JD-R) model. Participants completed surveys measuring digital connectivity, work engagement, technostress, and job performance. Results: The findings revealed moderate levels of digital connectivity and technostress, alongside high levels of work engagement and job performance. Mediation analysis indicated that work engagement positively mediated the relationship between digital connectivity and job performance, while technostress negatively impacted job performance. Notably, the two mediators operated independently rather than sequentially. Value: this research highlights the dual nature of digital connectivity as both a resource and a demand in the workplace. It underscores the importance of implementing strategies to enhance work engagement while addressing technostress. Organizations can benefit from adopting "right to disconnect" policies and flexible work arrangements to foster a healthier work environment, ultimately improving employee well-being and productivity in the digital age.

Keywords: constant connectivity; digital work; smart working; work engagement

Received: 3 September 2025
Revised: 10 October 2025
Accepted: 15 October 2025
Published: 17 October 2025

Citation: Bondanini, G., Sanchez-Gomez, M., Mucci, N., & Giorgi, G. (2025). Digital Connectivity at Work: Balancing Benefits and Risks for Engagement, Technostress, and Performance. *Administrative Sciences*, *15*(10), 398. https://doi.org/10.3390/admsci15100398

1. Introduction

1.1. Digital Connectivity and Its Implications for Work: Opportunities and Challenges

The COVID-19 pandemic accelerated the adoption of remote and hybrid work, reshaping how employees interact with their organizations at an unprecedented pace. A central feature of this shift is the rise of digital (constant) connectivity—being persistently reachable through devices and workflows. One of the most important effects of this evolution is the growth of digital connectivity (Tiwari et al., 2024), that is, of being permanently connected

to digital devices and workflows. Although this change has created new opportunities with respect to flexibility and autonomy over work, it has also raised a number of concerns in terms of workload management, psychological health and work–life balance (Felstead & Henseke, 2017).

The worker's role is improving through increased autonomy in job management, thanks to digital connectivity. Digitalization aids in time organization, enabling employees to access necessary data and collaborate from any location. This flexibility allows for better adaptation of work to individual needs, enhancing feelings of choice and responsibility (Dornelles et al., 2022; Mazmanian et al., 2013).

Moreover, the lack of physical commuting and real-time digital communication has reduced downtime and boosted productivity. Collaboration has improved with work management platforms like Google Meet, Microsoft Teams, and Zoom. Additionally, a digital workplace provides continuous learning opportunities through online courses and webinars, enabling workers to regularly update their skills and stay current in their fields (Dornelles et al., 2022; Majumdar et al., 2020).

However, the downside to increased digital connection includes important factors like rising work pressure (Franzè et al., 2024). With the power to always be connected through email, company chat, and video conferencing, creating clear lines between work and personal time has become a challenge. The challenge for many employees is that they need to process different messages and requests even outside working hours and feel the obligation to be permanently available (Franzè et al., 2024). This phenomenon, referred to as overconnectivity, may result in a higher perceived workload, along with a heightened challenge in cognitively disconnecting from work obligations, resulting in detrimental effects on mental health and sleep quality (Madon & Masiero, 2025; Tarafdar et al., 2010).

Another problem is technostress, stress due to the overuse of digital technologies. The constant information flow, the frequent notifications and the need to juggle multiple tools at once can lead to cognitive fatigue, lack of focus and overload. Such inability may cause low productivity and frustration in managing the tasks appropriately (Tarafdar et al., 2010).

In addition, being digitally connected can exacerbate social isolation. Even though some connection with colleagues and supervisors can be maintained virtually, physical interactions tend to lead to less perceived belongingness and social support in the organization. Because digital communication is less effective than face-to-face interactions, it may result in misunderstandings, decreased quality of interpersonal relationships, and decreased emotional engagement (Brown et al., 2024; Risi & Pronzato, 2021; Tsai et al., 2023).

Despite extensive work on digital connectivity, its dual role as both resource and demand remains underexplored (Bakker & Demerouti, 2017; Tarafdar et al., 2019). Previous research has predominantly examined digital connectivity through singular theoretical lenses—either as beneficial resources or as stressful demands—without adequately capturing their dual nature (Califf et al., 2020). While earlier studies have explored JD-R theory and technostress independently, few have systematically integrated these frameworks to explain the paradoxical effects of digital connectivity in post-pandemic work environments (La Torre et al., 2019).

This study addresses this theoretical gap by proposing a comprehensive parallel mediation model, simultaneously examining the positive pathway via work engagement and the negative pathway via technostress, using data from an company in Italy. Our contribution extends beyond previous work by demonstrating how digital connectivity operates as a "double-edged sword," where beneficial and detrimental pathways coexist rather than compete, offering a more nuanced understanding of technology's role in contemporary workplaces (Mazmanian et al., 2013; Tiwari et al., 2024).

1.2. The Theoretical Model

The growing spread of digital technologies in the workplace has profoundly transformed how people interact, communicate, and manage tasks. Digital connectivity (DC) defined as the ability to remain constantly connected to colleagues, information, and tools via digital devices can be a strategic resource for improving job performance (JP). At the same time, it can pose new psychosocial risks linked to stress and overload (Bakker & Demerouti, 2007).

1.2.1. Job Demands–Resources Theory

According to the Job Demands–Resources Theory (JD-R) (Bakker & Demerouti, 2007), any job can be described in terms of Job demands are elements requiring physical, cognitive, or emotional effort, such as high workloads, urgent deadlines, or frequent interruptions. Job resources are factors that help manage demands and promote well-being, such as autonomy, social support, or efficient digital tools. Job resources foster work engagement (WE), which in turn improves performance. Excessive demands, on the other hand, can cause stress and reduce performance. DC can act as a resource, enhancing information flow, collaboration, and operational effectiveness, thereby increasing WE and, consequently, JP. This mechanism reflects the motivational pathway of the JD-R model (Hypothesis 1) (Bakker & Demerouti, 2007, 2017). As per the JD-R model, digital connectivity can be interpreted as a resource as it can improve work, dynamism and autonomy, but at the same time also a demand and therefore a disadvantage as greater pressure and workload can be perceived beyond the permitted working hours, requiring a constant digital connection.

1.2.2. Technostress Model

The Technostress Model (Tarafdar et al., 2007) identifies several stress factors stemming from the intensive use of digital technologies like techno-overload increases workload caused by technology. Techno-invasion is the intrusion into personal life, and techno-complexity describes difficulties in learning and using new tools. High DC can amplify exposure to these factors, generating technostress (TQ), which depletes cognitive and emotional resources and reduces JP. This corresponds to the strain pathway of the JD-R model (Hypothesis 2) (Tarafdar et al., 2007, 2010).

1.2.3. Self-Determination Theory

Integrating Self-Determination Theory (SDT) into our framework further illuminates how autonomy and perceived control shape employees' responses to digital connectivity. SDT posits that fulfillment of the basic psychological need for autonomy enhances intrinsic motivation and well-being (Deci & Ryan, 2000). In digitally connected work environments, autonomy-supportive conditions—such as flexible scheduling, employee discretion over communication channels, and control over digital interruptions—can strengthen the resource pathway by fostering greater work engagement. Conversely, when digital systems undermine autonomy (e.g., through mandatory monitoring, constant connectivity mandates, or intrusive notifications), they thwart basic needs, heightening technostress and their negative impacts on performance and health (Gagné & Deci, 2005). By combining SDT with the JD-R and technostress perspectives, our model captures how autonomy support serves as a critical moderator: enhancing the positive engagement pathway while buffering against the adverse effects of overconnectivity on employee strain.

1.2.4. Parallel Mediation

DC can therefore have two contrasting effects. On the one hand, it can boost work engagement (WE) by facilitating collaboration, improving access to information, and

making work processes more efficient. On the other hand, it can also increase technostress (TQ), as constant connectivity may lead to overload, interruptions, and a blurring of boundaries between work and personal life. These processes operate in parallel, without a direct sequential link between them, forming a multiple parallel mediation (Hypothesis 3).

The proposed model assumes that:

DC positively influences JP through WE (positive mediation).

DC negatively influences JP through TQ (negative mediation).

The total effect of DC on JP is the sum of these two pathways, plus any residual direct effect.

1.2.5. Theoretical and Practical Implications

Theoretically, the model integrates the JD-R Theory with the technostress model, offering a more comprehensive view of how digital technologies affect work. Practically, it suggests that organizations should strengthen aspects of DC that foster WE, and reduce TQ risks through training, regulated connection times, and organizational support. DC thus appears to be a double-edged sword: it can foster growth, autonomy, and flexibility, but it can also create stress and overload. This binary perspective fails to capture the complex reality that digital connectivity can simultaneously serve as both a resource and a demand, creating parallel pathways that independently influence employee outcomes. Sustainable remote work requires balancing these demands and resources to maximize benefits while minimizing drawbacks.

By focusing on this Italian company, allows us to control for organizational culture and technological infrastructure, isolating the specific mechanisms through which digital connectivity influences employee outcomes. This approach provides robust evidence for large multinational corporations navigating post-pandemic work arrangements.

Based on the findings of previous research, we formulate the following hypotheses, as shown in Figure 1:

Hypothesis 1. *WE as a positive mediator: Bakker and Demerouti (2007) and Schaufeli (2017) show that job resources (including DC) stimulate WE, which in turn boosts JP. Higher DC can therefore enhance both WE and performance.*

Hypothesis 2. *TQ as a negative mediator: Tarafdar et al. (2011) and Ayyagari et al. (2011) found that intensive technology use can increase TQ, with negative impacts on JP.*

Hypothesis 3. *Parallel mediation by J. Zhang and Chen (2024) confirm that multiple mediators can act independently and simultaneously, influencing overall outcomes without a serial mediation link.*

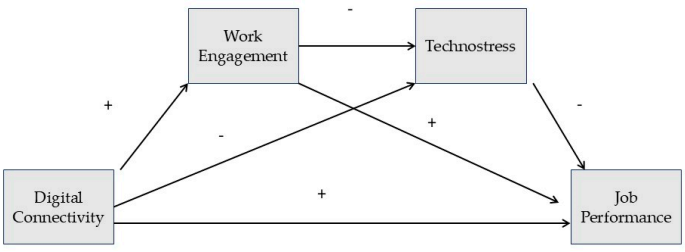

Figure 1. The theoretical mediation model proposed by the authors.

2. Materials and Methods

2.1. Participants and Sample Description

The study was conducted in a multinational company across different branches with the aim of examining how digital connectivity is influencing smart working. The company

has 6100 employees and it has been present in Italy since 1908 with numerous business divisions (Aviation, Energy, Healthcare, Digital) that employ thousands of people, although the company was spun off into separate entities in 2021: Aerospace, Vernova, and HealthCare. The Italian divisions have several plants, including the largest in Rivalta di Torino, which contribute to the country's innovation and economic growth.

The company provided a sample of 1185 employees, including 26 managers, 618 white-collar, 505 blue-collar, and 36 supervisors. The age distribution of the participants was quite varied: 149 employees were aged between 20 and 30, 278 were between 31 and 40, 479 were between 41 and 50, and 279 were over 50. In terms of gender, the sample included 792 males, 376 females, and 17 individuals who preferred not to disclose their gender.

2.2. Ethical Aspects

All participants provided their voluntary consent to participate in the study, a process that was rigorously designed to adhere to the ethical principles established in the Declaration of Helsinki. This commitment to ethical standards ensures that the rights and welfare of the participants were prioritized throughout the research process.

2.3. Instruments

Job Performance scale (Bal & De Lange, 2015) measures employee productivity and effectiveness in the workplace. It evaluates various aspects of job performance. We selected the following items:

1. How would you rate your job performance?
2. How would you rate your performance in terms of contribution to your work team?

This scale has been widely used in research to examine the impact of aging on job performance, the relationship between job crafting and performance, and the effects of HR practices on employee productivity. Each item is typically rated on a Likert scale, allowing participants to express their level of agreement or disagreement, and enabling the calculation of an overall score reflecting job performance. We selected these two items because they succinctly capture key aspects of self-rated job performance and team contribution. This selection balances brevity with conceptual relevance, minimizing respondent burden while maintaining a valid measure for our study objectives.

The Technostress Questionnaire (Finstad & Giorgi, 2021), developed by Finstad and Giorgi in 2021, measures the levels of technostress experienced by individuals related to technology use, particularly in the workplace. It assesses several dimensions of technostress; in our study, we focused specifically on technological overload, technological non-invasiveness, technological uncertainty, and technological complexity. Respondents rate a series of statements on a 5-point Likert scale, which provides insight into their experiences with technology. It was developed in Italian and translated into English following back-translation procedures. The pilot version included 80 items distributed across 15 scales/dimensions. Positive and negative items were used, with some items having reversed responses to calculate the scales. Here are some examples of questions used: 1. I think the use of technology in carrying out my job is useful. 2. I don't consider the use of information technology (IT) at work to be important. 3. I think it's easy for me to become proficient in using technology. 4. With technology, there's a risk of losing a lot of information. 5. I'm not sure I can do my job well when I have to use technology.

Digital connectivity (DC) was operationalized using the Constant Connectivity Scale (Büchler et al., 2020), which measures employees' perceived need to remain continuously reachable for work through digital devices and channels. It examines aspects like continuous availability (e.g., "Through my mobile work device, am I always available to my

colleagues and/or clients, even during downtime?") and the blurred boundaries between work and personal time (e.g., "Through the use of my mobile work device, I stay connected to work during Non-work hours me"). The revised scale, which removed one item for low factor loading, shows strong reliability and validity. Respondents rate their agreement with statements on a 5-point Likert scale. This scale provides insights into how constant connectivity affects employees' work–life balance, helping organizations understand the pressures of maintaining availability and offering guidance to support better work–life balance in a mobile-driven environment.

The Utrecht Work Engagement Scale developed by (Schaufeli et al., 2002) was used to measure work engagement and consists of 9 items rated on a 7-point, Likert-type scale ranging from 0 (never) to 6 (always). This scale assesses three dimensions of work engagement: vigor (e.g., "When I get up in the morning, I feel like going to work"), dedication (e.g., "I am enthusiastic about my job"), and absorption (e.g., "When I am working, I forget everything around me"). As these three subdimensions are highly correlated, the authors suggest that rather than computing three different scores, the total score, reflecting overall work engagement, can be used

General health (covariate). We measured psychological distress using the 12-item General Health Questionnaire (GHQ-12), a widely used screening instrument for recent non-psychotic psychiatric morbidity (Hayes, 2022). Items are rated on a 4-point scale and include both negatively and positively worded statements (e.g., "Been able to concentrate on whatever you are doing?", "Felt constantly under strain?"), with positive items reverse-coded. Consistent with common practice and evidence supporting a dominant general factor, we treated the GHQ-12 as essentially unidimensional for covariate adjustment.

2.4. Procedure

The data collection was conducted in 2024 among multiple subsidiaries of a multinational technology company operating in various Italian regions. All study measures were compiled into a survey, which was both printed and made accessible through an online platform.

Participants completed the survey during designated work hours to ensure adequate response quality and minimize after-hours burden. Data collection spanned three weeks to allow maximum participation while maintaining response consistency. All responses were collected anonymously with unique identification codes to prevent duplicate entries while preserving participant confidentiality.

2.5. Statistical Analyses

All statistical analyses were conducted using IBM SPSS Statistics version 29.0, with the PROCESS macro (version 4.2) developed by Hayes (2022) for mediation analysis. Prior to testing the hypothesized model, descriptive statistics, reliability analyses (Cronbach's alpha), and Pearson correlations were calculated for all study variables.

To ensure the construct validity of the measurement instruments, Confirmatory Factor Analyses (CFA) were conducted. The technostress questionnaire was modeled as a four-factor structure (techno-overload, techno-invasion, techno-uncertainty, and techno-complexity), yielding acceptable to good fit indices $\chi^2(48) = 102.37$, $p < 0.001$, CFI = 0.95, TLI = 0.93, RMSEA = 0.042 (90% CI [0.032, 0.053]), and SRMR = 0.046. All standardized factor loadings ranged from 0.61 to 0.84 and were statistically significant ($p < 0.001$). The Constant Connectivity scale demonstrated a unidimensional structure with satisfactory model fit: $\chi^2(5) = 9.83$, $p = 0.08$, CFI = 0.96, TLI = 0.94, RMSEA = 0.038 (90% CI [0.000, 0.076]), and SRMR = 0.031. Factor loadings ranged from 0.67 to 0.82. The Job Performance Scale consisted of only two items, which were highly correlated (r = 0.84, $p < 0.001$), and was

therefore treated as a composite observed variable in subsequent analyses. The Utrecht Work Engagement Scale was tested using its standard three-factor structure (Vigor, Dedication, Absorption). Results indicated an adequate fit for the model: $\chi^2(24) = 48.4$, $p < 0.001$, CFI = 0.96, TLI = 0.94, RMSEA = 0.05 (90% CI [0.030, 0.071]). All standardized factor loadings were above 0.60. For the GHQ-12, a unidimensional model was tested and yielded acceptable fit indices: $\chi^2(54) = 98.7$, $p < 0.001$, CFI = 0.93, TLI = 0.90, RMSEA = 0.04 (90% CI [0.025, 0.055]). Factor loadings ranged from 0.52 to 0.81, supporting the internal consistency of the measure.

Assumptions of linear regression were assessed and met. Normality of residuals was inspected both graphically (Q-Q plots and histograms) and analytically (Kolmogorov–Smirnov test), with no severe deviations found. Multicollinearity was ruled out, as all variance inflation factors (VIF) were well below the critical threshold of 5 (range: 1.050–1.172), and all tolerance values exceeded 0.80, indicating no concerns regarding multicollinearity among the predictor variables. To test our hypotheses, we first used Model 6 of SPSS macro PROCESS to examine the mediator role of work engagement and technostress in the relationship between DC and JP. A bootstrapping procedure with 5000 resamples and 95% bias-corrected confidence intervals (CI) was employed to test the significance of direct and indirect effects. Mediation was considered statistically significant when the confidence interval for an indirect effect did not include zero. Effect sizes and coefficients for all paths were reported. Additionally, a path diagram was constructed to visually represent the model, including unstandardized regression coefficients for all significant pathways.

3. Results

3.1. Descriptive Statistics and Correlations

Descriptive statistics and bivariate Pearson correlations for all study variables are presented in Table 1.

Table 1. Mean (M), standard deviation (SD), and correlations between variables.

Variable	M	SD	1	2	3	Cronbach's Alpha
1. DC	3.07	1.15	—			0.93
2. JP	6.98	1.41	0.204 **	—		0.92
3. WE	4.50	0.99	0.157 **	0.344 **	—	0.70
4. TQ	2.49	0.52	0.091 **	–0.230 **	–0.428 **	0.88

Note. N = 1185. DC = Digital Connectivity, JP = Job Performance, WE = Work Engagement, TQ = Technostress. ** $p < 0.01$ (two-tailed).

Pearson's correlation analyses revealed significant associations among the variables. Digital connectivity was positively correlated with work engagement (r = 0.157, $p < 0.001$) and job performance (r = 0.204, $p < 0.001$) and showed a smaller positive correlation with technostress (r = 0.091, $p = 0.004$). Work engagement was positively associated with job performance (r = 0.344, $p < 0.001$) and negatively with technostress (r = −0.428, $p < 0.001$). As expected, technostress was negatively related to job performance (r = −0.230, $p < 0.001$).

These correlations support the theoretical assumptions and the implementation of a multiple mediation model with WE and TQ as parallel mediators in the relationship between digital connectivity and job performance.

3.2. Mediation Analysis

To test our hypothesized parallel mediation model, we used PROCESS Model 6 with digital connectivity as the independent variable, work engagement and technostress as simultaneous mediators, and job performance as the dependent variable. General health,

gender, and age were included as covariates in all models to control their potential influence on the outcome (see Figure 2).

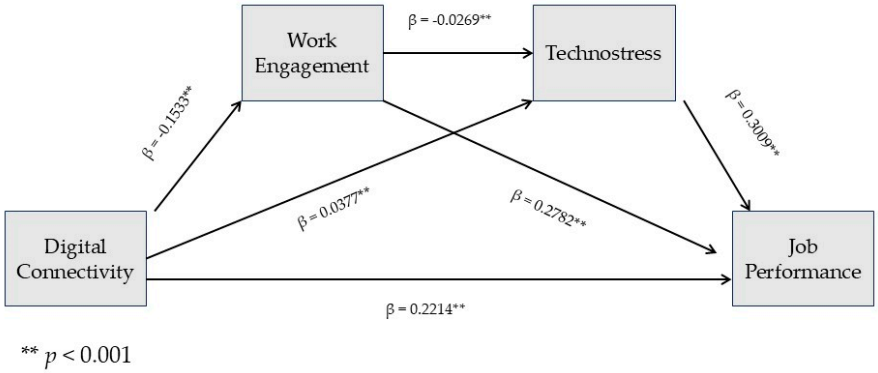

Figure 2. Mediation model explaining the relationship between digital connectivity, work engagement, technostress and job performance. Note: β = unstandardized coefficients.

The total effect of digital connectivity on job performance was significant (b = 0.254, SE = 0.036, t = 6.987, $p < 0.001$), with a 95% confidence interval that did not include zero [0.182, 0.325], suggesting that digital connectivity positively predicts job performance when no mediators are included in the model. When mediators and covariates were included, the direct effect remained significant, b = 0.221, SE = 0.036, t = 5.995, $p < 0.001$, [0.148, 0.293], indicating a partial mediation.

The total indirect effect was also significant, b = 0.032, BootSE = 0.0140, BootCI95% = [0.006, 0.062], confirming that part of the relationship between DC and JP is mediated by the proposed paths, and indicating that engagement and technostress jointly mediate the relationship between digital connectivity and job performance.

Specifically, the indirect effect through work engagement was significant (b = 0.042, BootSE = 0.012, BootCI95% = [0.021, 0.070]), confirming Hypothesis 1. These results suggest that higher digital connectivity is associated with greater work engagement, which in turn enhances job performance.

The indirect effect through technostress was negative and significant (b = −0.011, BootSE = 0.0059, BootCI95% = [−0.024, −0.001]) supporting Hypothesis 2. This demonstrates that higher digital connectivity seems to increase technostress, which in turn reduces job performance.

However, the serial path through both mediators (DC → WE → TQ → JP) was not significant (b = 0.001, BootSE = 0.000, BootCI95% = [−0.000, 0.003]) confirming Hypothesis 3. This suggests that the indirect effect through both mediators in sequence is not statistically supported.

The model explained a significant proportion of the variance in the outcome and mediating variables: 27.0% of the variance in Work Engagement ($R^2 = 0.270$), 54.1% in Technostress ($R^2 = 0.540$), and 11.7% in Job Performance ($R^2 = 0.117$).

Table 2 displays the unstandardized regression coefficients (B), standard errors (SE), bias-corrected 95% confidence intervals, and significance levels for the direct and indirect effects included in the proposed mediation model. As shown, these results indicate a complex dynamic: while digital connectivity enhances job performance in part by fostering engagement, it simultaneously contributes to technostress, which in turn diminishes performance. The dominant pathway appears to be the positive route via engagement, highlighting the importance of promoting engagement in digitally connected work environments to buffer against the potential downsides of technostress.

Table 2. Results of the hypothesis testing.

Direct/Indirect Effects	B	SE	95% BC CI		*p*-Value
			LL	UL	
Direct effects:					
DC → WE	0.153	0.021	0.111	0.195	<0.001
WE → JP	0.278	0.052	0.174	0.381	<0.001
DC → JP	0.221	0.036	0.148	0.293	<0.001
DC → TQ	0.037	0.009	0.019	0.056	<0.001
TQ → JP	−0.300	0.122	−0.540	−0.060	0.014
Indirect effects:					
DC → WE → JP	0.042	0.012	0.021	0.070	<0.001
DC → TQ → JP	−0.011	0.005	−0.024	−0.001	0.030
DC → WE→ TQ → JP	0.001	0.001	−0.000	0.003	0.106
Total indirect effect	0.032	0.014	0.006	0.062	<0.001

Notes: DC = Digital Connectivity; JP = Job Performance; WE = Work Engagement; TQ = Technostress; B = unstandardized structural path coefficients; SE = Bias-corrected standard error; 95% BC CI = Bias-corrected confidence interval based on 5000 bootstrap samples; LL = Lower limit; UL = Upper limit.

4. Discussion

The findings of this study contribute to a more comprehensive understanding of the interaction between digital connectivity (DC), work engagement (WE), technostress (TQ), and job performance (JP) within the framework of the JD-R model (Bakker & Demerouti, 2007, 2017). As hypothesized (H1), the results support the mediation pathway in which WE acts as a mediator between DC and JP. This aligns with the idea that access to and availability of digital tools and resources can enhance employee engagement and motivation, ultimately leading to better performance. However, the study also reveals the "dark side" of digital connectivity: TQ was found to be significantly and negatively related to JP. Consistent with Hypothesis 2, this suggests that, while DC fosters engagement, it simultaneously generates higher levels of TQ, which in turn negatively affects performance. This finding is consistent with Tarafdar et al. (2011) and Ayyagari et al. (2011), among others, who identified a paradox in the digital connectivity era—namely, that higher connectivity often comes with increased stress, driven by information overload and the pressure to remain constantly connected. In this sense, the JD-R model's focus on the balance between job demands and job resources is particularly relevant (Bakker & Demerouti, 2007, 2017). Our multiple parallel mediation model showed that the total effect of DC on JP was significant, with a negative and significant indirect effect through TQ. Supporting Hypothesis 3, this result highlights the dual nature of digital connectivity, where WE plays a positive role in enhancing performance, but TQ exerts a counteracting negative effect. Furthermore, the lack of a significant serial mediation effect indicates that TQ and WE operate independently rather than sequentially. This finding aligns with J. Zhang and Chen (2024), Bennett and Robinson (2000) and Y. Zhang et al. (2025), who suggested that multiple mediators can jointly influence job performance without necessarily forming a causal chain. From a practical standpoint, organizations should recognize that boosting work engagement is valuable but must be accompanied by efforts to mitigate technostress to maximize performance outcomes. The JD-R framework for technology use in the era of modern digital connectivity offers a valuable lens through which to examine potential outcomes for both employees and organizations (Bakker & Demerouti, 2007, 2017). Striking a balance between high demands and adequate resources is essential: insufficient resources can cause stress and burnout, while sufficient resources can improve well-being and performance. For instance, JD-R theory posits that autonomy can be viewed as a job resource that promotes well-being and performance, whereas excessive use of digital tools and hyperconnectivity

may be perceived as job demands that increase the risk of health issues such as stress and burnout (Bakker & Demerouti, 2007, 2017; Bakshi & Bhattacharyya, 2021). DC can have two contrasting effects. On one hand, it can enhance WE by fostering collaboration, facilitating access to information, and improving workflow efficiency. On the other hand, it can intensify TQ due to overload, constant interruptions, and blurred boundaries between work and personal life. Understanding and managing this duality is crucial for creating sustainable and productive digitally connected work environments.

4.1. Theoretical Implications and Critical Integration

Our findings provide nuanced evidence for the dual nature of digital connectivity within the JD-R framework, challenging simplistic views of technology as either beneficial or harmful (Bakker & Demerouti, 2017; Tarafdar et al., 2019). The parallel mediation model demonstrates that digital connectivity simultaneously enhances performance through increased engagement while undermining it through technostress—a paradox that reflects the complex reality of modern digital workplaces (Ragu-Nathan et al., 2008).

Critically, our results contradict some previous research that suggested sequential relationships between technology use, engagement, and stress (Ayyagari et al., 2011). Instead, we find that positive and negative pathways operate independently, consistent with recent conceptualizations of the JD-R model that emphasize parallel rather than competing processes (Bakker & Demerouti, 2017). This finding has profound implications for intervention design and highlights the need for bifurcated approaches that simultaneously enhance positive pathways while mitigating negative ones (Tims et al., 2013).

The absence of a significant serial mediation effect challenges traditional assumptions about the linear progression of technology's impact on employees (Tarafdar et al., 2010). Our evidence suggests that the JD-R model's dual pathways are more accurately conceptualized as parallel processes rather than competing or sequential mechanisms (Crawford et al., 2010), requiring theoretical refinement in future research. This aligns with emerging perspectives on technostress that recognize technology's simultaneous potential for both empowerment and burden (Califf et al., 2020; La Torre et al., 2019).

Our findings must be interpreted within the specific context of a large multinational technology corporation operating in Italy. The organizational culture, digital infrastructure, and workforce characteristics may differ substantially from small and medium enterprises (SMEs) or organizations in other cultural contexts. The sophisticated technological ecosystem and established digital work protocols in multinational corporations may facilitate higher levels of digital connectivity adoption compared to SMEs with limited technological resources.

4.2. Practical Implications

Taking all this into account, it is vital that companies and employees find strategies to benefit from digital connectivity while still preserving psychological and physical well-being. Organizations can mitigate the negative effects of hyperconnectivity by introducing right to disconnect policies that offer employees the right to unplug outside of working hours without consequences (Bakshi & Bhattacharyya, 2021; Chu et al., 2024; Sen et al., 2022).

At the same time, guidance should be given to cultivate a corporate culture that values sustainable time management and the importance of psychological recovery. Strategies to minimize the dangers of digital connectedness are as follows:

- Introducing flexible working hours to provide opportunities for employees to manage both work and personal commitments.
- Scheduling digital breaks to reduce mental fatigue and increase focus.

- Implementing time management techniques (e.g., the Pomodoro method) to manage attention and mitigate digital fatigue.
- Promoting corporate policies that restrict communications outside working hours so that people don't feel they are always "on."
- Train managers to model healthy digital behaviors by respecting offline boundaries and scheduling "no-meeting" blocks.
- Promote peer support networks and virtual "coffee chats" to sustain social connection and belonging, counteracting isolation from overconnectivity.

This study's practical implications are primarily applicable to large multinational corporations with similar technological infrastructure and organizational culture. Small and medium-sized enterprises and organizations in different cultural contexts may experience different patterns of digital connectivity effects due to variations in technological resources, management practices, and cultural attitudes toward technology adoption (OECD, 2023).

4.3. Limitations and Future Perspectives

Several limitations merit consideration when interpreting our findings. First, our single-organization design limits generalizability across industries and cultural contexts (Schaufeli & Taris, 2014). Future research should examine these relationships across diverse sectors and cultural settings where attitudes toward digital connectivity may vary.

Second, the cross-sectional design prevents causal inferences and fails to capture the dynamic evolution of digital connectivity's impact over time. Longitudinal studies tracking employees' adaptation to digital tools and changing technostress levels would provide crucial insights into temporal patterns and potential habituation effects (Cole & Maxwell, 2003).

Third, exclusive reliance on self-report measures raises concerns about common method variance and social desirability bias. Future investigations should incorporate objective performance metrics, physiological stress indicators, and behavioral observations to triangulate findings and enhance validity (Podsakoff et al., 2003).

Fourth, our post-COVID data collection context may have influenced perceptions of digital connectivity, as the pandemic fundamentally altered workplace norms and expectations. Comparative studies examining pre- and post-pandemic patterns would illuminate how crisis-driven digitalization differs from organic technological adoption (Kniffin et al., 2021).

Finally, our focus on individual-level outcomes overlooks important team and organizational-level dynamics. Future research should examine how digital connectivity affects collective performance, team cohesion, and organizational culture, potentially revealing multilevel interaction effects not captured in our individual-focused model (Kozlowski & Klein, 2000).

5. Conclusions

This research brings out the ambivalent role of digital connectivity in the workplace, by providing opportunities for increased work engagement and challenges in the form of technostress. The results emphasize the need for creating a work atmosphere that enhances respondent engagement and for practices that could diminish the negative influence of technostress (Arntz et al., 2020; Bogodistov & Moormann, 2024). This is where organizations can adopt initiatives that promote positive digital connectivity, such as stipulating limits on after-hours communication, or offering tools for stress reduction. Utilizing the Job Demands-Resources (JD-R) (Bakker & Demerouti, 2007, 2017) framework, organizations can develop a 'middle of the road' stance, where digital connectivity has high benefits and low downsides. Further studies need to delve deeper into the complexity of digital connectivity,

work engagement, and technostress in articulating their interdependent dynamics with job performance (Deng et al., 2023; Duan & Deng, 2023). An understanding of these relations is critical for the design of successful interventions aimed at supporting the digital well-being and productivity of employees in current working settings. Digital connection is a resource and a demand at work: it's something that allows you independence and flexibility but that also can push you toward stress and overload and those two factors can undermine employee performance and well-being. Thus, businesses have to smartly cope with these challenges, promoting "right to disconnect" policies that allow workers to disconnect from work during non-work hours is one positive practice to decrease workload perceptions and improve mental health (Buchanan & Wiklund, 2021; Nguyen, 2021). Likewise, introducing flexible working hours and scheduling between digital breaks can help to manage mental fatigue and enhance levels of concentration. Companies should also work on their sustainable time management culture, and raise awareness about the necessity of psychological recovery (Arıcan, 2025; Bernburg et al., 2025; Usta Kara & Ersoy, 2022). Additionally, educating workers about technostress and giving them the tools and skills to manage their work demands in a digital era can help ensure employees can juggle their workloads and responsibilities. Finally, in order to exploit the potential of smart working and ensure that it is sustainable for the current work context and future work scenarios, a balance between this set of challenges and available resources is required (Abu Talib et al., 2022; Bourlakis et al., 2023). An intentional and strategic approach to digital connectivity will help organizations turn obstacles into opportunities, and cultivate a positive, productive and connected work environment (Kasemy et al., 2022).

Author Contributions: The authors confirm contribution to the paper as follows: study conception and design: G.B., G.G., N.M. and M.S.-G.; data collection: G.B. and G.G.; analysis and interpretation of results: M.S.-G.; draft manuscript preparation: G.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research has not received any funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki. Ethical review and approval were waived for this study because it involved anonymous survey data, in accordance with institutional and national guidelines.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Acknowledgments: The authors are grateful to the participating organization and employees for their collaboration in this study.

Conflicts of Interest: The authors declare no conflicts of interest.

References

Abu Talib, S. L., Jusoh, M. A., Razali, F. A., & Awang, N. B. (2022). Technostress creators in the workplace: A literature review and future research needs in accounting education. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *7*(7), e001625. [CrossRef]

Arıcan, O. H. (2025). The effects of digital fatigue on mental health in seafarers: Delphi and multiple regression analysis. *Turkish Journal of Maritime and Marine Sciences*, *11*(1), 46–67. [CrossRef]

Arntz, M., Gregory, T., & Zierahn, U. (2020). Digitization and the future of work: Macroeconomic consequences. In K. F. Zimmermann (Ed.), *Handbook of labor, human resources and population economics* (pp. 1–29). Springer International Publishing. [CrossRef]

Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: Technological antecedents and implications. *MIS Quarterly*, *35*(4), 831–858. [CrossRef]

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology*, *22*(3), 309–328. [CrossRef]

Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, *22*(3), 273–285. [CrossRef] [PubMed]

Bakshi, T., & Bhattacharyya, A. (2021). Socially distanced or socially connected? Well-being through ICT usage among the Indian elderly during COVID-19. *Millennial Asia*, *12*(2), 190–208. [CrossRef]

Bal, P. M., & De Lange, A. H. (2015). From flexibility human resource management to employee engagement and perceived job performance across the lifespan: A multisample study. *Journal of Occupational and Organizational Psychology*, *88*(1), 126–154. [CrossRef]

Bennett, R. J., & Robinson, S. L. (2000). Development of a measure of workplace deviance. *Journal of Applied Psychology*, *85*(3), 349–360. [CrossRef] [PubMed]

Bernburg, M., Gebhardt, J. S., Groneberg, D. A., & Mache, S. (2025). Impact of digitalization in dentistry on technostress, mental health, and job satisfaction: A quantitative study. *Healthcare*, *13*(1), 72. [CrossRef]

Bogodistov, Y., & Moormann, J. (2024). *Process management and burnout prevention: A human-centred approach to reducing work-related stress*. Springer Nature Switzerland. [CrossRef]

Bourlakis, M., Nisar, T. M., & Prabhakar, G. (2023). How technostress may affect employee performance in educational work environments. *Technological Forecasting and Social Change*, *193*, 122674. [CrossRef]

Brown, M. R., Coombes, P. J., Rodriguez, K. J., Hickman, A. P. I., & Keating, D. S. (2024). Effectiveness of exercise via telehealth for chronic disease: Updated systematic review and meta-analysis of exercise interventions delivered via videoconferencing. *Journal of Clinical Exercise Physiology*, *13*(s2), 403. [CrossRef]

Buchanan, N. T., & Wiklund, L. O. (2021). Intersectionality research in psychological science: Resisting the tendency to disconnect, dilute, and depoliticize. *Research on Child and Adolescent Psychopathology*, *49*(1), 25–31. [CrossRef]

Büchler, N., Ter Hoeven, C. L., & Van Zoonen, W. (2020). Understanding constant connectivity to work: How and for whom is constant connectivity related to employee well-being? *Information and Organization*, *30*(3), 100302. [CrossRef]

Califf, C. B., Sarker, S., & Sarker, S. (2020). The bright and dark sides of technostress: A mixed-methods study involving healthcare IT. *MIS Quarterly*, *44*(2), 809–856. [CrossRef]

Chu, F., Zhang, J., Pellegrini, M. M., Wang, C., & Liu, Y. (2024). Staying connected beyond the clock: A talent management perspective of after-hours work connectivity and proactive behaviours in the digital age. *Management Decision*, *62*(10), 3132–3154. [CrossRef]

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology*, *112*(4), 558–577. [CrossRef] [PubMed]

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: A theoretical extension and meta-analytic test. *Journal of Applied Psychology*, *95*(5), 834–848. [CrossRef]

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. [CrossRef]

Deng, H., Duan, S. X., & Wibowo, S. (2023). Digital technology driven knowledge sharing for job performance. *Journal of Knowledge Management*, *27*(2), 404–425. [CrossRef]

Dornelles, J. D. A., Ayala, N. F., & Frank, A. G. (2022). Smart working in industry 4.0: How digital technologies enhance manufacturing workers' activities. *Computers & Industrial Engineering*, *163*, 107804. [CrossRef]

Duan, S. X., & Deng, H. (2023). Job performance in digital work: Do personality traits matter? *Journal of Computer Information Systems*, *65*, 15–27. [CrossRef]

Felstead, A., & Henseke, G. (2017). Assessing the growth of remote working and its consequences for effort, well-being and work-life balance. *New Technology, Work and Employment*, *32*(3), 195–212. [CrossRef]

Finstad, G. L., & Giorgi, G. (2021). The technostress questionnaire: A pilot study. *Journal of Advanced Health Care*, *3*(3), 1–11. [CrossRef]

Franzè, C., Paolucci, E., & Pessot, E. (2024). Sustained value creation driven by digital connectivity: A multiple case study in the mechanical components industry. *Technovation*, *129*, 102918. [CrossRef]

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331–362. [CrossRef]

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). Guilford Press.

Kasemy, Z. A., Sharif, A. F., Barakat, A. M., Abdelmohsen, S. R., Hassan, N. H., Hegazy, N. N., Sharfeldin, A. Y., El-Ma'doul, A. S., Alsawy, K. A., Abo Shereda, H. M., & Abdelwanees, S. (2022). Technostress creators and outcomes among egyptian medical staff and students: A multicenter cross-sectional study of remote working environment during COVID-19 pandemic. *Frontiers in Public Health*, *10*, 796321. [CrossRef]

Kniffin, K. M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S. P., Bakker, A. B., Bamberger, P., Bapuji, H., Bhave, D. P., Choi, V. K., Creary, S. J., Demerouti, E., Flynn, F. J., Gelfand, M. J., Johns, G., Kesebir, S., Klein, P. G., Lee, S. Y., . . . & Vugt, M. V. (2021). COVID-19 and the workplace: Implications, issues, and insights for future research and action. *American Psychologist*, *76*(1), 63–77. [CrossRef] [PubMed]

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein, & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3–90). Jossey-Bass.

La Torre, G., Esposito, A., Sciarra, I., & Chiappetta, M. (2019). Definition, symptoms and risk of techno-stress: A systematic review. *International Archives of Occupational and Environmental Health*, *92*(1), 13–35. [CrossRef]

Madon, S., & Masiero, S. (2025). Digital connectivity and the SDGs: Conceptualising the link through an institutional resilience lens. *Telecommunications Policy*, *49*(1), 102879. [CrossRef]

Majumdar, P., Biswas, A., & Sahu, S. (2020). COVID-19 pandemic and lockdown: Cause of sleep disruption, depression, somatic pain, and increased screen exposure of office workers and students of India. *Chronobiology International*, *37*(8), 1191–1200. [CrossRef]

Mazmanian, M., Orlikowski, W. J., & Yates, J. (2013). The autonomy paradox: The implications of mobile email devices for knowledge professionals. *Organization Science*, *24*(5), 1337–1357. [CrossRef]

Nguyen, M. H. (2021). Managing social media use in an "always-on" society: Exploring digital wellbeing strategies that people use to disconnect. *Mass Communication and Society*, *24*(6), 795–817. [CrossRef]

Organisation for Economic Co-Operation and Development. (2023). *OECD SME and entrepreneurship outlook 2023*. OECD Publishing. [CrossRef]

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879–903. [CrossRef]

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research*, *19*(4), 417–433. [CrossRef]

Risi, E., & Pronzato, R. (2021). Smart working is not so smart: Always-on lives and the dark side of platformisation. *Work Organisation, Labour & Globalisation*, *15*(1), 107–125. [CrossRef]

Schaufeli, W. B. (2017). Applying the job demands-resources model. *Organizational Dynamics*, *46*(2), 120–132. [CrossRef]

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies*, *3*(1), 71–92. [CrossRef]

Schaufeli, W. B., & Taris, T. W. (2014). A critical review of the job demands-resources model: Implications for improving work and health. In G. F. Bauer, & O. Hämmig (Eds.), *Bridging occupational, organizational and public health: A transdisciplinary approach* (pp. 43–68). Springer. [CrossRef]

Sen, K., Prybutok, G., & Prybutok, V. (2022). The use of digital technology for social wellbeing reduces social isolation in older adults: A systematic review. *SSM—Population Health*, *17*, 101020. [CrossRef] [PubMed]

Tarafdar, M., Cooper, C. L., & Stich, J. F. (2019). The technostress trifecta: Techno eustress, techno distress and design: Theoretical directions and an agenda for research. *Information Systems Journal*, *29*(1), 6–42. [CrossRef]

Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S. (2007). The impact of technostress on role stress and productivity. *Journal of Management Information Systems*, *24*(1), 301–328. [CrossRef]

Tarafdar, M., Tu, Q., & Ragu-Nathan, T. S. (2010). Impact of technostress on end-user satisfaction and performance. *Journal of Management Information Systems*, *27*(3), 303–334. [CrossRef]

Tarafdar, M., Tu, Q., Ragu-Nathan, T. S., & Ragu-Nathan, B. S. (2011). Crossing to the dark side: Examining creators, outcomes, and inhibitors of technostress. *Communications of the ACM*, *54*(9), 113–120. [CrossRef]

Tims, M., Bakker, A. B., & Derks, D. (2013). The impact of job crafting on job demands, job resources, and well-being. *Journal of Occupational Health Psychology*, *18*(2), 230–240. [CrossRef]

Tiwari, M. K., Pal, R., Singh, R., Singh, A. K., Kumar, V., Sharma, S., & Zaib, N. (2024). The comprehensive review: Internet protocol (IP) address a primer for digital connectivity. *Asian Journal of Research in Computer Science*, *17*(8), 34–45. [CrossRef]

Tsai, H.-H., Cheng, C.-Y., & Shieh, W.-Y. (2023). Effectiveness of laptop-based versus smartphone-based videoconferencing interaction on loneliness, depression and social support in nursing home residents: A secondary data analysis. *Journal of Telemedicine and Telecare*, *29*(3), 177–186. [CrossRef] [PubMed]

Usta Kara, I., & Ersoy, E. G. (2022). A new exhaustion emerged with COVID-19 and digitalization: A qualitative study on zoom fatigue. *OPUS Toplum Araştırmaları Dergisi*, *19*(46), 365–379. [CrossRef]

Zhang, J., & Chen, Z. (2024). Exploring human resource management digital transformation in the digital age. *Journal of the Knowledge Economy*, *15*(1), 1482–1498. [CrossRef] [PubMed]

Zhang, Y., Zhang, J., Lu, Y., & Ji, F. (2025). Digitalization and firm value: The evidence from China's manufacturing enterprises. *Sustainability*, *17*(6), 2623. [CrossRef]