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Technology Tetheredness and Employees Innovative Work Behavior and Adaptive Performance During and After COVID-19

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Abstract

The modern workplace demands new work patterns and employee adaptability to stay competitive; the less dependent employees are on technology, the more they can achieve in innovative work behavior, particularly in technology-driven industries. Thus, this study emphasizes the need to explore and identify factors that negatively affect the innovative work behavior and adaptive performance of employees in the IT industry. This dissertation aimed to contribute to the body of knowledge on IWB and employee adaptive performance by examining the factors that can hinder IWB and adaptive performance, how this can happen, and the boundaries within which it can flourish. This was done by employing a mediation mechanism. To gather primary data, 800 survey questionnaires were distributed to software companies and software developers. A total of 504 survey questionnaires were returned, of which 462 were considered valid after removing incomplete questionnaires and outliers. The present study used pre-existing measures, and we assessed their validation and reliability through various procedures. To further investigate the indirect relationship of tetheredness to technology and IWB and employee adaptive performance, mediation analysis was also

performed. The data show a strong (negative) relationship between tetheredness to technology and IWB and employee adaptive performance. According to my model, emotional factors (i.e., emotional exhaustion and restlessness) mediate the relationship between IWB and employee adaptive performance, and between tetheredness to technology and employee adaptive performance. Additionally, emotional factors (emotional exhaustion and restlessness) moderate the relationship between IWB and entrepreneurial leadership. Moreover, family background mediates the association between emotional factors (emotional exhaustion and restlessness) and employee adaptive performance. The study also discussed its limitations, possible implications, and future research directions in the context of the findings. Studies indicate that IT managers and professionals can help staff think outside the box by implementing policies that reduce the impact of being "tethered" to technology.

Keywords: Tetheredness Technology, Emotional Exhaustion, Restlessness, Adaptive Performance, Innovative Work Behavior, Entrepreneurial Leadership, Family Background.

1. Introduction

In the current fast-paced and dynamic business landscape, companies need to create an environment that encourages individuals to think outside the box and apply new ideas to gain a competitive edge (de Barros et al., 2025; Siswanti & Muafi, 2025; Al-Omoush et al., 2024). But this is not easy to achieve because of increased competition in corporate environments (Bolliger et al., 2022; Khedhaouria et al., 2017; Sharma et al., 2024). In today's organizations, stressors are ubiquitous, and the balance between innovation and employee adaptive performance is a critical area of interest – how can people innovate yet maintain high levels of adaptive performance in stressful situations? Adaptive performance involves an employee changing their work behaviors and strategies to meet new demands, situations, and unexpected challenges at work (Pulakos et al., 2000; Ployhart & Bliese, 2006). There is growing concern regarding COVID-19 and dependence on computers as a result of the shift in the nature of work and some companies permitting their employees to work remotely and continue to be "always-standby" even during the closed office period (Khudaykulov et al., 2024; Troisi et al., 2022). The COVID-19 trend of remote work may have increased technological dependence, blurring the lines between home and workplace.

Workers' locus of control is lost, resulting in absentmindedness, lack of creativity and poor health as a result of stress brought on by over using technology (George et al., 2024:

Greenhalgh et al., 2017). Minimizing the adverse impacts of telework has been less emphasized than other methods. A vast literature suggests that becoming tech dependent could have a negative effect on employees' creativity and innovation at work during COVID-19 (Abolnasser et al., 2023). However, the explanations for these results have been based more on speculation than evidence. Innovation at workplace has come to be viewed as a key determinant of organization's long-term survival, effectiveness in this chaotic market context (Muchiri et al., 2020: Anderson et al., 2014). Employees' innovative actions unquestionably boost the company's performance and are crucial to its expansion. Unlike the traditional approach, workplace innovation carries risks and uncertainties. If the organization does not value shortcomings and new ideas, it will not achieve its promising goals. Workplace innovation involves 4 steps, and the process is multi-step. The creative processes involved in the first two stages, ideation and exploration, and innovation in the last two stages, concept championing and implementation, are closely related. An individual employee may miss the chance to put ideas into action. This can be due to company restrictions. In today's complex and volatile economic environment, companies must create a workplace culture that encourages employees to innovate and put their ideas into practice to gain and maintain a competitive edge (Janssen, 2000; Chen Li & Leung, 2016).

Both the emotional and the cognitive aspects of the person are relevant to innovative behavior on the job (Janssen, 2004). When workers put a lot of thought and emotion into coming up with novel ideas, it could distract them from their work, and vice versa (Hameed et al., 2025; Harari et al., 2016). Leaders in any industry or company, no matter how big or small, have long made innovation one of their top priorities (Naveed et al., 2022; Kang, Solomon, & Choi, 2015). In particular, businesses struggle to hire and retain highly skilled people to work on IWB projects and to foster creativity and innovative thinking in today's complex, challenging workplaces (Sayili, 2020; Papa et al., 2020; Chen et al., 2016). The most significant thing an employee can do to help their company succeed is to exhibit innovative behavior on the job (Nasifoglu et al., 2020; AlEssa & Durugbo, 2022). Several studies have identified creative work behavior as deliberate attempts by an employee to develop new ideas, promote them within the company, and implement them to improve company productivity (De Jong & Den Hartog, 2010).

The first two stages of the innovation process – concept exploration and idea generation are anchored in each person's cognitive gifts. In the final two phases, participants used their prior knowledge to identify problems and consider possible solutions. People need to advocate for

and put new ideas into action in the following two steps of the innovation process. The effectiveness of the final two stages (Mumford, 2003) depends on employees' ability to persuade upper management and other employees of the benefits of their ideas and to get others to buy into implementation. However, managing an individual's exploration, creation, advocacy, and implementation of new concepts is a heavy lift (Williams et al., 2021; Bunce & West, 1994). These tasks also involve cognitive and emotional involvement (Janssen, 2004). Compared with ordinary tasks, workplace innovation requires high resource use, meaning people must put significant effort into all parts of the innovation process (Wu et al., 2022). For instance, while creative tasks involve a variety of activities (e.g., problem identification and definition, idea sharing, idea evaluation and refinement), they require sustained effort over a long period (Tan, 2020).

Once creative concepts have emerged, the next step is to sell them emotionally to other team members who may be apprehensive about change and to the relevant decision makers in the business to gain their buy-in (Janssen, 2004). Lastly, when implementing innovation, people may face unexpected barriers, such as being too committed to their technology, which might motivate them to focus even more on problem-solving responsibilities (Abbasnejad, 2021). However, with this added workload, organizations need to invest in resources to launch new initiatives (Montani et al., 2020). Research on emotional tiredness and restlessness has identified available therapies and coping mechanisms. These can include stress-management programs, mindfulness practice, organizational initiatives that strengthen support networks, or a supportive work culture. Understanding the causes of emotional fatigue and restlessness is crucial to improving innovation and employees' adaptive performance. This is the only way to develop intervention and prevention strategies that work.

2. Research Gap

Information technology use for organizational tasks can happen anytime and anywhere. Consequently, it does not limit employees to the workplace. For example, people can check work-related emails during vacation, while eating with their family, or while traveling, thanks to this technological advancement. While these technologies can improve productivity by making workers more connected and responsive to work challenges, they can also have a negative impact on people, such as mental illness, addiction, and work overload. Additionally, employees feel burdened by being involved in technology outside working hours and/or for work-related purposes, which in turn causes emotional exhaustion and restlessness

(Kakiashvili et al., 2013). Unfortunately, emotional exhaustion and restlessness from connectivity demands outside working hours have peaked in recent decades and will likely rise further (Butts et al., 2015). High work stress and impatience can cost both the employee and the workplace. They found negative consequences of emotional exhaustion and restlessness; as Grossi et al. (2015) note, emotional exhaustion and restlessness are linked to cognitive, physical, and behavioral consequences, including lower quality of life and desired performance in the workplace.

Conservation of resource theory proposes that these negative experiences reduce innovative work behavior because the energy required to conserve resources reduces individuals' motivation to avoid future resource depletion (Hobfoll & Shirom, 2000). However, innovation is an important driver of productivity and economic performance in IT industries (Malek et al., 2013). Moreover, innovation is viewed as the key to the competitiveness, success, and long-term survival of organizations (Yesil & Sozbilir, 2013). Accordingly, organizations focus on human resource innovation that culminates in organizational-level innovation (Yesil & Sozbilir, 2013). Thus, organizational success depends on employees' creativity and innovation (Yesil & Sozbilir, 2013), but in stressful workplaces, employees' IWB and performance may be affected.

Some positive experiences boost employees' behavioral control and motivation, including positive aspects of leadership, such as entrepreneurial leadership and an entrepreneurial family background. Strauss and Parker (2018) therefore proposed implementing these supportive features in the next study, while the active features support individuals' and organizations' productivity and growth. In addition, previous studies have ignored entrepreneurial leadership and family background as buffering resources. Therefore, the present study takes entrepreneurial leadership and entrepreneurial family background of the employees as intervening variables and investigates how they can boost the enhancement.

3. Problem Statement

Companies in the local area that used to focus on information technology have quickly adapted to work-from-home environments, using technology extensively. This transformation has given rise to a condition called "Technology Tetheredness," in which employees are becoming more reliant on digital tools and platforms for their work activities and communication. Nevertheless, the impact of increased dependence on technology on employees' innovative work behavior and adaptive performance remains unclear (Perrigino, 2024). For enterprises

today, it is vital to understand the link between technology tetheredness and employees' behaviors in times of uncertainty. In the digital era, while remote co-operation and adaptability are possible, growing reliance on technology can also negatively affect employees' creativity, problem-solving abilities, and individual adaptability. Moreover, the long-term impact of remote work could significantly shape employees' experience of technology and their adaptability to the changing nature of work (Wang, 2021; Becker, 2022). The primary concern is to examine the link between technology tetheredness and employees' IWB and adaptive performance in recent times. By improving staff adaptive performance, organizations can strengthen their digital workplaces and build a culture of innovation and adaptation to overcome disruptions.

4. Research Objectives

1. To investigate the impact of tetheredness to technology on IWB and adaptive performance.
2. To examine the role of restlessness and emotional exhaustion as mediators in the association between tetheredness to technology and employee IWB and adaptive performance.
3. To evaluate moderating role of entrepreneurial leadership on the association between emotional exhaustion and supervisor-rated innovative behavior.
4. To investigate the moderating role of family background between emotional exhaustion and employee adaptive performance.

5. Conceptual Framework

The conceptual framework shows the relationships among tetheredness to technology, emotional exhaustion, restlessness, adaptive performance, innovative work behavior, entrepreneurial leadership, and family background. The framework suggests that workers' excessive dependence on or attachment to technology could directly and indirectly affect their work outcomes. In the model, the independent variable is tetheredness to technology, while the dependent variable is emotional exhaustion and restlessness, the latter of which serves as a mediator variable. Adaptive performance and innovative work behaviour are the dependent variables. In addition, entrepreneurial leadership and family background are proposed as moderating variables that can either reinforce or weaken certain relationships in the model. The framework suggests that the more strongly an employee is tied to technology, the lower they will be rated by their supervisor on innovative work behaviours and the lower their employee adaptive performance will be. Employees that are always connected with technological devices

and are always in touch with work-related digital communication may struggle with mentally separating from work, information overload, and constant technological demands. These can decrease the capacity of workers to think and develop new ideas and to be flexible in response to evolving job demands.

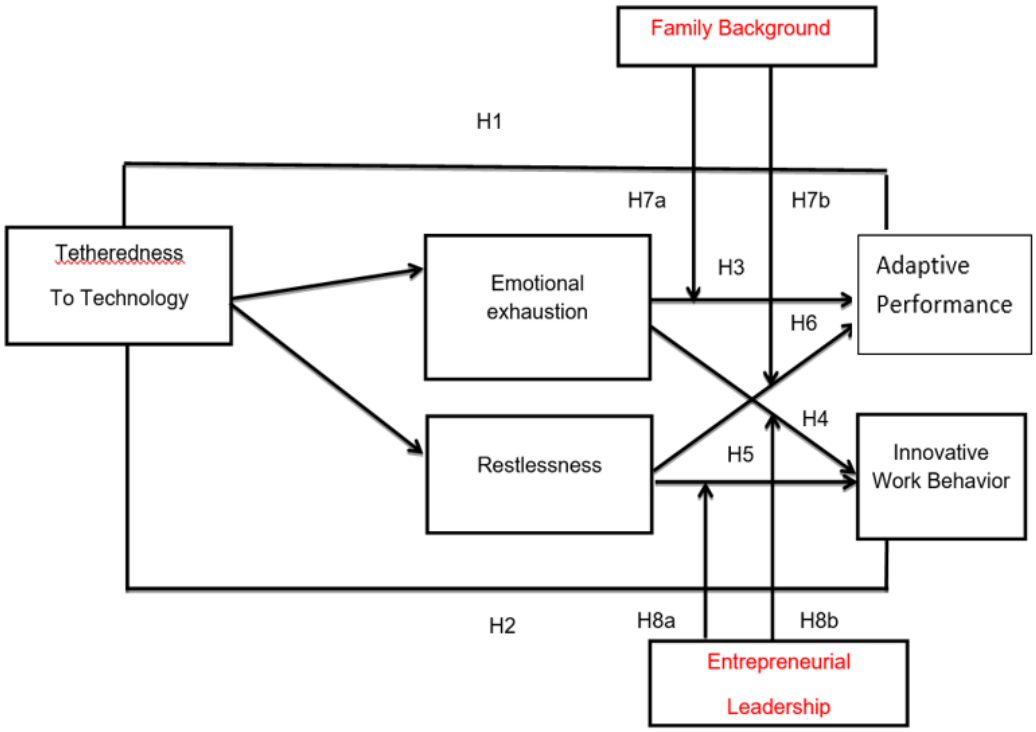

Figure 1: Conceptual Framework

6. Hypothesis

H_1: Tetheredness to technology is negatively related to supervisor-rated innovative work behaviour.

H_2: Tetheredness to technology is negatively related with employee's adaptive performance.

H_3: Tetheredness to technology is positively related with emotional exhaustion.

H_4: Tetheredness to technology is positively related with restlessness.

H_5: Emotional exhaustion mediates the association between tetheredness to technology and supervisor-rated innovative work behavior.

H_6: Emotional exhaustion mediates the relationship between tetheredness to technology and employees' adaptive performance.

H_7: Restlessness mediates the relationship between tetheredness to technology and supervisor-rated innovative work behaviour.

H_8: Restlessness mediates the relationship between tetheredness to technology and employee adaptive performance.

H_9: Entrepreneurial leadership moderates the relationship between restlessness and supervisor-rated innovative work behavior.

H_{10}: Entrepreneurial leadership moderates the relationship between emotional exhaustion and supervisor-rated innovative work behavior.

H_{11}: Family background moderates the relationship between emotional exhaustion and employee adaptive performance.

H_{12}: Family background moderates the relationship between restlessness and employee adaptive performance.

7. Research Methodology

In executing the study, a deductive research approach and a positivist research paradigm were used. Employees of Software companies in Pakistan were selected as respondents, and data were collected through self-administered questionnaires using a time-lag research design. Rapid and unpredictable changes are common in the information technology sector, and this sector requires more innovation and adaptation in employees' behavior. Many software companies are located in different cities in Pakistan. Most software firms, however, are in large cities in Pakistan such as Karachi, Lahore, Islamabad, and Faisalabad. This study is limited to software companies in Lahore, Faisalabad, and Islamabad as the targeted population. At present, the sample of 355 persons is adequate for the study. In addition, if the exact population size is unknown, a rule of thumb is to multiply the number of items in a survey by 10 to estimate the sample size. According to this rule of thumb, a sample of 440 individuals is sufficient for the current study.

Survey questionnaires were self-administered to gather data from 30 software houses in the main cities of Faisalabad, Lahore, and Islamabad, Pakistan, with an emphasis on web design and software development. These cities were selected because most software firms in Pakistan are based there, and highly educated and skilled software engineers are employed there. In this wave, 121 individuals did not complete the survey questionnaires or return a survey form. In the third wave, we collected data on employee adaptive performance from the same respondents who completed the time 1 and time 2 survey questionnaires, and we collected employees' innovative work behavior data from their respective supervisors. We received 504 questionnaires in the 3rd and last wave. Similarly, in the third wave, 89 respondents' surveys were not filled out by their respective supervisors. Of the 504 questionnaires received, 35 were

incomplete and were discarded. Furthermore, during data screening to ensure normality, 7 responses were deleted. So, the ultimate number of samples taken in this study was 462 people.

Table 1: Measurement of Scales

Variables	Items	References
Tetheredness to technology	2	Boswell and Olson-Buchanan (2014)
Emotional exhaustion	5	Whitman et al. (2014)
Restlessness	18	Adler et al. (2006)
Entrepreneurial leadership	8	Renko et al. (2015)
Employee adaptive performance	5	Charbonnier-Voirin and Roussel (2012)
Innovative work behavior	6	Scott and Bruce (1994)

Tables 1 shows the scales used in the operationalization of major variables of the study. The number of items used for each construct and the original source from which the measurement scales were obtained is indicated in the table. To assess tetheredness to technology, 2 items adapted from Boswell and Olson-Buchanan (2014) were used, and emotional exhaustion was assessed using 5 items from Whitman et al. (2014). In this study, we selected 18 items from Adler et al. (2006) to measure employees' restlessness because they were relatively broad. Entrepreneurial leadership was assessed using 8 items borrowed from Renko et al. (2015). Likewise, adaptive performance was measured using 5 items from Charbonnier-Voirin (2012), and innovative work behavior was measured using 6 items adapted from Scott and Bruce (1994). Using well-tested measurement scales allows systematic measurement of the constructs and provides consistency and comparability with previous studies.

To collect data from software engineers, the researcher used self-administered questionnaires. Self-administered questionnaires have several benefits: they give respondents time to think through their answers, consult others, and are relatively inexpensive. We used multi-source self-reported questionnaires, divided into seven sections. The first six portions consisted of measurement scales for the constructs that were the focus of the research. The seventh and final portion included demographic variables such as education, age, gender, tenure with the current organization, whether they have their own family business, and total experience. This study used validated, well-established scales to assess the study variables.

8. Results

Table 2 shows the demographic profile of the 462 respondents in this study. By gender, 331 respondents were male (71.6%) and 131 were female (28.4%). Regarding age, the highest number of respondents were aged 26-30 years (28.4%), followed by those aged 20-25 (26.2%).

The 31 to 35 age group made up 20.8% of respondents, the 36 to 40 age group comprised 17.5%, and those over 40 years old made up 7.1%. For the field of education, 303 respondents (65.6%) had a BS Engineering degree, and 159 (34.4%) had an MS Engineering degree. As to work experience, the respondents with more than one year of experience (42.2%) accounted for the largest share followed by those with 1-2 years of experience (25.3%), 2-5 years of experience (15.8%), 6-10 years of experience (12.1%) and more than 10 years of experience (4.5%). Demographic profile revealed that the sample was mainly male, relatively young engineering employees with most having an undergraduate engineering degree.

Table 2: Demographic of the Target Population (N=462)

Variables	Description	Frequency	%
Gender	Male	331	71.6
	Female	131	28.4
Age	20-25 Years	121	26.2
	26-30 Years	131	28.4
	31-35 Years	96	20.8
	36-40 Years	81	17.5
	> 40 Years	33	7.1
Education	BS Engineering	303	65.6
	MS Engineering	159	34.4
Experience	> 1 Year	195	42.2
	1-2 Year	117	25.3
	2-5 Years	73	15.8
	6-10 Years	56	12.1
	> 10 Years	21	4.5

Table 3 presents the descriptive statistics and internal consistency reliability of all study variables. The mean values are the average responses from the participants and the standard deviation (SD) represents the amount of variation from the mean. The mean and standard deviation of tetheredness to technology was 2.70 (SD = 1.22), and the Cronbach's alpha was 0.79. The mean value of emotional exhaustion was 3.44 (SD = 1.10) and the alpha value was 0.90, which indicates excellent reliability. The mean score for Restlessness was 3.42 (SD = 1.03) while Cronbach's alpha was 0.97, showing that the scale was extremely internally consistent. The means and SDs for entrepreneurial leadership and employee adaptive performance were 3.33 (SD = 1.14) and 3.18 (SD = 1.12), respectively, with alphas of 0.93 and 0.89, respectively. Finally, the mean of innovative work behaviour was 3.28 (SD = 1.21) with

an alpha of 0.94. In general, all constructs were found to have good to excellent reliability with Cronbach's alpha coefficient values greater than the generally accepted threshold of 0.70.'

Table 3: Mean, Standard Deviation and Cronbach's Alpha

Variables	Items	Mean	SD	Cronbach's Alpha
Tetheredness to technology	2	2.70	1.22	0.79
Emotional exhaustion	5	3.44	1.10	0.90
Restlessness	18	3.42	1.03	0.97
Entrepreneurial leadership	8	3.33	1.14	0.93
Employee adaptive performance	5	3.18	1.12	0.89
Innovative work behaviour	6	3.28	1.21	0.94

Table 4 presents the skewness, kurtosis, tolerance, and variance inflation factor (VIF) values for the study variables. The data distribution characteristics were assessed by examining skewness and kurtosis. The reported skewness values range from about -1.46 to -2.99, and the kurtosis values range from -3.66 to -6.26. These values suggest that there are some deviations from a normal distribution in the distributions, so the results should be used with caution depending on the analytical method used. The table also reports tolerance and VIF to assess multicollinearity among the independent variables. Tolerance values range from 0.447 to 0.637, while VIF values range from 1.570 to 2.238. VIF values are below the 5 standard, and tolerance values are comfortably above 0.10, so the results show no serious multicollinearity between the variables. As such, the predictors may be combined in subsequent regression and mediation/moderation analyses without significant worry of an overly confounded set of predictors.

Table 4: Skewness, Kurtosis and Multicollinearity Analysis

Variables	Skewness	Kurtosis	Tolerance	VIF
Tetheredness to technology	-1.46	-4.67	.637	1.570
Emotional exhaustion	-2.43	-5.45	.620	1.613
Restlessness	-.2.99	-3.66	.631	1.586
Innovative work behavior	-2.28	-6.26	.463	2.159
Adaptive performance	-1.81	-5.70	.447	2.238
Entrepreneurial leadership	-2.43	-5.45	.490	2.040

Average Variance Extracted and Composite Reliability assess convergent validity and are presented in Table 5. The AVE values of the constructs ranged from 0.51 to 0.60, and the constructs with an AVE value of 0.60 or more are as follows: tetheredness to technology (AVE = 0.60), emotional exhaustion (AVE = 0.57), restlessness (AVE = 0.58), innovative work

behaviour (AVE = 0.58), adaptive performance (AVE = 0.51), and entrepreneurial leadership (AVE = 0.54). These values meet the commonly used criterion of 0.50 or higher, suggesting that the indicators account for a significant amount of variance in their constructs. The reliability of the composite values ranges from 0.75 to 0.93, indicating fair to good construct reliability. Thus, the results indicate that the measurement instrument adequately represents the respective latent constructs, and the measurement model is valid and reliable for convergent validity.

Table 5: Average Variance Extracted and Convergent Reliability

Variables	AVE	Composite Reliability
Tetheredness to technology	0.60	0.75
Emotional exhaustion	0.57	0.87
Restlessness	0.58	0.93
Innovative work behavior	0.58	0.89
Adaptive performance	0.51	0.83
Entrepreneurial leadership	0.54	0.90

Table 6 presents the results of a six-factor Confirmatory Factor Analysis (CFA) conducted to test whether the six constructs could be distinguished empirically from each other. The model had a χ^2/df of 1.66, below the criterion of 5, thus suggesting good model fit. The SRMR value also falls within the acceptable range (0.03), and both the TLI and CFI exceeded the recommended value of 0.90, with values of 0.96. In addition, the RMSEA value was 0.04, which is less than 0.08, the cut-off value for good approximation of data. As such, all the fit indices reported in this paper indicate good fit with the observed data for the six-factor measurement model. This is in support of the proposed separation between the three types of tetheredness to technology (emotional exhaustion, restlessness, entrepreneurial leadership), and innovative work behavior and adaptive performance.

Table 6: Model Fit Indices of Six-Factor Confirmatory Factor Analysis

Model fit Index	Threshold Value	Actual Value	Result
X^2/df	≤5	1.66	Good Fit
SRMR	.03-.08	0.03	Good Fit
TLI	≥0.9	0.96	Good Fit
CFI	≥0.9	0.96	Good Fit
RMSEA	≤ 0.08	0.04	Good Fit

Table 7 shows the results of an alternative 3-factor CFA model in which tetheredness to technology (TT), emotional exhaustion (EE), restlessness (RL), and entrepreneurial leadership

(EL) were combined. This alternative model appears to be a poor fit to the data, with the following results. The χ^2/df ratio of 4.34 is high for the six-factor model, and the SRMR is 0.09, which is above the recommended value. The TLI and CFI are also below the recommended value of 0.90 (0.80 and 0.81, respectively). Although the RMSEA is at the specified upper limit, the other indices suggest poor model fit. Therefore, the three-factor model does not perform significantly better than the proposed six-factor model. This provides evidence that the constructs combined in this alternative model should not be considered a single underlying construct.

Table 7: Model Fit Indices of Three Factor Model Confirmatory Factor Analysis

Model fit Index	Threshold Value	Actual Value	Result
X^2/df	≤ 5	4.34	Not Good Fit
SRMR	.03-.08	0.09	Not Good Fit
TLI	≥0.9	0.80	Not Good Fit
CFI	≥0.9	0.81	Not Good Fit
RMSEA	≤ 0.08	0.08	Not Good Fit

Note: TT, EE, RL and EL were merged.

Table 8 reports the results of the one-factor CFA model, in which all study variables were centered on a single factor. The model fit was clearly poor, as evidenced by the results. The value of χ^2/df was found to be 7.67, which is greater than the acceptable value of 5. The SRMR was 0.12, which was not acceptable, as values in the acceptable range are less than 0.20. The TLI (0.59) and CFI (0.61) were both significantly below the recommended values of 0.90. The RMSEA was 0.12, above the recommended value of 0.08. Therefore, the one-factor model is not suitable for the observed data.

Table 8: Model Fit Indices of One Factor Model Confirmatory Factor Analysis

Model fit Index	Threshold Value	Actual Value	Result
X^2/df	≤5	7.67	Not Good Fit
SRMR	.03-.08	0.12	Not Good Fit
TLI	≥0.9	0.59	Not Good Fit
CFI	≥0.9	0.61	Not Good Fit
RMSEA	≤ 0.08	0.12	Not Good Fit

Note: All variables were merged

Table 9 shows no negative correlations between the major constructs and the demographic variables, and that the demographic variables exhibited acceptable discriminant validity. The results show several statistically significant relationships among the study variables. For

instance, the negative correlation between tetheredness and innovative work behaviour is at r = -.53, p < .01, and the correlation between tetheredness and adaptive performance is at r = -.54, p < .01; the positive correlation between tetheredness and restlessness is at r = .34, p < .01, and the positive correlation between tetheredness and emotional exhaustion is at r = .35, p < .01. There is a negative relationship between emotional exhaustion and innovative work behaviour (r = -.47, p < .01) and adaptive performance (r = -.51, p < .01). Similarly, restlessness has negative relationships with innovative work behaviour (r = -.44, p < .01) and adaptive performance (r = -.50, p < .01). Entrepreneurial leadership are positively related to innovative work behaviour (r = .63; p < .01) and adaptive performance (r = .61; p < .01). The values in parentheses are the discriminant-validity values for the constructs. The overall pattern of correlations does seem to support the proposed conceptual framework, and the constructs are still empirically different from each other.

Table 9: Correction and Discriminant Validity

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Gender											
2. Age	.05										
3. Edu	-.22**	.15**									
4. Exp	-.04	.62**	.25**								
5. FB	.08	-.03	-.02	-.05							
6. RL	-.05	-.06	-.07	-.04	-.45**	(.76)					
7. EL	.06	.04	.06	.03	.51**	-.49**	(.73)				
8. EE	-.08	-.04	-.14**	-.00	-.36**	.52**	-.48**	(.75)			
9. IWB	.06	-.00	.05	-.04	.58**	-.44**	.63**	-.47**	(.76)		
10. EAP	.05	.01	.05	-.03	.84**	-.50**	.61**	-.51**	.63**	(.71)	
11. TT	-.06	.07	-.01	.09*	-.45**	.34**	-.46**	.35**	-.53**	-.54**	(.77)

Note: Edu = education, Exp = experience, FB = family background, RL = restlessness, EL = entrepreneurial leadership, EE = emotional exhaustion, IWB = innovative work behavior, AP = employee adaptive performance, TT = tetheredness to technology. Discriminant validity is presented in parenthesis. * p < .05, **p < .01

The results of the tests of the direct relationships hypothesized in H1–H4 are shown in Table 10. The results confirm a strong negative association between innovative work behavior and the degree to which it is tethered to technology (β = -0.62, SE = 0.04, 95% CI [-.69, -.55]), aligning with H1. Likewise, the greater the level of employee tethering to technology, the lower the level of employee adaptive performance (β = -0.65, SE = 0.04, 95% CI = [-.73, -.58]), consistent with the hypotheses. However, the positive relationship between tetheredness to technology and emotional exhaustion is significant (β = 0.42, SE = 0.05, 95% CI [.32, .51]), supporting H3. Tetheredness to technology also showed a significant positive correlation with

restlessness (β = 0.39, SE = 0.05, 95% CI [.30, .49]), supporting H4. Furthermore, emotional exhaustion and restlessness were negatively correlated with innovative work behavior and adaptive performance, respectively. Overall, the direct-effect results corroborate the key hypothesis that higher employee tether is linked to worse employee outcomes and higher employee psychological strain.

Table 10: Direct Hypothesis Analysis

Hypothesis	Relationship	β	SE	95% CI	Remarks
H1	TT -> IWB	-0.62***	0.04	(-.69, -.55)	Supported H1
H2	TT -> EAP	-0.65***	0.04	(-.73, -.58)	Supported H2
H3	TT -> EE	0.42***	0.05	(.32, .51)	Supported H3
H4	TT -> Restlessness	0.39***	0.05	(.30, .49)	Supported H4
	EE -> IWB	-0.52***	0.04	(-.60, -.44)	
	Restlessness -> IWB	-0.47***	0.04	(-.54, -.39)	
	EE -> EAP	-0.58***	0.05	(-.65, -.50)	
	Restlessness -> EAP	-0.54***	0.05	(-.61, -.47)	

EE = emotional exhaustion, IWB = innovative work behavior, AP = employee adaptive performance, TT = tetheredness to technology
* p < .05, **p < .01, ***p < .01

A mediation analysis was conducted to test for mediation effects in the relationships between tetheredness to technology and the two dependent variables, and is shown in Table 11. The results confirm that emotional exhaustion significantly mediates the relationship between tetheredness to technology and innovative work behavior (Estimate = -0.31, SE = 0.05, 95% CI [-.40, -.22]), supporting H5. Emotional Exhaustion also plays a significant role in the relationship between Tethering to Technology and Adaptive Performance (Estimate = -0.37, SE = 0.04, 95% CI [-.46, -.28]), supporting H6. As with the previous hypotheses, the relationship between innovative work behavior, the mediator of restlessness, and the predictor of tetheredness to technology is also supported (H7: Estimate = -0.26, SE = 0.05, 95% CI [-.35, -.18]). Regarding H8, restlessness significantly mediated the relationship between tetheredness to technology and adaptive performance (Estimate = -0.34, SE = 0.05, 95% CI [-.42, -.25]). All indirect effects are statistically significant, as none of the confidence intervals include zero.

Table 11: Mediation Results by Baron and Kenny's (1986)

Hypothesis	Relationship	Estimate	SE	95% CI	Remarks
H5	TT ·> EE ·> IWB	-0.31***	0.05	(-.40, -.22)	Supported H5
H6	TT ·> EE ·> EAP	-0.37***	0.04	(-.46, -.28)	Supported H6
H7	TT ·> RL ·> IWB	-0.26***	0.05	(-.35, -.18)	Supported H7
H8	TT ·> RL ·> EAP	-0.34***	0.05	(-.42, -.25)	Supported H8

EE = emotional exhaustion, IWB = innovative work behavior, AP = employee adaptive performance, TT = tetheredness to technology, RL = restlessness * p < .05, **p < .01, ***p < .01

Hayes' PROCESS approach (Hayes, 2013) was used to analyze the proposed mediation and moderation relationships, as detailed in Table 12. The results confirm all four indirect effects. Emotional exhaustion is one of the significant mediators between tetheredness to technology and innovative work behaviour (Estimate = -0.13, 95% CI [-.17, -.09]) as well as between tetheredness to technology and adaptive performance (Estimate = -0.15, 95% CI [-.20, -.11]), which supports H5 and H6. Restlessness also mediated the relationship between tetheredness to technology and innovative work behavior (Estimate = -0.10, 95% CI [-.14, -.06]) and between tetheredness to technology and adaptive performance (Estimate = -0.13, 95% CI [-.17, -.09]), supporting H7 and H8.

Table 12: Mediation and Moderation Analysis by Hayes Process

Hypothesis	Relationship	Estimate	SE	95% CI	Remarks
H5	TT ·> EE ·> IWB	-0.13**	0.02	(-.17, -.09)	Supported H5
H6	TT ·> EE ·> EAP	-0.15***	0.02	(-.20, -.11)	Supported H6
H7	TT ·> RL ·> IWB	-0.10***	0.02	(-.14, -.06)	Supported H7
H8	TT ·> RL ·> EAP	-0.13***	0.02	(-.17, -.09)	Supported H8
H9	RL*EL ·> IWB	0.23***	0.06	(.12, .34)	Supported H9
H10	EE*EL ·> IWB	0.18**	0.05	(.07, .28)	Supported H10
H11	EE*FB ·> EAP	0.21**	0.05	(.10, .32)	Supported H11
H12	RL*FB ·> EAP	0.24**	0.07	(.10, .38)	Supported H12

FB = family background, RL = restlessness, EL = entrepreneurial leadership, EE = emotional exhaustion, IWB = innovative work behavior, AP = employee adaptive performance, TT = tetheredness to technology. * p < .05, **p < .01, ***p < .01

The table also highlights the moderating effects as hypothesized in H9–H12. The relationship between restlessness and entrepreneurial leadership is significant and predicts innovative work behavior to a great extent (Estimate = 0.23, SE = 0.06, 95% CI [.12, .34] supporting H9. Similarly, the interaction between emotional exhaustion and entrepreneurial leadership is

statistically significant (Estimate = 0.18, SE = 0.05, 95% CI [.07, .28]), supporting H10. This moderating effect of family background on the relationship between emotional exhaustion and adaptive performance is supported (Estimate = 0.21, SE = 0.05, 95% CI [.10, .32]), supporting H11. Finally, the interaction between restlessness and family background strongly predicts adaptive performance (Estimate = 0.24, SE = 0.07, 95% CI [.10, .38]), consistent with H12. The results support all four moderation hypotheses, as none of the confidence intervals contain zero. Overall, Table 12 provides evidence for the proposed mediated and moderated relationships, showing that emotional exhaustion and restlessness mediate the relationships between tetheredness to technology and employee outcomes, while this factor moderates the relationships between emotional exhaustion and employee outcomes and between family background and entrepreneurial leadership.

9. Discussion

According to the first hypothesis (H1), supervisor-rated IWB is adversely correlated with tetheredness to technology. The current study's findings support H1, showing a negative correlation between employees' IWB and their tetheredness to technology. The result is consistent with previous research that found a significant and negative correlation between followers' creativity at work and being "tethered" to technology (Raoof et al., 2024). Previous research therefore highlighted the detriment of the 'tyranny of technology' to individuals' involvement in creativity and IWB. However, the results of the present study are remarkable, as no previous studies have examined the negative correlation between being technologically tethered and IWB among people working on high-technology projects. This research has clarified the work environments in which software engineers in software companies are likely to avoid creative work practices. Employees' high levels of stress and burnout from excessive technology use are a major contributing factor to the unfavorable correlation between tetheredness to technology and IWB. Second, overdependence on technology exacerbates cognitive exhaustion. According to Zunaira et al. (2020), cognitive exhaustion reduces cognitive and emotional resources, which enables workers to exhibit creative work practices. In addition, cognitive fatigue leads to emotional exhaustion, burnout, and forgetfulness, which decreases workers' IWB.

Thus, another explanation for the study's findings is the modeling of burnout and cognitive impairment. The second hypothesis (H2), that "tethering to technology negatively and significantly relates to employee adaptive performance," was supported by the current study's

findings. Employees who use their phones and other devices frequently have irregular sleep habits (Xie et al., 2020).

Excessive screen time harms sleep duration and quality (Arshad et al., 2021). People who use screens may also experience social isolation, which can impair their ability to adapt and worsen the quality of their sleep. As a result, individual adaptive performance is negatively correlated with tetheredness to technology. The study's results supported hypothesis (H3), which states that technology use and emotional tiredness are positively correlated. IT workers are more likely to comply with technology-based requests at work, particularly when employers ask them to do so outside regular business hours. This over-reliance on technology can easily deplete their emotional resources, which can further exacerbate employees' emotional tiredness.

The results were supported with earlier studies carried out by Anwar & Iqbal (2023) in which The findings were corroborated by previous research by Anwar & Iqbal (2023), which discovered a negative correlation between emotional tiredness and tetheredness to technology. The study's findings supported hypothesis (H4), which said that restlessness and tetheredness to technology are positively correlated. The findings are consistent with earlier research (Anwar & Iqbal, 2023; Iqbal et al., 2020) showing that technology use is detrimental to workers' health.

According to Citil et al. (2022), internet and related technology use during and after work hours is a significant health concern for employees. It can result in various forms of depression, anxiety, and aggression, as well as diminished working capacity, cognitive impairment, poor eating habits, difficulty sleeping, visual and hearing impairment, social isolation, and restlessness. This led to the study's fifth hypothesis (H5), which states that emotional weariness mediates the relationship between tethering to technology and supervisor-rated innovative work behavior.

The study's findings supported the claim. The mediation role of emotional tiredness in the correlations between supervisor-rated IWB and tethering to technology is not well documented in the literature. The precise mediation association between tetheredness to technology and IWB has not been identified by any study. However, the current study's findings support previous research. (Xie and others, 2024).

In their investigation of the relationship between challenge and hindrance stress and creative work behavior, they looked at the intervening impact of emotional weariness. The current study

proposed the sixth hypothesis (H6), which postulated a connection between employee adaptive performance and tetheredness to technology and emotional weariness. Earlier findings show that emotional weariness mediates the relationship between work-related smartphone use at night and job satisfaction (Cheung, 2022).

In a different study, Lagios et al. (2021)) found that emotional weariness mediated the association between psychological strain and organizational dehumanization. Based on recent studies, Hypotheses H7 and H8 were expected to examine the mediation effect of restlessness on the relationships between individual adaptive performance and tetheredness to technology and supervisor-rated innovative work behaviors, respectively. Earlier research validated this hypothesis (Goodarzi et al., 2023).

Furthermore, the current study proposed two assumptions: Hypothesis H9 proposed that entrepreneurial leadership would moderate the link between restlessness and supervisor-rated IWB, while Hypothesis H10 proposed that entrepreneurial leadership would moderate the association between emotional weariness and supervisor-rated IWB. These findings align with previous studies showing a connection between creative work practices and leadership (Green et al., 2013; Knezović & Drkić, 2021; Sahibzada et al., 2024). Furthermore, the current study's hypotheses H11 and H12 proposed that family background moderates the association between emotional weariness and adaptive performance and between restlessness and adaptive performance, respectively. The findings align with earlier research conducted by Garrosa-Hernández et al. (2013), Gull et al. (2023), and Halbesleben et al. (2010).

10. Conclusion and Recommendation

In the context of HRM in developing nations, this study examines differences in research on the effects of technological dependence, restlessness, emotional exhaustion, entrepreneurial leadership, family entrepreneurial background, innovative work behavior, and individual adaptive performance. The study's conclusions guide software company CEOs and human resource managers on how to retain seasoned workers in the cutthroat information technology industry. To do so, software companies must incorporate entrepreneurial leadership methods into their organizational structure to reduce the detrimental effects of being mired in technology and encourage creative behavior and adaptive performance among staff. The study's conclusions and outcomes align with earlier research showing how tetheredness to technology, emotional exhaustion, and restlessness affect Pakistani software company employees' creative behavior and adaptive performance.

The study clarifies the data, which show that employees in software organizations often experience emotional weariness and restlessness due to their reliance on technology, hindering their ability to be creative and adaptable. The study's findings on the connection between an employee's IWB, adaptive performance, and reliance on technology are both concerning and noteworthy. Additionally, innovative work practices and adaptable staff performance are associated with family entrepreneurship and entrepreneurial leadership. Employees at software companies with entrepreneurial leadership are more motivated and enthusiastic. However, without such leadership, software engineers may experience emotional fatigue and restlessness, which may negatively affect their creative behavior and adaptable performance at work. In this study, the researcher focuses on the problem of software engineers in software businesses being "tethered" to technology. Managers are responsible for inspiring software engineers to work enthusiastically and overcome emotional exhaustion and restlessness.

Managers must empower staff to carry out their duties, inspire them, accept criticism, and provide opportunities for professional development and feedback. As a result, people will feel more part of the software company. The findings show that while technological fixations are positively correlated with emotional exhaustion and restlessness and negatively correlated with innovative work behavior, REST is negatively correlated with both employee adaptive performance and innovative work behavior.

The two primary intervening variables in this study that proved significant were emotional weariness and restlessness. Both tetheredness to technology and IWB (emotional weariness) and tetheredness to technology and IWB (restlessness) serve as partial mediators. Furthermore, restlessness serves as a partial mediator between tetheredness to technology and employee adaptive performance (supporting H8), while emotional exhaustion indicates a partial mediating role between tetheredness to technology and adaptive performance (supporting H6).

Furthermore, entrepreneurial leadership moderates the negative correlation between emotional weariness and IWB, weakening the relationship and encouraging employees' innovative behavior (supporting H10). However, entrepreneurial leadership moderates the negative relationship between restlessness and IWB, weakening the association and encouraging employees' innovative behavior (supported H9). Additionally, family background moderates the relationship between emotional tiredness and AP, weakening the correlation and improving employees' adaptable performance when they come from an entrepreneurial family (supported H11).

However, an entrepreneurial family background moderates the relationship between restlessness and AP, weakening the correlation and improving employees' adaptable performance (supported H12). In the IT sector, the study focused on software firms operating in Pakistan's major cities of Islamabad, Faisalabad, and Lahore.

The theoretical framework drew on COR theory, which explained how employee adaptive performance and IWB are affected by tetheredness to technology. Employees who are overly dependent on technology are less creative and adaptable at work. Organizational management must interact with staff positively, be amiable, show consideration for their sentiments and emotions, and provide feedback that emphasizes how crucial employees are to the company's success. The results corroborate the conservation of resource theory-supported negative and significant link between employees' adaptive performance and their tetheredness to technology and IWB. This suggests that software companies should implement procedures that help increase employees' IWB and adaptive performance to prevent emotional weariness and restlessness in Pakistani software companies.

Because it clarifies the middle ground between tetheredness and employees' creative work behavior and adaptive performance, this conservation of resources theory explains the mediation of emotional tiredness and restlessness. Among the elements of tetheredness to technology, emotional weariness and restlessness partially mediate the relationship between innovative work behavior and employee adaptive performance. As a result, the current study suggests that employees' attachment to technology will negatively affect their creative work practices and reduce their adaptability.

Additionally, it implies that emotional tiredness and emotional restlessness can moderate the relationship between them and lower employees' creative work practices and adaptive performance. (Park & Park, 2019; Pulakos et al., 2000). In order to overcome these limitations, future research can: (1) use multi-wave longitudinal designs to investigate post-COVID transitions; (2) use objective measures of technology use, such as screen time analytics; (3) test cross-cultural comparability in other developing economies; (4) add additional boundary conditions, such as organizational support for work-life balance and job crafting behaviors; and (5) investigate potential non-linear relationships between technology tetheredness and outcomes, since moderate levels of tethered technology may not be as harmful as excessive or extreme tethered technology.

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