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What Drives Virtual Team Collaboration in the IT Industry? Role of Personality Traits

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Abstract

Purpose *–This study investigates how the big five personality traits conscientiousness, extraversion, agreeableness, openness to experience, and neuroticism predict the effectiveness of virtual collaboration in digital workplaces and applies trait activation theory to explain how personality virtual situational cues influence behaviour.*

Design/methodology/approach *–The study's design was cross-sectional, and 340 knowledge workers in the Indian IT sector who worked remotely or were hybrid were surveyed. PLS-SEM was used to analyse the data after structural equation modelling.*

Findings *–The most favourable predictors of virtual collaboration are extraversion, agreeableness, and openness to new experiences, highlighting proactive communication and socioemotional flexibility. While neuroticism has a negative correlation, conscientiousness is still advantageous but less so than in co-located teams. A significant amount of the variance in virtual collaboration may be explained by the model.*

Originality/value *–This study provides an effective, individual-oriented model that explains why socio-emotional dispositions dominate under high virtuality by applying Trait Activation Theory to Virtual Collaboration. It then converts these insights into practical recommendations to build high-performing digital teams.*

Keywords: *Trust, Cohesion, Big Five Personality Traits, Virtual Collaboration, Digital Workplaces, Trait Activation Theory, Remote Team Effectiveness.*

1. INTRODUCTION

Virtual collaboration is now a key method of coordinating work across industries, rather than a peripheral practice. Knowing who works well in virtual environments has become just as crucial as knowing the tools they employ as teams increasingly coordinate through technology-mediated communication. In order to explain systematic variations in how people start, maintain, and enhance collaborative work online, personality provides a reliable, theoretically supported lens (Mammadov, 2022). Building on this idea, the current study investigates how virtual collaboration in modern digital workplaces is influenced by the Big Five Personality Traits: conscientiousness, extraversion, agreeableness, openness to experience, and neuroticism (Zhu et al., 2024).

According to the Trait Activation Theory, situational clues influence how a trait is expressed. Different cues are introduced by virtual work, and thus decrease nonverbal cues, increase asynchronicity, increase information transparency via platforms, and increase the requirement for control and textual clarity (Słysz, 2021). These characteristics have the potential to directly impact virtual collaboration by activating dispositional inclinations. As a result, our model identifies direct relationships between Virtual Collaboration and each of the Big Five traits.

First, extraversion is expected to support virtual collaboration by promoting social presence, initiating interactions, and maintaining engagement across channels (Tett & Burnett, 2003); second, conscientiousness should support virtual

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collaboration through dependability, deadline adherence, and disciplined task coordination capabilities that are particularly valuable when work is interdependent and distributed; and third, agreeableness should support virtual collaboration by orienting individuals toward cooperation, perspective-taking, and conflict de-escalation in low-cue, technology-mediated exchanges. Fourth, Openness to Experience is likely to enhance Virtual Collaboration through curiosity, flexibility, and comfort with novel tools and workflows, which together promote constructive knowledge sharing and adaptive problem solving. Finally, although often associated with strain responses, Neuroticism can still relate positively to Virtual Collaboration when virtual contexts make planning, documentation, and risk anticipation salient; vigilance and error-avoidance may translate into careful coordination and thorough hand-offs in digitally tracked environments(Showkat et al., 2025).

Accordingly, our conceptual model proposes five direct paths from Conscientiousness, Extraversion, Agreeableness, Openness to Experience, and Neuroticism to Virtual Collaboration. We expect all five relations to be positive in aggregate virtual settings, with Agreeablenesstheorised to exert the strongest effect because cooperative intent and trust formation are foundational to coordination when social cues are lean(Salgado, 1997). This model focuses deliberately on direct personality collaboration links to provide a clean test of trait activation under virtual work conditions and to generate clear, managerially useful signals for team design, selection, and development.

This study advances a person-centric account of Virtual Collaboration by modelling it directly as a function of the Big Five Personality Traits, rather than inferring collaboration indirectly from performance or satisfaction outcomes. It highlights a contextual re-ranking of trait influence in high-virtuality settings, elevating Agreeableness and Extraversion while still demonstrating meaningful roles for Conscientiousness, Openness to Experience, and a vigilance-based interpretation of Neuroticism, thereby refining Trait Activation Theory for digital work(Salohiddin, 2025).Methodologically, a parsimonious five-path structure delivers strong explanatory power for Virtual Collaboration, establishing a transparent baseline for future mechanism and boundary-condition tests. Practically, the findings translate into clear guidance for selection, team composition, and leadership development in technology-mediated environments, where getting the “people mix” right is as critical as choosing the platform.

Research on the Big Five Personality Traits largely reflects co-located teams and links personality to performance or satisfaction, leaving Virtual Collaboration in technology-mediated settings characterised by asynchronicity, limited nonverbal cues, platform-based coordination, and self-management under-specified. Few studies model all five traits simultaneously to compare their effects on this outcome, and parsimonious multivariate approaches remain uncommon. Addressing this gap, the study (i) tests the direct relationships between Conscientiousness, Extraversion, Agreeableness, Openness to Experience, and Neuroticism and Virtual Collaboration; (ii) estimates their relative importance using a compact structural model; (iii) evaluates explanatory and predictive power with PLS-SEM; (iv) establishes measurement reliability and validity; and (v) translates the results into managerial guidance for selection, team composition, and development in digital and hybrid workplaces.

2. LITERATURE REVIEW AND HYPOTHESES

Theoretical background

The theory of trait activation (TAT) explains how personality traits are activated in various contexts (Tett & Burnett, 2003). The circumstances in which qualities that lead to organisational-level outcomes (such as job satisfaction, career satisfaction, or firm performance) are activated can differ. Therefore, the circumstance is deemed trait-relevant if it provides enough clues fordisplaying conduct that is related to traits (Tett et al., 2021).

According to trait activation theory (Trett & Guterman, 2000), the main factors causing individual differences and changing states are the

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interactions between situational cues and traits. As an example, aggressive people typically show more hostility in a friendly environment, but even good-hearted people might act aggressively during a conflict. When trait-relevant environmental cues are present, personality traits will manifest, according to trait activation theory (TAT). Tett and Burnett (2003) used trait activation theory in the workplace to propose that depending on the strength and intensity of the relationship between situational cues and traits, trait-relevant signs will affect employees' working states to different ways (Liu et al., 2023).

The Big Five Personality Traits and Virtual Collaboration

One of the oldest predictors of work-related and work-relevantbehaviour and performance is personality (Barrick & Mount, 1991; Salgado, 1997). The Big Five openness, conscientiousness, extraversion, agreeableness, and neuroticism personality model can offer a solid structure for how traits relate to collaboration and organisational performance (Marengo et al., 2021; Zell & Lesick, 2022). The model has been widely tested in conventional work contexts, but its potential as a predictor in virtual collaborations (where communication is technology-mediated, social cues are reduced, and collaborations depend largely on self-regulation (Flavián et al., 2022; Olsen et al., 2024) is less understood.

As organisations move toward digital workplaces, it is necessary to reimagine personality theories in the face of new challenges: asynchronous communication, distributed decision making, and trust development in virtual platforms (Zhu et al., 2024). The subsequent subsections summarise previous results for the Big Five on digitally mediated collaboration.

Openness to Experience

Openness is related to creativity, curiosity (intellectual) and an open mind to novelty (Costa & McCrae, 1992). In regard to physical workspaces, openness has also been associated with flexibility, problem-solving and innovation (Fuchs et al., 2022). In DCT environments, the importance of openness may be even greater given the need for virtual teams to adapt to new technologies, actively accept different ways of seeing things, and seek more creative solutions as they respond to more or less complex issues (Flavián et al., 2022). Openness The openness trait predisposes employees to explore collaborative technologies and easily embrace new technology (Zhu et al., 2024; Costa & McCrae, 1992). In the workplace, openness has been associated with adaptiveness, problem-solving, and creativity (Fuchs et al., 2022). In digital environments, openness can be particularly relevant since virtual teams function best with members with the ability to be flexible with the use of new technologies, to consider different points of view and to develop creative ways to solve complex problems (Flavián et al., 2022). Openness is positively related to experimenting collaborative tools and technology changes (Zhu et al., 2024).

H1: Openness to experience positively influences virtual collaboration.

Conscientiousness

Conscientiousness is characterised by organization, dependability and goal orientation. It is arguably the single best predictor of job performance for absolutely all types of work situations (Barrick & Mount, 1991; Salgado, 1997). In the virtual world, conscientiousness is particularly relevant since it helps self-regulation, time management, and a feeling of accountability for one’s actions, in the absence of direct supervision (Olsen et al., 2024; Parra et al., 2022). Research shows that conscientious persons are effective in a relative role performance, on time work and group reliability in virtual teams (Uhlemann et al., 2025; Zaharie, 2021).

H2: Conscientiousness positively influences virtual collaboration.

Nonetheless, extraversion still plays the role of maintaining motivation and group cohesion in virtual worlds (Zhu et al., 2024).

H3: Extraversion has a direct positive effect on virtual collaboration.

Agreeableness

Agreeableness emphasises empathy, trust and cooperativeness (McNeese et al., 2021; Pavez et

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al., 2021; Słysz, 2021). Being agreeable is essential to building harmony and trust in remote teams because miscommunication is very likely (McNeese et al., 2021). Employees with a friendly disposition improve team dynamics in online collaboration, minimise disputes, and facilitate the exchange of knowledge (Bell, 2007; Pozzali & Jomaa, 2025). This kind of camaraderie between teams is especially essential when there are misconceptions that need to be cleared up without direct communication or face-to-face interaction.

H4: Virtual Collaboration is positively affected by agreeableness.

Neuroticism

Neuroticism is reflected by a predisposition to respond in an emotionally and stress-sensitive manner (Costa & McCrae, 1992). Neuroticism was significantly negatively related to job performance, and conflict proneness, 503 stress exposures in the traditional workplace (Showkat et al., 2025; Tett et al., 2013). In virtual working contexts, this tendency may be amplified through technology-related interruptions and ambiguity and an absence of reassuring social cues (Olsen et al., 2024). That is, depending on levels of neuroticism, individuals may fix themselves more rigidly, more persistently, and more positively into digitally mediated environments, contrasting those who score low on neuroticism (Flavián et al., 2022).

H5: Neuroticism is negatively related to virtual collaboration.

Former studies easily concentrated on a single characteristic as opposed to the combined effect in team operation (Flavián et al., 2022; Zhu et al., 2024). Furthermore, only a limited number of studies have used structured modelling in the form of PLS-SEM to depict these intricate relationships (Olsen et al., 2024). Drawing on a general personality theory in the context of a digital workplace, our study fills these gaps and provides a more comprehensive framework for the understanding of personality predicting virtual collaboration.The experience of digital work environments is marked by asynchronous communication, low perception of non-verbal signals and dependence on collaborative technologies, which might amplify or dampen the effects of individual dispositions(Flavián et al., 2022; Olsen et al., 2024).

In this conceptualisation, the five personality properties are expected to act as antecedents of effectiveness in virtual collaboration. Openness is likely to facilitate adaptive and innovative approaches to technology-facilitated problem solving (Zhu et al., 2024). Conscientiousness does so because of self-discipline or task orientation or accountability, which is especially crucial when little supervision is available (Slack & Pierazzo, 2021). Proactive communication and group cohesion are positively related to extraversion; however, its association with expressive immediacy can be modulated in virtual environments (Fuchs et al., 2022). Agreeableness promotes trust, cooperation, and conflict resolution, thereby maintaining team harmony in the absence of FTF interaction (Conti et al., 2022). Lastly, neuroticism is expected to hinder cooperation as a result of stress sensitivity and a low threshold for ambiguity in digital settings (Zaharie, 2021). All hypotheses are presented in table I given below.

Table I. Hypotheses Statements

Hypothesis	Statement
H1	Openness to experience positively influences virtual collaboration.
H2	Conscientiousness positively influences virtual collaboration.
H3	Extraversion has a direct positive effect on virtual collaboration.
H4	Virtual Collaboration is positively affected by agreeableness.
H5	Neuroticism is negatively related to virtual collaboration.

Source: Prepared by Authors

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3. RESEARCH METHODOLOGY

Research Design

This study used a quantitative, cross-sectional survey grounded in Trait Activation Theory to test the proposed relationships. A random sample of professionals from multiple industries who regularly used Microsoft Teams, Slack, Zoom, or Google Meet participated, with a minimum of six months of virtual-team experience. The online questionnaire, distributed through organisational and professional mailing lists, yielded 340 valid responses, exceeding recommended sample-size thresholds for PLS-SEM (Cohen et al., 2003). Measures were adapted from validated sources, including a shortened Big Five Inventory (John & Srivastava, 1999) and multi-item scales for virtual collaboration, communication quality, task coordination, and team cohesion (Hodzic et al., 2025), rated on a five-point Likert scale. Content validity was confirmed through expert review and a pilot study, minor revisions were made, and all constructs demonstrated acceptable reliability, with Cronbach's alpha values above .70 (Hair et al., 2019).

Constructs and Measurement

In this investigation, all scale items were in English. A five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), was used to measure the response format. The online questionnaire comprises three sections: demographic questions, questions testing virtual collaborative constructs, and questions measuring the Big Five Inventory Scale (BFI). Benet-Martínez & John (1998) created the BFI, which has 44 five-point Likert-type items. (Arpaci et al., 2022; Horoub et al., 2025) served as the model for the BFI. Conscientiousness (9 items), agreeableness (9 items), extraversion (8 items), neuroticism (8 items), and openness (10 items) are the five personality traits that the BFI seeks to assess. An eight-item measure of virtual collaboration. The Virtual Collaboration Scale was adapted by Elyousfi, Anand & Dalmasso (2021).

Data Analysis Strategy

For data analysis, the PLS-SEM model was also estimated by Warp-PLS. We preferred this approach because it can deal with more complex models with many latent variables and is geared toward a predictive perspective, while being less sensitive to multivariate non-normal distributions in behavioural survey data, which are typically violated (Hair et al., 2019; Sarstedt et al., 2020). Consistent with good practice, analysis occurred in two stages. To produce valid results, the measurement model was examined by examining indicator reliability, internal consistency (Cronbach's alpha and CR) and convergent validity (AVE) as well as discriminant validity (Fornell–Larcker criterion and HTMT). Second, the structural model was analysed with a criterion focusing on testing the anticipated relationships between constructs, and results in form of explained variances (R^2), predictive relevance (Q^2), effect sizes (f^2), and path coefficients are presented. Stable confidence intervals and levels of significance were estimated for each path. Together, these methods allowed for a thorough analysis of the model's inferences as well as its measurement characteristics.340 people who are currently engaged in virtual collaboration across a range of industries made up the entire sample. Table II displays the population distribution. While regression analysis may investigate linear relationships between observed variables, partial least squares structural equation modelling (PLS-SEM) allows the simultaneous estimation of multiple correlations among latent constructs, which is why it was chosen for this investigation. By deftly combining the measurement and structural elements of the model, PLS-SEM offers a more thorough understanding of the theoretical framework. It is also preferred for datasets with complex causal pathways, exploratory models, and smaller samples or nonnormal distributions (Hair et al., 2019; Sarstedt et al., 2020).Therefore, in a digitally mediated setting, PLS-SEM provides a more appropriate analytical method for investigating the relationships between personality traits and virtual collaboration outcomes.

This study takes into consideration the PLS-SEM technique, which helps to examine variance (R2)

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and predictive relevance (Q2), because variance-based SEM is the superior tool for analysis (Hair et al., 2019). Additionally, PLS-SEM can handle non-normally distributed data and extremely small sample sizes, which are typical features of organisational research surveys (Sarstedt et al., 2020). This makes it possible to investigate several personality factors that influence collaborative outputs at the same time. Using PLS-SEM, the study offers a dependable and predictive model that captures the relationship between virtual collaboration and personality factors in the digitally mediated workplace.

Table II:Demographic Profile of Respondents (N = 340)

Variable	Category	N	Percent
Gender	Male	235	69.1
	Female	105	30.9
Age Group	21–30 years	184	54.1
	31–40 years	134	39.4
	Above 40	22	6.5
Education Level	Postgraduate	170	50.0
	Graduate	156	45.9
	Diploma/Below	14	4.1
Work Experience	< 3 years	58	17.3
	3–5 years	139	40.9
	6–10 years	89	26.2
	> 10 years	53	15.6

Source: Author's work

4. RESULTS

Measurement Model Assessment

The reliability and validity of the measurement model were tested with PlSc. The internal consistency estimates of the constructs were high (Cronbach's alpha >. 93, and Composite Reliability [CR] >. 94). In Dijkstra's rho_A coefficient, the scores ranged from 0.935 (Extraversion) to 0.968 (Agreeableness), demonstrating good reliability of constructs. Convergent validity was confirmed (sizes for all AVEs> 0.65 for the BFTs, and just below 0.65 for Virtual Collaboration (0.47); Virtual Collaboration was kept, because of high CRs and significant loadings). All PLS indicator loadings were significant ($p < 0.001$), suggesting high item reliability.

Table III. Reliability and Loadings

Construct	Cronbach's α	CR	rho_A	AVE	PLSc Loadings (Range)
Openness (O)	*0.951*	*0.958*	*0.952*	*0.694*	*0.763 – 0.872*
Conscientiousness (C)	*0.947*	*0.955*	*0.948*	*0.704*	*0.753 – 0.850*
Extraversion (E)	*0.932*	*0.944*	*0.935*	*0.679*	*0.710 – 0.899*
Agreeableness (A)	*0.967*	*0.971*	*0.968*	*0.791*	*0.784 – 0.942*
Neuroticism (N)	*0.947*	*0.955*	*0.954*	*0.728*	*0.706 – 1.000*
Virtual Collaboration (VC)	*0.841*	*0.878*	*0.844*	*0.474*	*0.554 – 0.692*
*Notes: All PLSc loadings are significant at ***p < 0.001. CR = Composite Reliability; AVE = Average Variance Extracted; rho_A = Dijkstra's reliability.*					

Source: Author's work

To evaluate discriminant validity, the Fornell–Larcker criterion was applied. The square root of AVE (diagonal values) exceeded the inter-construct correlations (off-diagonal values), confirming discriminant validity across all constructs.

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Table IV. Fornell–Larcker Criterion

CONSTRUCT	O	C	E	A	N	VC
OPENNESS (O)	**0.833**					
CONSCIENTIOUSNESS (C)	0.314	**0.839**				
EXTRAVERSION (E)	0.264	0.230	**0.824**			
AGREEABLENESS (A)	0.357	0.326	0.333	**0.889**		
NEUROTICISM (N)	0.454	0.312	0.389	0.380	**0.853**	
VIRTUAL COLLABORATION (VC)	0.565	0.558	0.546	0.665	0.289	**0.689**

Source: Author's work

4.2 Combined Loadings and Cross-Loadings

The study examined the Unified and cross-loaded to ratify internal consistency and discriminate validity at the item level. All items loaded most strongly on their respective factors, Condition Scores exceeding the 0.40 cut-off value. Cross-loadings for non-target items were of a substantially weaker magnitude, evidencing that items were primarily influenced by the target constructs and to only a small extent by other constructs. SEs were ≈0.048 to 0.050 (all loadings $p < 0.001$). This means that the reflective measurement model is highly reliable and valid.

Table V. Combined Loadings of Indicators

Construct	Indicator Range (Loadings)	SE Range	p-value
Openness (O)	0.814 – 0.855	0.048	<0.001
Conscientiousness (C)	0.814 – 0.866	0.048	<0.001
Extraversion (E)	0.757 – 0.844	0.048–0.049	<0.001
Agreeableness (A)	0.865 – 0.903	0.047–0.048	<0.001
Neuroticism (N)	0.822 – 0.869	0.048	<0.001
Virtual Collaboration (VC)	0.612 – 0.738	0.049–0.050	<0.001
Notes: All primary loadings exceeded the 0.70 threshold, confirming indicator reliability. Cross-loadings with non-target constructs remained lower than primary loadings, ensuring discriminant validity.			

Source: Authors' work

Structural Model Assessment

The structural model was robust as R^2=0.853 for Virtual Collaboration (VC) is sufficiently substantial. This finding implies that all Big Five traits as a whole, account for more than 85% of variance in VC effectiveness and reflects the prominent role of Big Five traits in digital teamwork. The above mentioned model predictability was also confirmed by a Q2=0.733, much higher than the threshold of 0.35 for a model when to be considered to have strong predictability. Model fit indices also supported the model (APC = 0.301, $p < 0.001$; GoF = 0.761, large; AVIF = 1.368, good).

All the proposed associations were significant at the 0.001 level. Agreeableness (β = 0.422, f^2 = 0.290) constituted one of the strongest positive influences indicating that empathy, trust and cooperation are the most required for virtual collaboration. Also, found that Openness (ß = 0.304, f^2 = 0.175) and Extraversion (ß = 0.296, f^2 = 0.164) play a significant and positive role, indicating that being flexible, curious and engaged are relevant in digital technology teamwork. Conscientiousness (β = 0.287, f^2 = 0.163) remained, though diminished slightly, suggesting that conscientiousness, characterized by attention to work practices and dependability, still has value, just to a lesser extent than socially adaptive traits within virtual environments. finally, Neuroticism (β = –0.193, f^2 = 0.060) had a negative, small and significant effect, meaning that negative emotionality negatively impacts on remote working.

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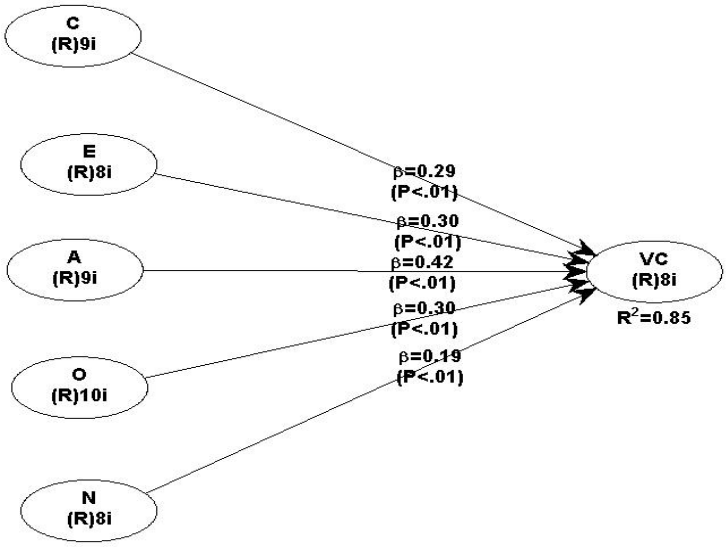

Source: Authors' work (PLS generated)

Table VI. Structural Model Results with Hypotheses

Hypothesis	Path	β (Coefficient)	SE	p-value	f^2 (Effect Size)	Type of Effect	Result
H1	Conscientiousness → VC	0.287	0.052	<0.001	0.163	Positive, Medium	Supported
H2	Extraversion → VC	0.296	0.052	<0.001	0.164	Positive, Medium	Supported
H3	Agreeableness → VC	0.422	0.051	<0.001	0.290	Positive, Medium–Large	Supported
H4	Openness → VC	0.304	0.052	<0.001	0.175	Positive, Medium	Supported
H5	Neuroticism → VC	–0.193	0.053	<0.001	0.060	Negative, Small	Supported
Notes: ***p < 0.001. Effect size thresholds: small (0.02), medium (0.15), large (0.35) (Cohen, 1988).							

Source: Authors

5. DISCUSSION

This study examined how the Big Five personality traits influence virtual collaboration in technology-mediated work settings through the lens of Trait Activation Theory. The results show that in virtual environments where social cues are limited, communication is asynchronous, and collaboration depends on digital transparency rather than physical presence, personality traits become less significant.

The findings confirm the hypothesis that trait activation varies across traditional, co-located work environments and virtual contexts. The results show that socio-emotional characteristics have a greater impact on collaboration effectiveness in digitally mediated environments than do task-oriented characteristics.

The most significant predictor of virtual collaboration was found to be agreeableness (β = 0.422, f^2 = 0.290). This emphasises how important interpersonal warmth, trust, and collaboration are in settings with few visual and contextual indicators. The outcome implies that when communication relies heavily on technology, collaborative intent, empathy, and mediation are the basis of productive teamwork.

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The most effective measure of virtual collaboration was found to be agreeableness. These results demonstrate that a collaborative orientation and interpersonal awareness become crucial for maintaining harmony and trust in settings when nonverbal feedback is lacking. Agreeable people seem to be better at handling conflict, understanding textual communication tone, and maintaining a positive environment in remote teams. These results align with other research that found trust and empathy to be important strategies for maintaining teamwork when there is no face-to-face interaction.

Openness to Experience ($\beta = 0.304$, $f^2 = 0.175$) and Extraversion ($\beta = 0.296$, $f^2 = 0.164$) were both positive and significant. Curiosity, flexibility, and a willingness to try new things are qualities that are essential for interacting with changing digital tools and workflows. In virtual environments, extraversion improves social presence, communication richness, and sustained engagement. By encouraging both discovering and connectedness in technology-mediated engagement, these two characteristics work together to encourage collaboration.

Openness is an indicator of curiosity, cognitive flexibility, and the ability to interact with changing workflows and technologies. People with high openness are more willing to experiment with new technologies and encourage innovative problem-solving in digital work contexts where creativity and adaptability have constant demands. In turn, extraversion helps maintain social presence and engagement (Bonito et al., 2022). In virtual interactions that might not often be immediate, extraverted members start conversations, maintain interest, and foster unity. Thus, the informational and relational quality of collaboration are improved when extraversion and openness are combined.

Conscientiousness ($\beta = 0.287$, $f^2 = 0.163$) continued to be a significant and favourable predictor, although its impact was less significant. This suggests that while task focus, dependability, and self-control are still necessary for productive teamwork, the autonomy and distributed accountability of digital work somewhat offset their significance. When defined procedures and accountability systems are in place, conscientious conduct improves performance under high virtuality; but, overall, socio-emotional flexibility has a higher impact. Although it had a lesser impact, conscientiousness was still a significant predictor. The structure of digital collaboration systems that currently mandate task visibility and responsibility seems to mitigate its impact. Digital systems that automate oversight and progress tracking sometimes counteract the traditional benefits of conscientiousness, including as discipline and process adherence.This does not diminish its relevance but suggests that its contribution depends on how work is structured and monitored in virtual teams. Conscientious individuals still facilitate reliability, yet their impact is less dominant when digital mechanisms standardise task discipline.

Neuroticism ($\beta = –0.193$, $f^2 = 0.060$) showed a small but significant negative relationship with virtual collaboration. Individuals high in emotional instability face greater strain from asynchronous coordination, ambiguity, and limited feedback, which reduces collaboration quality. This finding reinforces the importance of emotional resilience and coping skills in virtual teams. Overall, the pattern of results confirms a re-ranking of trait salience in digital contexts. Agreeableness, Openness, and Extraversion dominate collaboration outcomes, whereas Conscientiousness and Neuroticism play secondary roles. This supports the idea that virtual environments activate socio-emotional and adaptive tendencies more strongly than procedural or control-oriented traits. The evidence thus extends Trait Activation Theory by showing that technological mediation moderates how dispositional characteristics translate into collaborative behaviour.

Neuroticism showed a small but significant negative effect. Emotional instability and heightened sensitivity to uncertainty appear detrimental in settings where delayed feedback and limited interpersonal reassurance are common. High levels of neuroticism may increase stress, misunderstanding, or withdrawal from interaction, undermining coordination quality (Anwar et al.,

2022). Conversely, emotional stability allows individuals to tolerate ambiguity and maintain composure during asynchronous exchanges, supporting consistent collaborative performance.

Taken together, these findings demonstrate that virtual collaboration depends more on socio-emotional adaptability than on traditional task orientation. The digital context amplifies the need for trust, flexibility, and proactive communication, while reducing the functional advantage of traits linked to routine and structure. The results thus suggest a contextual reordering of trait influence, where interpersonal and adaptive qualities contribute most to collaborative success in technology-mediated environments. This pattern indicates that effectiveness in virtual teams relies less on compliance with task systems and more on the capacity to manage relationships and ambiguity through digital interfaces. Emotional steadiness, openness to new methods, and willingness to engage constructively with others appear to determine whether individuals collaborate efficiently when distance and technology redefine workplace interaction.

Theoretical contributions

This study refines Trait Activation Theory by showing how digital work environments change the way personality traits are expressed. Earlier research viewed trait activation as a response to physical and social cues in traditional workplaces. The findings of this study demonstrate that virtual collaboration introduces a different set of cues, such as asynchronous communication, limited non-verbal feedback, and platform-based visibility. These cues influence which traits become most relevant for effective collaboration.Agreeableness, openness to experience, and extraversion were stronger predictors of collaboration than conscientiousness. This pattern suggests that in technology-mediated settings, cooperation, adaptability, and proactive communication are more valuable than rule-following or self-discipline. The study therefore, extends Trait Activation Theory by identifying technology as a distinct situational feature that shapes the activation of traits. It provides a clearer understanding of how the structure of digital work determines which personal dispositions contribute most to collaborative performance.

By placing Trait Activation Theory (TAT) in the context of the digital workplace, this study fills a significant research gap and enhances TAT. The activation of characteristics through social and physical signals in traditional contexts is emphasised by traditional TAT. On the other hand, our study shows that some environmental cues, like asynchronous communication, diminished nonverbal input, and platform-based visibility that influence the expression of personality traits, are present in technology-mediated situations. The findings indicate that extraversion, agreeableness, and openness to new experiences are better indicators of virtual collaboration than conscientiousness. By highlighting technology as a contextual moderator affecting the activation and significance of characteristics in digitally mediated cooperation, these findings go beyond TAT.

Practical contributions

The findings provide actionable directions for improving collaboration in digital workplaces. The dominance of agreeableness, openness, and extraversion suggests that organisations should emphasise socio-emotional and adaptive capacities rather than traditional task orientation in recruitment, team design, and management. For hiring, selection systems should focus on identifying individuals who display cooperation, empathy, and curiosity about technology. Structured interviews and situational judgment tests that assess responses to ambiguity, asynchronous interaction, and conflict management are particularly relevant.

In team composition, collaboration improves when teams combine socially oriented members with dependable and adaptive colleagues. Overreliance on a single trait profile reduces diversity and limits creativity. Leadership practices should reinforce clarity and coordination through transparent task definitions, shared accountability systems, and consistent communication norms. These processes help balance autonomy with cohesion.

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Organizations also need continuous skill-building in digital communication, resilience, and trust formation to sustain engagement across distance. A guideline framework (Figure X) summarizes how personality-based hiring, balanced team design, and structured digital practices can enhance collaborative performance and inform workforce development policies for hybrid and remote work systems.

The results directly affect how collaboration is managed in digital and hybrid workplaces. Recruitment, team building, and leadership techniques should all be in line with the behavioural requirements of remote cooperation. Socio-emotional and adaptive qualities should be evaluated via selection systems using situational and behavioural assessments. While leadership should foster trust, clarity, and organised communication, team design should incorporate dependable and socially conscious people to improve cohesion and creativity. When combined, these techniques can enhance collaborative performance in tech-driven workplaces and support personality-based workforce initiatives.

6. CONCLUSION

This study positions the Big Five Personality Traitsas direct antecedents of Virtual Collaboration in technology-mediated work and shows that personality meaningfully explains collaborative behaviour in digital settings. The model accounts for substantial variance in Virtual Collaboration, with Agreeableness emerging as the strongest positive predictor, followed by Openness to Experience, Extraversion, and Conscientiousness, while Neuroticism exhibits a negative association. Interpreted through Trait Activation Theory, lean cues such as asynchronicity, limited nonverbal signals, and platform transparency appear to elevate socio-emotional and adaptive dispositions, clarifying why cooperation, engagement, and flexibility matter more for collaboration than task discipline alone in high-virtuality contexts. The contribution is twofold: theoretically, the paper offers a person-centric, replication-ready baseline that specifies how virtual cues reorder the relative importance of traits for Virtual Collaboration; practically, it translates these effects into actionable guidance for selection, team composition, leadership routines, and workflow design in remote and hybrid teams. While the cross-sectional design and single-source data limit causal inference, the findings provide a clear foundation for future work to test mediating mechanisms (e.g., trust, psychological safety, communication quality), boundary conditions (virtuality and synchronicity), and predictive validity in broader occupational settings using longitudinal and multi-source designs.

Limitations and Future Research Directions

This study has limitations that shape a clear agenda for future work. The cross-sectional, single-source design constrains causal inference and may inflate associations, while a knowledge-intensive convenience sample limits generalizability beyond similar remote or hybrid contexts. Measures relied on a reduced Big Five Inventory and self-reported Virtual Collaboration, without multi-source ratings or behavioral traces, and invariance across subgroups was not tested. The parsimonious structure - direct paths from Conscientiousness, Extraversion, Agreeableness, Openness to Experience, and Neuroticism to Virtual Collaboration, omitted theorized mechanisms (e.g., trust, psychological safety, communication quality) and boundary conditions (e.g., degree of virtuality, synchronicity, media richness), and did not account for platform/workflow heterogeneity, team tenure/size, or time-zone dispersion. Analyses were individual-level, assuming linear effects and no trait–trait interactions, and potential endogeneity was unaddressed. Future research should use longitudinal or experience-sampling designs with peer/supervisor ratings and digital trace data to triangulate collaboration behavior; test mediation and moderation within a Trait Activation Theory framework; model multilevel and compositional effects (team trait mix, person–team fit) and explore non-linearities and trait interactions; extend construct space judiciously (e.g., Honesty–Humility, proactive personality) while retaining parsimony; experimentally manipulate virtual cues (camera policies, channel norms, transparency of work boards); replicate across industries and

cultures with invariance checks; examine AI-mediated workflows as shifting situational cues; and report predictive validation (e.g., PLSpredict) and robustness (e.g., endogeneity diagnostics, preregistration) to strengthen cumulative evidence.

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