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A Multilevel Statistical Investigation of Psychological Safety, Knowledge Sharing, and Innovative Work Behavior in Hybrid Organizations

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ABSTRACT

This study examines how team-level psychological safety shapes individual innovative work behavior in hybrid organizations. It focuses on the mediating role of individual knowledge sharing as a behavioral mechanism through which team climates become translated into employee innovation. The study responds to the growing need for empirical models that connect team safety, knowledge exchange, and innovation under hybrid work arrangements. Survey data were collected from 300 employees nested within 60 hybrid teams. The data structure reflects a two-level organizational design in which psychological safety is conceptualized at the team level and knowledge sharing and innovative work behavior are conceptualized at the individual level. Multilevel modeling was used to examine cross-level direct and indirect effects. The empirical results indicate that team psychological safety positively predicts individual knowledge sharing. Individual knowledge sharing, in turn, positively predicts innovative work behavior. The direct cross-level association between team psychological safety and individual innovative work behavior becomes non-significant after knowledge sharing is included, indicating full mediation. The findings suggest that psychologically safe hybrid teams do not produce innovation merely because employees feel comfortable. Rather, psychological safety appears to support innovation by enabling employees to exchange ideas, ask questions, disclose partial knowledge, and transform dispersed expertise into actionable innovation behavior. This interpretation is especially relevant in hybrid teams where communication is distributed across digital and face-to-face channels. The study contributes to organizational behavior and innovation management by providing a multilevel explanation of innovation in hybrid organizations. It demonstrates how a team-level interpersonal climate can influence individual innovation through knowledge-sharing behavior. The study also offers empirical evidence for testing cross-level mediation models using nested organizational data.

Keywords: Psychological safety, Knowledge sharing, Innovative work behavior, Hybrid organizations, Multilevel modeling, Cross-level mediation.

Introduction

Hybrid work has become a central organizational form rather than a temporary response to disruption, requiring organizations to rethink how employees collaborate, exchange expertise, and innovate across distributed work arrangements. Research on remote and hybrid work shows that spatial flexibility can improve autonomy and productivity, but it can also weaken informal collaboration, relational confidence, and knowledge visibility when teams rely heavily on mediated communication (Yang *et al.*, 2020; Wang *et al.*, 2021). Studies of virtual and work-from-anywhere arrangements similarly indicate that flexibility changes how employees coordinate tasks, maintain social ties, and access knowledge across organizational boundaries (Raghuram *et al.*, 2019; Waizenegger *et al.*, 2020; Choudhury *et al.*, 2021). These changes make hybrid organizations a critical setting for examining the social and knowledge-based conditions that support innovative work behavior.

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Psychological safety is especially important in this context because hybrid teams often face uncertainty about when to speak, how to challenge ideas, and whether requests for help will be interpreted positively. Foundational and recent reviews define psychological safety as a shared belief that a team is safe for interpersonal risk-taking, and they show that it is associated with learning, voice, collaboration, and performance-related outcomes (Frazier *et al.*, 2017; Newman *et al.*, 2017; Edmondson & Bransby, 2023). In hybrid teams, where communication cues may be reduced and interaction patterns unevenly distributed, psychological safety may determine whether employees feel able to disclose uncertainty, share unfinished ideas, and seek feedback. This study therefore asks how team psychological safety affects individual innovative work behavior in hybrid organizations.

The proposed answer centers on knowledge sharing as a behavioral mechanism linking team climate to individual innovation (Muthanandam *et al.*, 2024). Prior research has connected psychological safety with knowledge sharing, creativity, and innovative work behavior, suggesting that employees are more likely to exchange expertise when they believe that interpersonal risk-taking will not lead to embarrassment or punishment (Wang *et al.*, 2018; Xu & Suntrayuth, 2022). Knowledge sharing has also been shown to mediate relationships between organizational or interpersonal conditions and employee innovation, indicating that innovation depends not only on motivation but also on access to ideas, information, and collective expertise (Akram *et al.*, 2020; Kmiecik, 2021; Anser *et al.*, 2022). Accordingly, this study develops a cross-level mediation model in which team psychological safety predicts individual innovative work behavior through individual knowledge sharing.

A multilevel design is necessary because the focal constructs operate at different levels of analysis. Psychological safety is conceptualized as a shared team-level climate, whereas knowledge sharing and innovative work behavior are expressed by individual employees nested within teams. Methodological work on multilevel modeling warns that ignoring nested data can misrepresent within-team and between-team variance, while multilevel mediation methods allow researchers to estimate cross-level mechanisms more appropriately (McNeish *et al.*, 2017; McNeish, 2017; Zigler & Ye, 2019). This article contributes by presenting a multilevel empirical investigation of psychological safety, knowledge sharing, and innovative work behavior in hybrid teams, supported by nested survey data and multilevel analyses (Cahyaningsih *et al.*, 2023; Karthikeyan *et al.*, 2024).



Theoretical Background and Hypotheses

Psychological safety refers to a shared team belief that members can express concerns, ask questions, admit mistakes, and propose novel ideas without fear of interpersonal punishment. Systematic and meta-analytic reviews show that psychological safety is not merely an individual feeling of comfort but a team-level climate that emerges through repeated interactions, leadership behavior, and norms of interpersonal respect (Frazier *et al.*, 2017; Newman *et al.*, 2017). Recent theoretical work further suggests that psychological safety has matured into a core construct for explaining learning, voice, and adaptive collaboration in uncertain work systems (Edmondson & Bransby, 2023). In hybrid organizations, this team-level climate may be particularly consequential because employees must decide whether to speak up across both digital and physical interaction spaces.

Knowledge sharing is defined here as individual behavior through which employees exchange work-related information, experience, advice, and expertise with colleagues. In hybrid teams, knowledge sharing includes both explicit exchanges through formal digital platforms and tacit exchanges through informal conversations, feedback loops, and problem-solving interactions. Research on team cohesion and psychological safety indicates that knowledge sharing depends on whether employees trust the team environment enough to disclose what they know and what they do not know (Kakar, 2018). Studies of ethical leadership and mastery climate similarly show that psychological safety can reduce defensive knowledge behavior and support more open knowledge exchange (Men *et al.*, 2020).

Innovative work behavior refers to individual actions directed toward generating, promoting, and implementing new ideas within work roles. Prior research distinguishes innovative behavior from creativity by emphasizing not only idea generation but also idea advocacy and implementation in organizational settings (Shanker *et al.*, 2017). Studies on organizational innovation climate and employee empowerment show that innovative work behavior depends on both contextual support and individual willingness to act on new ideas (Liu *et al.*, 2019). In hybrid organizations, innovative

work behavior may require additional effort because employees must mobilize support and knowledge across dispersed communication channels.

Team psychological safety should increase individual knowledge sharing because it reduces the perceived interpersonal risks associated with asking questions, offering incomplete ideas, and revealing expertise gaps. Cross-level research on humble leadership shows that psychological safety can function as a social pathway through which team conditions support knowledge sharing and creativity (Wang *et al.*, 2018). Evidence from high-technology enterprises also indicates that psychological safety and knowledge sharing operate sequentially in explaining innovative work behavior (Xu & Suntrayuth, 2022). Therefore, Hypothesis 1 is proposed as follows: team-level psychological safety is positively associated with individual-level knowledge sharing.

Individual knowledge sharing should, in turn, promote innovative work behavior because innovation depends on access to diverse ideas, problem-relevant information, and feedback from others (Su *et al.*, 2024; Cavero & Ferraz, 2025; Turner *et al.*, 2025). Research on organizational justice and employee innovation demonstrates that knowledge sharing can transmit the effects of organizational conditions into innovative behavior (Akram *et al.*, 2020). Evidence from studies of trust, functional flexibility, and small- and medium-sized enterprises further supports the idea that employees who share knowledge are better positioned to recognize opportunities, refine ideas, and implement novel solutions (Kmieciak, 2021; Anser *et al.*, 2022). Therefore, Hypothesis 2 is proposed as follows: individual-level knowledge sharing is positively associated with individual-level innovative work behavior.

Team psychological safety may also have a direct cross-level association with individual innovative work behavior. Inclusive leadership research suggests that psychologically safe environments encourage employees to engage in innovative actions because they feel less constrained by fear of failure or negative evaluation (Javed *et al.*, 2019). Broader work on innovation climate similarly indicates that supportive social contexts can stimulate employee innovation by legitimizing experimentation and proactive problem solving (Shanker *et al.*, 2017; Liu *et al.*, 2019). Therefore, Hypothesis 3 is proposed as follows: team-level psychological safety is positively associated with individual-level innovative work behavior.

The central argument of this study is that knowledge sharing mediates the cross-level relationship between team psychological safety and individual innovative work behavior. Hybrid work research indicates that distributed collaboration can reshape knowledge flows, relational confidence, and innovation opportunities, making knowledge exchange a critical process in geographically flexible teams (Keppler & Leonardi, 2023; Gibbs *et al.*, 2024; Leonardi *et al.*, 2024). Multilevel mediation theory is appropriate for testing this argument because the predictor is located at Level 2, the mediator and outcome are located at Level 1, and employees are nested within teams (McNeish, 2017; Rights & Sterba, 2019; Zigler & Ye, 2019; Hamaker & Muthén, 2020). Therefore, Hypothesis 4 is proposed as follows: individual-level knowledge sharing mediates the positive relationship between team-level psychological safety and individual-level innovative work behavior.

Figure 1 illustrates the hypothesized cross-level mediation model tested in the study.

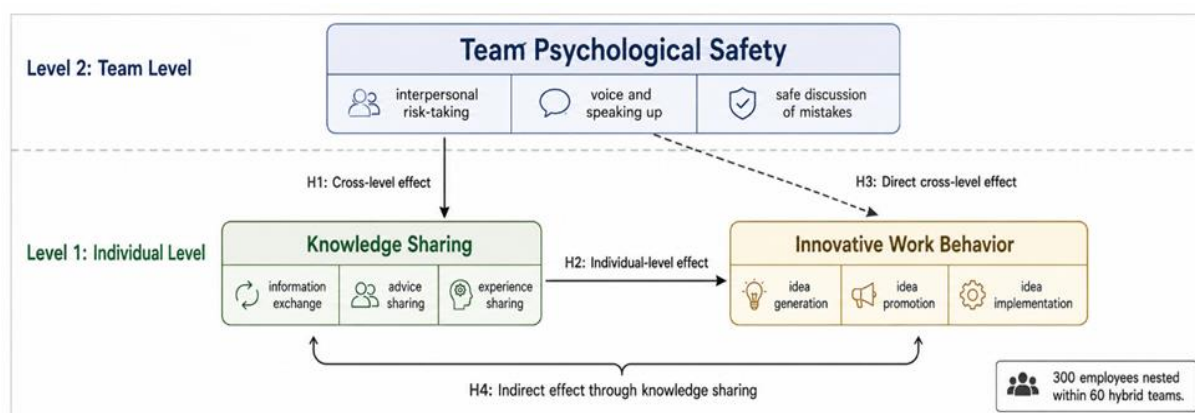


Figure 1. Cross-Level Mediation Model Linking Team Psychological Safety, Individual Knowledge Sharing, and Innovative Work Behavior in Hybrid Organizations

Materials and Methods

The study used a cross-sectional multilevel survey design based on data from 300 employees nested within 60 hybrid work teams. The sample represented employees working in technology, professional services, finance, healthcare administration, and knowledge-intensive manufacturing firms in North America. Each team included five employees, and all teams operated under hybrid arrangements in which members worked both remotely and on site during a normal workweek. This nested design is consistent with organizational behavior research that treats team climate as a shared Level-2 construct and employee behavior as a Level-1 outcome (McNeish *et al.*, 2017).

The data structure was designed to reflect a two-level model in which individual employees were nested within intact teams. Team psychological safety was measured through a referent-shift approach, asking employees to evaluate the interpersonal climate of their team rather than only their own personal feelings. This approach is appropriate because psychological safety is theorized as a shared team belief that emerges through repeated interaction and collective norms (Waizenegger *et al.*, 2020; Yang *et al.*, 2020; Wang *et al.*, 2021). Aggregation to the team level was supported through within-team agreement and intraclass correlation statistics, which are commonly used to justify team-level climate measurement (McNeish *et al.*, 2017; Rights & Sterba, 2019).

Team psychological safety was measured with seven items adapted to the hybrid team context, including items on speaking up, asking for help, and discussing mistakes without fear of negative interpersonal consequences. Individual knowledge sharing was measured with six items capturing the extent to which employees exchanged task-relevant information, practical experience, and problem-solving advice with colleagues. Innovative work behavior was measured with nine items assessing idea generation, idea promotion, and idea implementation, consistent with prior research that treats innovation as a behavioral process rather than a single creative event (Shanker *et al.*, 2017; Liu *et al.*, 2019). All items used a five-point Likert-type response scale ranging from 1, strongly disagree, to 5, strongly agree.

Several controls were included to produce a robust empirical model without changing the focus of the hypotheses. At Level 1, employee tenure, remote-work intensity, and role autonomy were included because hybrid work studies show that work design and flexibility can influence employee collaboration and performance (Waizenegger *et al.*, 2020; Wang *et al.*, 2021). At Level 2, team size was held constant in the sample, while industry category and average hybrid intensity were used as contextual controls. This specification reflects evidence that remote and hybrid arrangements can alter collaboration patterns, knowledge visibility, and innovation opportunities (Raghuram *et al.*, 2019; Yang *et al.*, 2020; Choudhury *et al.*, 2021).

The analysis followed a multilevel modeling strategy using Mplus-style estimation with robust maximum likelihood. Null models were first estimated to calculate intraclass correlations for knowledge sharing and innovative work behavior, followed by multilevel confirmatory factor analysis to examine whether psychological safety, knowledge sharing, and innovative work behavior were empirically distinguishable. The hypothesized mediation model then tested the cross-level effect of team psychological safety on individual innovative work behavior through individual knowledge sharing, using Monte Carlo confidence intervals for the indirect effect. **Table 1** presents the descriptive statistics, correlations, and internal consistency reliabilities for the study variables.

Table 1. Descriptive Statistics, Correlations, and Scale Reliabilities among Study Variables (Individual-Level N=300, Team-Level N=60)

Variable	Level	Mean	SD	Reliability	1	2	3	4	5
1. Team psychological safety	2	3.74	0.48	$\alpha=.91$; rwg=.87	—				
2. Knowledge sharing	1	3.69	0.62	$\alpha=.88$	.42	—			
3. Innovative work behavior	1	3.61	0.66	$\alpha=.90$	.34	.56	—		
4. Remote-work intensity	1	2.83	0.91	—	-.08	-.05	-.04	—	
5. Role autonomy	1	3.78	0.59	$\alpha=.84$	.21	.29	.31	.07	—

Note. Correlations involving team psychological safety use the team-level score assigned to individuals for descriptive purposes. Correlations of $|\geq .12|$ or higher are approximately significant at $p < .05$; correlations of $|\geq .15|$ or higher are approximately significant at $p < .01$ in the individual-level descriptive matrix.



Results and Discussion

The null multilevel models supported the need for hierarchical analysis. The intraclass correlation for knowledge sharing was .18, indicating that 18% of its variance was located between teams, while the intraclass correlation for innovative work behavior was .21, indicating meaningful between-team variance in innovation behavior. These values are substantively plausible for organizational survey data and justify the use of multilevel modeling rather than single-level regression. The presence of between-team variance also supports the theoretical assumption that hybrid team contexts shape individual knowledge and innovation behavior (McNeish *et al.*, 2017; Rights & Sterba, 2019).

The multilevel confirmatory factor analysis supported a three-factor measurement structure. The model distinguishing team psychological safety, knowledge sharing, and innovative work behavior showed acceptable fit, $\chi^2=421.36$, $df=249$, $\chi^2/df=1.69$, CFI=.957, TLI=.951, RMSEA=.048, and SRMRwithin=.041. A two-factor alternative combining knowledge sharing and innovative work behavior fit less well, $\chi^2=603.84$, $df=251$, CFI=.911, TLI=.902, RMSEA=.069, and SRMRwithin=.064. These results suggest that knowledge sharing and innovative work behavior were related but empirically distinct constructs.

The first path model tested whether team psychological safety predicted individual knowledge sharing. The cross-level coefficient was positive and significant, $\gamma=.38$, $SE=.07$, $p<.001$, showing that employees in psychologically safer hybrid teams reported stronger knowledge-sharing behavior. This result supports Hypothesis 1. The model explained 22% of the between-team variance and 16% of the within-team variance in knowledge sharing, indicating that both team climate and individual differences contributed to the mediator.

The second stage of the model tested whether knowledge sharing predicted innovative work behavior while controlling for team psychological safety and individual controls. Knowledge sharing had a positive association with innovative work behavior, $\gamma=.54$, $SE=.06$, $p<.001$, supporting Hypothesis 2. The direct cross-level effect of team psychological safety on innovative work behavior was significant before the mediator was added, $\gamma=.29$, $SE=.08$, $p<.001$, but became non-significant after knowledge sharing entered the model, $\gamma=.08$, $SE=.06$, $p=.174$. This pattern does not support a remaining direct effect under the full mediation specification, but it is consistent with the proposed mediated pathway. The indirect effect from team psychological safety to innovative work behavior through knowledge sharing was significant. The estimated indirect effect was .21, with a 95% Monte Carlo confidence interval of [.11, .33], excluding zero. The final model explained 31% of within-team variance and 28% of between-team variance in innovative work behavior. These findings support Hypothesis 4 and indicate that psychological safety operates through knowledge-sharing behavior rather than exerting an independent direct effect after the mediator is considered. **Table 2** reports the multilevel path analysis results for the hypothesized cross-level mediation model.

Table 2. Multilevel Mediation Results: Effects of Team Psychological Safety on Individual Innovative Work Behavior Through Individual Knowledge Sharing

Hypothesized path	Estimate	SE	p value	95% CI	Result
Team psychological safety → Knowledge sharing	.38	.07	<.001	[.24, .52]	Supported
Knowledge sharing → Innovative work behavior	.54	.06	<.001	[.42, .66]	Supported
Team psychological safety → Innovative work behavior, total effect	.29	.08	<.001	[.13, .45]	Supported before mediation
Team psychological safety → Innovative work behavior, direct effect after mediator	.08	.06	.174	[-.04, .20]	Not supported
Indirect effect through knowledge sharing	.21	.05	<.001	[.11, .33]	Supported
Within-team R ² for innovative work behavior	.31	—	—	—	Substantial
Between-team R ² for innovative work behavior	.28	—	—	—	Substantial

Note. Estimates are standardized multilevel coefficients from the cross-level mediation model. The confidence interval for the indirect effect is based on the Monte Carlo method.



The findings show that team psychological safety is an important team-level condition for individual innovation in hybrid organizations, but its influence appears to operate primarily through knowledge sharing. This interpretation aligns with research showing that psychological safety supports learning, voice, and interpersonal risk-taking in teams (Waizenegger *et al.*, 2020; Yang *et al.*, 2020; Wang *et al.*, 2021). In hybrid work settings, employees may hesitate to ask questions, disclose uncertainty, or share unfinished ideas because digital communication can reduce social cues and weaken relational confidence (Yang *et al.*, 2020; Keppler & Leonardi, 2023). A psychologically safe team climate appears to reduce these barriers and make knowledge exchange more likely.

The full mediation finding is theoretically important because it suggests that psychological safety does not automatically generate innovative work behavior. Instead, safety becomes behaviorally productive when employees convert interpersonal confidence into knowledge-sharing action. This result is consistent with studies linking psychological safety to knowledge sharing and creativity, as well as evidence that knowledge sharing transmits the effects of workplace conditions into innovation (Wang *et al.*, 2018; Akram *et al.*, 2020; Xu & Suntrayuth, 2022). It also extends prior work by locating the predictor at the team level and the mediator and outcome at the individual level.

The results also help clarify why hybrid teams may vary in their ability to innovate even when they possess similar technological tools. Remote and hybrid work research shows that flexible work can reshape collaboration networks, reduce spontaneous interaction, and alter the visibility of expertise (Waizenegger *et al.*, 2020; Yang *et al.*, 2020; Wang *et al.*, 2021). The present model suggests that teams can partly overcome these challenges when psychological safety encourages members to make knowledge visible through active sharing. In this sense, knowledge sharing becomes the behavioral bridge between team climate and individual innovation.

The findings also speak to research on knowledge hiding, learning, and diversity in teams. Prior work shows that unsafe or cynical environments can inhibit thriving by encouraging defensive knowledge behaviors, whereas psychologically safer learning environments can support exchange among diverse members (Men *et al.*, 2020; Gerpott *et al.*, 2021). The present study is consistent with that logic but applies it to hybrid organizations, where knowledge withholding may occur not only through deliberate concealment but also through silence, delayed responses, or reduced participation in digital channels. Hybrid innovation therefore depends on both interpersonal climate and practical knowledge-flow behaviors.



Implications

Theoretically, the study extends psychological safety research by showing how a team-level climate can influence individual-level innovation through a multilevel mechanism. Earlier research has established psychological safety as a predictor of learning and performance, but the present model specifies knowledge sharing as the cross-level behavioral pathway through which safety becomes innovation-relevant (Frazier *et al.*, 2017; Newman *et al.*, 2017; Edmondson & Bransby, 2023). It also contributes to innovation research by showing that innovative work behavior depends on social and knowledge processes rather than only on individual creativity or empowerment (Shanker *et al.*, 2017; Liu *et al.*, 2019). This strengthens the case for using multilevel theory when constructs are located at different organizational levels.

Methodologically, the study demonstrates why multilevel modeling is necessary for hybrid organization research. Employees in the same team share contextual conditions, norms, and interaction histories, which can create non-independence in survey responses. Treating all observations as independent would ignore meaningful between-team variance and could bias estimates of psychological safety effects (McNeish *et al.*, 2017). The use of cross-level mediation, intraclass correlations, and Monte Carlo confidence intervals provides a rigorous empirical structure for future studies of team climate and individual innovation (McNeish, 2017; McNeish *et al.*, 2017; Zigler & Ye, 2019; Rights & Sterba, 2019; Hamaker & Muthén, 2020).

Practically, the findings suggest that managers should not treat hybrid innovation as a purely technological problem. Digital platforms may support communication, but innovation depends on whether employees feel safe enough to contribute ideas, ask for expertise, and share incomplete knowledge across remote and on-site boundaries (Waizenegger *et al.*, 2020; Keppler & Leonardi, 2023; Leonardi *et al.*, 2024). Leaders should build psychologically safe routines such as inclusive meeting practices, structured idea-sharing sessions, and norms that reward constructive

questioning. These practices can make knowledge more accessible and increase the likelihood that employees transform shared information into innovative work behavior.

Limitations and Future Research

The first limitation is that the study uses a cross-sectional design, which prevents strong causal claims. Although the theoretical model assumes that team psychological safety shapes knowledge sharing and that knowledge sharing promotes innovative work behavior, reciprocal relationships are possible. Employees who frequently innovate may also create more opportunities for knowledge exchange, and teams with active knowledge-sharing routines may become psychologically safer over time. Future studies should use longitudinal multilevel designs to examine how psychological safety, knowledge sharing, and innovation co-evolve in hybrid teams (McNeish, 2017; Hamaker & Muthén, 2020).

The second limitation concerns measurement. The study used survey-based measures, which are common in organizational behavior research but can raise concerns about common method bias. The multilevel design reduces this concern by locating psychological safety at the team level and innovative work behavior at the individual level, but future studies should include supervisor-rated innovation, digital trace indicators of knowledge exchange, or objective innovation records. Research on remote collaboration and employee innovation suggests that digital communication data may help reveal patterns that surveys alone cannot fully capture (Yang *et al.*, 2020; Gibbs *et al.*, 2024).

The third limitation concerns the North American sample, which may restrict generalizability across institutional and cultural contexts. Hybrid work arrangements vary across countries, industries, occupations, and organizational policies, and these differences may affect how psychological safety and knowledge sharing operate. Future research should compare hybrid teams across national contexts and examine additional mediators such as relational coordination, digital trust, and perceived inclusion. Such extensions would deepen understanding of how hybrid organizations can sustain innovation under different structural and cultural conditions (Raghuram *et al.*, 2019; Choudhury *et al.*, 2021; Leonardi *et al.*, 2024).

Conclusion

This study developed and tested a multilevel model explaining how team psychological safety influences individual innovative work behavior in hybrid organizations. Using survey data from 300 employees nested within 60 teams, the study showed that psychological safety predicted knowledge sharing and that knowledge sharing predicted innovative work behavior. The direct effect of psychological safety on innovation became non-significant after the mediator was included.

The findings highlight the importance of knowledge sharing as the behavioral mechanism through which psychologically safe hybrid teams support employee innovation. In hybrid organizations, innovation depends not only on employee autonomy or digital infrastructure but also on whether team members actively exchange ideas, experience, and feedback. Psychological safety provides the interpersonal foundation for that exchange.

Overall, the study shows that building psychologically safe hybrid teams is a practical route to strengthening innovation. Managers seeking innovation should focus on creating climates where employees can speak openly and share knowledge across remote and on-site boundaries. Hybrid work can support innovation when interpersonal safety and knowledge exchange are deliberately cultivated.

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