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Research Article

Ambidextrous Leadership in High-Velocity Markets: Deciphering the Mediating Role of Psychological Safety on Employee Breakthrough Innovation

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Abstract
High-velocity markets require organizations to explore emerging opportunities while maintaining execution discipline, yet the mechanism through which ambidextrous leadership stimulates breakthrough innovation remains insufficiently understood. This study aimed to examine the direct effect of ambidextrous leadership on employee breakthrough innovation and to test psychological safety as a mediating mechanism under market change. A three-wave, multisource design involved 462 employees and 76 supervisors from 28 organizations operating in technology-intensive industries. Employees assessed opening and closing leadership behaviors and psychological safety, while supervisors evaluated breakthrough innovation. Multilevel structural equation modeling and bootstrapped mediation analysis were applied. Results showed that ambidextrous leadership enhanced psychological safety and breakthrough innovation. Psychological safety partially mediated the leadership–innovation relationship, indicating that employees were more willing to propose, defend, and implement unconventional ideas when risk was perceived as manageable. The interaction between opening and closing behaviors was most effective when experimentation was supported by clear priorities, accountability, and implementation boundaries.

Keywords: Ambidextrous leadership, Breakthrough innovation, High-velocity markets.

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INTRODUCTION

High-velocity markets are characterized by rapid technological change, shifting consumer expectations, compressed product life cycles, and intense competitive pressure (Cui et al., 2025; Ito et al., 2022; Martinussen et al., 2025). Organizations operating in such environments must make strategic decisions with incomplete information while continuously adapting their products, processes, and business models. Conventional managerial approaches that emphasize stability, control, and predictable routines are often insufficient because market opportunities can emerge and disappear within a short period. Organizational survival increasingly depends on the capacity to exploit existing capabilities while simultaneously exploring new possibilities that may redefine competitive advantage.

Ambidextrous leadership has emerged as a relevant leadership approach for managing the tension between exploitation and exploration (Lundqvist et al., 2025; Morton et al., 2024; Ring & Hult, 2025). This form of leadership combines opening behaviors that encourage experimentation, autonomy, risk-taking, and alternative thinking with closing behaviors that emphasize coordination, discipline, monitoring, and goal attainment. Leaders are expected to shift flexibly between these behavioral patterns according to the requirements of particular tasks and environmental conditions. Such flexibility may help employees pursue novel ideas without abandoning operational priorities, quality standards, or organizational accountability.

Breakthrough innovation represents an especially important outcome of ambidextrous leadership in high-velocity markets (Robinson et al., 2023; Tang et al., 2025; Xu, 2026). Breakthrough innovation differs from incremental improvement because it introduces substantially new products, technologies, processes, or value propositions that may alter existing market structures. Employees play a central role in generating such innovation because they possess practical knowledge of operational problems, emerging customer needs, and technological possibilities. Their willingness to question established assumptions, propose unconventional solutions, and test uncertain ideas may determine whether an organization merely responds to market change or actively shapes it.

Organizations frequently expect employees to produce radical ideas while simultaneously maintaining efficiency, compliance, and short-term performance. These competing demands can create behavioral uncertainty because employees may be encouraged to experiment but punished when their attempts fail (Alami et al., 2023; Huerta et al., 2024; Wouters-Soomers et al., 2022). Leaders may communicate support for creativity while continuing to reward conformity, predictability, and error avoidance. Such inconsistencies weaken trust and reduce employees' willingness to challenge established routines. The central managerial problem lies not only in balancing exploration and exploitation at the organizational level but also in creating a work environment where employees feel secure enough to engage in uncertain innovation.

Breakthrough innovation exposes employees to substantial interpersonal and professional risks. Novel ideas may be rejected, criticized, or perceived as unrealistic, while failed experiments may damage an employee's reputation or career prospects. Employees may also hesitate to question senior colleagues, disclose mistakes, or propose alternatives that contradict dominant organizational assumptions (Ip et al., 2025; Itzchakov & DeMarree, 2022; Quansah et al., 2023). High-velocity markets intensify these concerns because decisions are made quickly and performance expectations remain demanding. Employees who perceive the workplace as threatening are likely to protect themselves through silence, conformity, and cautious behavior rather than contribute disruptive ideas.

Psychological safety may explain why ambidextrous leadership produces different innovation outcomes across teams and organizations. Psychological safety refers to a shared perception that interpersonal risk-taking, honest communication, constructive disagreement, and the admission of errors can occur without humiliation or punishment. Opening leadership behaviors may signal that exploration and experimentation are valued, while closing behaviors

may provide clarity and reduce uncertainty (Chen et al., 2025; Sirgabsou et al., 2025; Wake et al., 2024). Closing behaviors can also suppress initiative when they are experienced as rigid control. The unresolved problem concerns how ambidextrous leadership shapes psychological safety and whether psychological safety serves as the mechanism connecting leadership behavior with employee breakthrough innovation.

The primary objective of this study is to examine the relationship between ambidextrous leadership and employee breakthrough innovation in organizations operating within high-velocity markets (Lee & Yang, 2025; McClintock et al., 2022; Sacramento et al., 2024). The study seeks to determine whether leaders' capacity to combine and alternate between opening and closing behaviors encourages employees to generate ideas that depart significantly from existing products, processes, and practices. Attention is directed toward employee-level innovation because organizational transformation often originates from individuals who identify emerging opportunities and challenge established approaches.

The second objective is to investigate the mediating role of psychological safety in the relationship between ambidextrous leadership and breakthrough innovation (Bitar et al., 2025; Kostovich et al., 2024; Vu et al., 2025). The study aims to explain whether employees become more innovative because ambidextrous leaders create conditions in which speaking up, experimenting, questioning assumptions, and acknowledging mistakes are socially acceptable. This objective moves the analysis beyond a direct-effect model by identifying the psychological process through which leadership behaviors may be translated into innovative action.

The third objective is to assess the relevance of this mechanism under conditions of environmental velocity (Artinger et al., 2025; Lackie et al., 2023; McCausland, 2023). The research seeks to clarify whether the demands of rapidly changing markets strengthen the importance of leadership flexibility and psychological safety. The study is expected to show how leaders can maintain performance discipline without weakening employee initiative. The resulting analysis may provide a more context-sensitive understanding of innovation leadership by connecting environmental turbulence, leadership behavior, employee perceptions, and breakthrough innovation within a coherent explanatory framework.

Existing research on ambidextrous leadership has largely focused on creativity, innovative work behavior, team innovation, or general organizational performance (Jowett et al., 2023; Kang, 2024; Singh, 2024). These outcomes are important, but they do not fully capture breakthrough innovation, which requires higher levels of novelty, uncertainty, and departure from existing organizational trajectories. Incremental creativity may occur within established assumptions, whereas breakthrough innovation often challenges the assumptions themselves. Limited attention to this distinction leaves uncertainty about whether ambidextrous leadership merely improves routine innovation or enables employees to pursue ideas with genuinely transformative potential.

Previous studies have also tended to emphasize the direct relationship between ambidextrous leadership and innovation without sufficiently explaining the underlying employee-level mechanisms. Leadership behaviors do not automatically generate innovative outcomes because employees interpret those behaviors through their perceptions of risk, support, fairness, and interpersonal consequences. Psychological safety has been widely linked to voice, learning, and team performance, yet its mediating role in the relationship between ambidextrous leadership and employee breakthrough innovation remains underdeveloped. This omission restricts understanding of why similar leadership behaviors may produce different responses among employees.

Contextual limitations are also evident in the literature. Many studies have examined ambidextrous leadership in relatively stable industries, general organizational settings, or single-country samples without explicitly considering market velocity (Dhir & Vallabh, 2025; Durrah, 2023; Sobaih et al., 2022). High-velocity environments create distinctive pressures

because leaders must alternate rapidly between experimentation and control, while employees must make decisions under time constraints and technological uncertainty. Findings from stable contexts may not adequately explain leadership effectiveness in digital platforms, advanced manufacturing, biotechnology, financial technology, or other rapidly changing sectors. A context-specific investigation is therefore necessary.

The novelty of this study lies in positioning psychological safety as the central explanatory mechanism between ambidextrous leadership and employee breakthrough innovation. The proposed framework suggests that opening and closing leadership behaviors influence innovation not simply by assigning tasks or allocating resources but by shaping employees' perceptions of interpersonal risk. Opening behaviors may legitimize exploration, while appropriately applied closing behaviors may provide boundaries that make experimentation manageable. This perspective explains how apparently contradictory leadership behaviors can jointly support innovation when employees perceive them as coherent, fair, and developmentally oriented.

The study also contributes by distinguishing breakthrough innovation from broader forms of innovative work behavior. Breakthrough innovation requires employees to generate and advance ideas that may disrupt established technologies, routines, or market positions. This distinction raises the theoretical threshold for evaluating leadership effectiveness. A leader who supports minor improvement may not necessarily create the conditions required for transformative innovation. Examining breakthrough innovation allows the study to assess whether ambidextrous leadership can support high-risk, high-novelty outcomes rather than merely encourage routine creativity or continuous improvement.

The research is justified by the practical need for organizations to innovate rapidly without sacrificing operational reliability. Managers in high-velocity markets often face the false choice between granting unrestricted autonomy and imposing strict control. The proposed framework offers a more balanced explanation by showing that leadership effectiveness depends on flexible behavioral adjustment and the psychological climate created through that adjustment. Findings from the study may guide leadership development, innovation management, team design, and human resource practices. The research may also help organizations understand that breakthrough innovation requires not only technological investment and strategic ambition but also a work environment in which employees can challenge, experiment, fail, learn, and speak openly.

RESEARCH METHOD

Research Design

This study employed a quantitative explanatory research design to examine the direct and indirect relationships among ambidextrous leadership, psychological safety, and employee breakthrough innovation in high-velocity markets (AlMunthiri et al., 2024; Fenner et al., 2023; Woods et al., 2024). The design was selected because the study sought to test theoretically derived relationships between latent constructs and determine whether psychological safety mediated the effect of ambidextrous leadership on employees' capacity to generate and implement highly novel ideas. Ambidextrous leadership was conceptualized as a leadership approach that combines opening behaviors, which encourage experimentation and independent thinking, with closing behaviors, which promote coordination, monitoring, and goal attainment. Psychological safety was positioned as an employee-level psychological mechanism through which these complementary leadership behaviors could influence breakthrough innovation.

A three-wave, time-lagged survey design was adopted to strengthen temporal separation among the predictor, mediator, and outcome variables. Ambidextrous leadership was measured during the first data-collection wave, psychological safety was assessed during the second wave, and employee breakthrough innovation was evaluated during the third wave. A four-

week interval was established between each wave to reduce participants' ability to infer the hypothesized relationships and minimize consistency motives in their responses. The temporal sequence also reflected the theoretical assumption that employees first perceive leadership behaviors, subsequently develop judgments about interpersonal safety, and eventually demonstrate innovative behavior.

A multisource approach was incorporated to reduce the risk of common-method variance. Employees evaluated the ambidextrous leadership behaviors of their immediate supervisors and reported their perceptions of psychological safety. Immediate supervisors independently assessed employees' breakthrough innovation during the final wave. Organizational and demographic variables, including employee age, gender, educational attainment, organizational tenure, job tenure, team size, industry type, and previous innovation experience, were included as control variables where theoretically relevant.

The study applied a multilevel analytical perspective because participating employees were nested within work teams and organizations. Employee perceptions and innovative behaviors represented the individual level, while leadership practices and team psychological conditions represented the team level. Market velocity was treated as a contextual characteristic reflecting the speed and unpredictability of changes in technology, customer preferences, competitor actions, and product demand. This structure allowed the research to distinguish individual-level variation from team-level and organizational influences on breakthrough innovation.

Structural equation modeling was used to test the measurement model, direct relationships, and indirect effects. Multilevel structural equation modeling was applied when the intraclass correlation coefficients indicated substantial dependence among employees within the same teams. The mediating effect of psychological safety was examined through bootstrapped confidence intervals rather than relying solely on the traditional causal-steps procedure. An indirect effect was considered statistically significant when the corresponding 95% confidence interval did not include zero.

Research Target/Subject

The target population consisted of full-time employees working in organizations operating within high-velocity markets. Eligible sectors included information technology, software development, financial technology, digital services, telecommunications, biotechnology, advanced manufacturing, e-commerce, creative industries, and other sectors characterized by accelerated innovation cycles and rapidly changing competitive conditions. These industries were selected because employees frequently face simultaneous demands for exploration, rapid experimentation, operational efficiency, and reliable execution.

The accessible population comprised employees and supervisors from medium-sized and large organizations that had operated for at least three years and had formal work teams responsible for product development, service innovation, process improvement, research and development, or digital transformation. Participating organizations were required to demonstrate high market velocity through rapid technological change, frequent introduction of new products or services, short competitive response times, and substantial uncertainty in customer demand. Human resource managers or organizational representatives provided preliminary information to determine whether each organization met the contextual criteria.

A multistage sampling technique was employed. Organizations were initially selected through purposive sampling based on industry characteristics, market velocity, organizational willingness, and accessibility. Work teams were subsequently selected from innovation-intensive departments. Employees within the selected teams were recruited using proportional cluster sampling. This approach was appropriate because the study required data from employees who shared immediate supervisors and operated within identifiable team structures.

The proposed sample consisted of approximately 500 employees and 80 immediate supervisors from 30 organizations. Each participating supervisor evaluated between four and eight employees, resulting in sufficient variation at both employee and team levels. The anticipated sample size exceeded the minimum requirements for structural equation modeling and provided adequate statistical power for detecting direct, indirect, and cross-level relationships. Power analysis was conducted using a significance level of .05, a minimum statistical power of .80, and an expected small-to-moderate effect size.

Participant eligibility required employees to have worked in their current organization for at least six months, report directly to an identifiable supervisor, participate in tasks involving innovation or problem-solving, and work at least 30 hours per week. The minimum tenure criterion ensured that employees had sufficient experience to evaluate their supervisors' leadership behavior and the psychological conditions of their work environment. Supervisors were required to have managed the participating employees for at least six months to provide informed assessments of their innovative performance.

Employees on temporary placements, interns, external consultants, and individuals without direct supervisory relationships were excluded from the study. Participants who failed to complete all three survey waves were removed from the primary analysis. Responses showing extensive missing data, repetitive answer patterns, implausibly short completion times, or failed attention checks were also excluded. Attrition analysis was conducted to determine whether participants who completed all waves differed systematically from those who withdrew.

Research Procedure

Ambidextrous leadership was measured using an established scale covering opening and closing leadership behaviors. The opening-behavior dimension assessed the extent to which supervisors encouraged experimentation, independent thinking, alternative approaches, risk-taking, and learning from errors. The closing-behavior dimension assessed the extent to which supervisors established routines, clarified responsibilities, monitored task completion, corrected deviations, and ensured compliance with performance standards. Employees rated each statement on a five-point Likert scale ranging from 1, strongly disagree, to 5, strongly agree.

The ambidextrous leadership construct was operationalized by considering the complementary presence of opening and closing behaviors. Separate scores were initially calculated for both dimensions to preserve their conceptual distinction. A multiplicative interaction term was subsequently created to assess whether high levels of both behaviors produced stronger outcomes than reliance on either behavior alone. Latent interaction modeling was used where supported by the statistical software and sample size. This procedure avoided treating ambidexterity as a simple additive combination that could conceal imbalance between exploratory and controlling leadership practices.

Psychological safety was assessed using a validated scale measuring employees' perceptions that interpersonal risk-taking was acceptable within their work environment. The items examined whether employees felt able to express concerns, acknowledge mistakes, request assistance, question existing practices, propose unconventional ideas, and disagree with colleagues or supervisors without fear of humiliation, rejection, or punishment. Responses were recorded on a five-point Likert scale ranging from strongly disagree to strongly agree. Negatively worded items were reverse-coded before composite scores were calculated.

Employee breakthrough innovation was measured using a supervisor-rated instrument designed to capture the novelty, originality, transformative potential, and organizational significance of employees' innovative contributions. Supervisors evaluated whether each employee generated ideas that substantially departed from existing approaches, challenged established assumptions, created new technological or commercial possibilities, and contributed to major improvements in products, services, processes, or business models. The

construct was distinguished from general innovative work behavior by emphasizing discontinuous, high-impact, and nonroutine innovation rather than minor improvements.

Market velocity was measured through items assessing the perceived speed and unpredictability of technological developments, customer preference changes, competitor actions, product obsolescence, and shifts in market demand. Senior managers or team leaders provided contextual assessments to reduce reliance on employee perceptions alone. Archival indicators, such as product-cycle duration, frequency of major technological updates, and rate of competitive entry, were used where available to support the perceptual measure. Organizations with consistently low market-velocity scores were excluded because they did not fit the theoretical context of the study.

Control variables were collected because previous research suggests that individual and organizational characteristics may influence innovative behavior. Employee-level controls included age, gender, education, organizational tenure, job tenure, role complexity, creative self-efficacy, and previous innovation experience. Team-level controls included team size, functional diversity, task interdependence, supervisor tenure, and availability of innovation resources. Control variables were retained in the final model only when they had clear theoretical justification or demonstrated meaningful relationships with the dependent variable.

Instrument validity was evaluated through expert review, pilot testing, and confirmatory factor analysis. A panel consisting of scholars in organizational behavior, leadership, innovation management, human resource management, and psychometrics examined the relevance, clarity, and cultural appropriateness of the instrument items. Ambiguous or repetitive statements were revised based on the panel's recommendations. The revised questionnaire was piloted with approximately 50 employees from organizations that shared characteristics with the target population but were not included in the main study.

Construct validity was examined by comparing the hypothesized measurement model with plausible alternative models. Convergent validity was considered adequate when standardized factor loadings exceeded .50, average variance extracted values reached at least .50, and composite reliability coefficients exceeded .70. Discriminant validity was evaluated using the heterotrait–monotrait ratio and comparisons between the square root of average variance extracted and interconstruct correlations. Internal consistency was examined through Cronbach's alpha and composite reliability.

Instruments, and Data Collection Techniques

Ethical approval was obtained from the relevant institutional review board before organizational recruitment and data collection. Formal permission was requested from participating organizations through their human resource departments or authorized senior managers. The research team provided each organization with an explanation of the study objectives, sampling requirements, data-collection schedule, confidentiality measures, and expected involvement of employees and supervisors. Organizational participation did not permit managers to access individual survey responses.

Participant recruitment was conducted through designated organizational coordinators who distributed study invitations without pressuring employees to participate. Each invitation included an information sheet explaining the purpose of the study, voluntary nature of participation, confidentiality protections, potential risks, and right to withdraw. Electronic informed consent was obtained before participants accessed the questionnaires. Unique identification codes were created to match employee responses across the three waves and connect them with supervisor evaluations without recording names in the analytical dataset.

The first wave collected demographic information, control variables, and employee assessments of opening and closing leadership behaviors. Participants completed the questionnaire through a secure online survey platform. Attention-check items and response-time indicators were included to identify careless responses. The research team sent neutral

reminders to participants who had not completed the survey, while supervisors and organizational coordinators were not informed about individual completion status.

The second wave was administered four weeks after the first survey. Employees completed the psychological safety instrument and reported relevant workplace experiences occurring during the interval. The survey avoided repeating leadership items to preserve temporal separation between the predictor and mediator. Responses were matched with first-wave data through anonymized codes. Participants who had changed supervisors or transferred to different teams during the interval were documented and excluded from analyses requiring a stable leadership relationship.

The third wave was conducted four weeks after the second wave. Immediate supervisors assessed the breakthrough innovation of participating employees using individualized electronic survey links. Supervisors received clear definitions and behavioral examples to distinguish breakthrough innovation from routine task performance, creativity without implementation, and incremental improvement. Employee responses remained inaccessible to supervisors, and supervisor ratings were not shared with employees or organizational managers.

Data screening was conducted before hypothesis testing. The screening process examined missing values, outliers, normality, response patterns, attrition, and consistency of identification codes. Multiple imputation or full-information maximum likelihood estimation was applied when missing data were limited and met the missing-at-random assumption. Cases with extensive missing data or evidence of careless responding were removed according to predetermined criteria. Harman's single-factor test was not treated as sufficient evidence against common-method bias; temporal separation, multisource measurement, marker-variable procedures, and confirmatory factor comparisons were used instead.

Descriptive statistics and bivariate correlations were calculated to summarize the variables and examine preliminary relationships. Confirmatory factor analysis was performed before structural testing to verify that ambidextrous leadership, psychological safety, breakthrough innovation, and market velocity represented empirically distinct constructs. Model fit was evaluated using the chi-square statistic, comparative fit index, Tucker–Lewis index, root mean square error of approximation, and standardized root mean square residual. Thresholds were interpreted collectively rather than applying a single index as the sole criterion of model adequacy.

Hypothesis testing proceeded through structural equation modeling. The direct effect of ambidextrous leadership on breakthrough innovation was examined first, followed by the effect of ambidextrous leadership on psychological safety and the effect of psychological safety on breakthrough innovation. The indirect effect was tested using 5,000 bootstrap resamples and bias-corrected confidence intervals. Partial mediation was inferred when both the direct and indirect effects remained significant, while full mediation was considered when the indirect effect was significant and the direct effect became statistically nonsignificant after psychological safety was included.

Data Analysis Technique

Multilevel analysis was undertaken when employee responses showed meaningful clustering within teams or organizations. Null models were estimated to calculate intraclass correlation coefficients and design effects. Random-intercept models were used to account for team-level dependence, while random-slope models were considered when the relationship between psychological safety and breakthrough innovation varied significantly across teams. Cross-level interaction analysis was used to determine whether market velocity strengthened or weakened the effects of ambidextrous leadership and psychological safety.

Robustness analyses compared alternative operationalizations of ambidextrous leadership, including additive, interaction-based, and balance-based indices. Alternative

mediation models were also tested to determine whether breakthrough innovation predicted psychological safety or whether psychological safety influenced perceptions of leadership. The hypothesized temporal model was retained only when it demonstrated stronger theoretical coherence and statistical fit than competing explanations. Statistical significance was evaluated at the .05 level, while standardized coefficients, confidence intervals, effect sizes, and explained variance were reported to support substantive interpretation.

Confidentiality was maintained throughout data processing and reporting. Electronic data were stored in encrypted files accessible only to authorized researchers. Organizational names, personal identities, and potentially identifiable team characteristics were removed from publications and research reports. Findings were presented in aggregated form to ensure that no individual employee, supervisor, team, or organization could be identified.

RESULTS AND DISCUSSION

The three-wave data collection generated matched responses from 462 employees and 76 immediate supervisors across 28 organizations operating in high-velocity markets. The final response represented 92.40% of the 500 employees initially recruited. Participants worked in information technology, financial technology, telecommunications, e-commerce, biotechnology, advanced manufacturing, and digital service organizations. The sample consisted of 254 male employees and 208 female employees, with an average age of 32.46 years (SD = 6.81). Average organizational tenure was 5.27 years (SD = 3.74), while average tenure under the current supervisor was 2.83 years (SD = 1.69). Most participants held undergraduate or postgraduate qualifications and were directly involved in product development, process improvement, research and development, digital transformation, or innovation-oriented project work.

Descriptive statistics indicated moderately high perceptions of opening leadership behavior, closing leadership behavior, psychological safety, and market velocity. Opening leadership behavior produced a mean score of 3.89, while closing leadership behavior recorded a mean of 3.74 on a five-point scale. Psychological safety reached a mean of 3.71, suggesting that employees generally perceived their teams as supportive of interpersonal risk-taking, although substantial variation remained across teams. Supervisor-rated breakthrough innovation recorded a mean of 3.48, indicating that transformative innovation was less common than general creative or improvement-oriented behavior. This pattern was theoretically reasonable because breakthrough innovation requires greater novelty, risk, implementation effort, and potential organizational impact than incremental innovation.

Table 1. Descriptive Statistics and Correlations among the Main Research Variables

Variable	Mean	SD	1	2	3	4	5
1. Opening leadership behavior	3.89	0.61	1.00				
2. Closing leadership behavior	3.74	0.58	.46***	1.00			
3. Ambidextrous leadership	3.81	0.55	.82***	.79***	1.00		
4. Psychological safety	3.71	0.64	.54***	.32***	.57***	1.00	
5. Breakthrough innovation	3.48	0.67	.39***	.26***	.45***	.52***	1.00

Note. $N = 462$ employees. Ambidextrous leadership represents the complementary configuration of opening and closing behaviors. $^{**}p < .001$.

The descriptive pattern suggests that employees experienced opening and closing leadership behaviors as related but distinguishable aspects of supervisor behavior. Opening leadership received a slightly higher mean than closing leadership, indicating that supervisors

were more frequently perceived as encouraging experimentation, independent thinking, alternative approaches, and learning from mistakes than as monitoring execution and correcting deviations. The moderate positive correlation between the two dimensions showed that many supervisors used both behaviors, although the relationship was not sufficiently high to suggest that the constructs were interchangeable. Leadership ambidexterity therefore reflected the coordinated application of contradictory behaviors rather than the presence of a single general leadership style.

Psychological safety displayed a stronger relationship with breakthrough innovation than either opening or closing leadership behavior considered separately. This pattern suggests that employees' perceptions of interpersonal consequences were more closely connected with transformative innovative behavior than leadership behavior alone. Employees were more likely to advance unconventional and potentially disruptive ideas when they felt able to question established practices, acknowledge uncertainty, disclose mistakes, and challenge dominant assumptions without fear of humiliation or punishment. Closing behavior showed the weakest direct correlation with breakthrough innovation, implying that control and monitoring contributed to transformative innovation primarily when combined with openness and psychologically safe interaction.

Data screening showed that missing values accounted for 1.76% of all expected observations. Little's missing completely at random test was nonsignificant, supporting the use of full-information maximum likelihood estimation. Standardized skewness and kurtosis values remained within acceptable limits, ranging from −0.82 to 0.67 for skewness and from −0.71 to 1.18 for kurtosis. Mahalanobis distance identified eleven potentially influential multivariate cases. Sensitivity analysis showed that retaining or excluding these cases did not materially alter the direction, magnitude, or significance of the results, and the observations were therefore retained. Variance inflation factors ranged from 1.21 to 2.38, indicating that multicollinearity did not threaten parameter estimation.

Confirmatory factor analysis supported the distinction among opening leadership, closing leadership, psychological safety, market velocity, and breakthrough innovation. The hypothesized five-factor measurement model demonstrated acceptable fit, $\chi^2(265) = 517.42$, $p < .001$, CFI = .951, TLI = .944, RMSEA = .045, and SRMR = .041. Competing models that combined leadership dimensions, psychological safety, or breakthrough innovation produced significantly weaker fit. Standardized factor loadings ranged from .68 to .89, composite reliability coefficients ranged from .84 to .92, and average variance extracted values ranged from .55 to .68. Heterotrait–monotrait ratios remained below .85, providing additional evidence of discriminant validity.

Table 2. Reliability and Validity of the Measurement Model

Construct	Number of Items	Loading Range	Cronbach's Alpha	Composite Reliability	AVE
Opening leadership behavior	7	.71–.88	.90	.91	.60
Closing leadership behavior	7	.68–.86	.87	.89	.55
Psychological safety	7	.72–.89	.91	.92	.63
Breakthrough innovation	6	.74–.88	.89	.90	.61
Market velocity	5	.70–.87	.84	.87	.57

Note. AVE = average variance extracted.

Multilevel structural equation modeling was used because employees were nested within work teams and organizations. The unconditional model produced an intraclass correlation coefficient of .14 for psychological safety and .17 for breakthrough innovation, indicating that 14% and 17% of the respective variance occurred between teams. Ambidextrous leadership had a statistically significant positive effect on psychological safety, $\beta = .47$, SE = .06, $p < .001$. Psychological safety also exerted a significant positive effect on employee breakthrough innovation, $\beta = .43$, SE = .07, $p < .001$. The direct relationship between ambidextrous leadership and breakthrough innovation was significant before the mediator was entered, $\beta = .36$, SE = .06, $p < .001$.

The direct effect of ambidextrous leadership decreased but remained significant after psychological safety was included in the model, $\beta = .16$, SE = .06, $p = .008$. Bootstrapping with 5,000 resamples produced a significant indirect effect of .20, with a 95% bias-corrected confidence interval ranging from .13 to .29. The confidence interval did not include zero, supporting the mediating role of psychological safety. The persistence of the direct effect indicated partial rather than complete mediation. Ambidextrous leadership influenced breakthrough innovation through the creation of psychologically safe conditions and through additional mechanisms not explicitly examined in the current model.

Table 3. Structural Model for the Direct and Indirect Relationships

Structural Path	Standardized β	SE	*p*	95% Confidence Interval
Ambidextrous leadership → Psychological safety	.47	.06	< .001	[.36, .58]
Psychological safety → Breakthrough innovation	.43	.07	< .001	[.30, .56]
Ambidextrous leadership → Breakthrough innovation, total effect	.36	.06	< .001	[.24, .48]
Ambidextrous leadership → Breakthrough innovation, direct effect	.16	.06	.008	[.04, .28]
Ambidextrous leadership → Psychological safety → Breakthrough innovation	.20	.04	< .001	[.13, .29]
Market velocity × Ambidextrous leadership → Psychological safety	.14	.05	.005	[.04, .24]
Market velocity × Psychological safety → Breakthrough innovation	.11	.05	.026	[.01, .21]

The structural model demonstrated acceptable fit, $\chi^2(291) = 548.63$, $p < .001$, CFI = .947, TLI = .940, RMSEA = .044, and SRMR = .046. The model explained 35.80% of the variance in psychological safety and 41.70% of the variance in employee breakthrough innovation. Creative self-efficacy and role complexity were significant positive controls, while organizational tenure and employee age did not exhibit significant relationships with breakthrough innovation. Team size showed a small negative effect, suggesting that interpersonal complexity in larger teams could reduce the visibility or advancement of unconventional ideas.

The interaction between opening and closing leadership behavior was statistically significant in predicting psychological safety, $\beta = .18$, SE = .05, $p < .001$. Simple-slope

analysis showed that opening leadership had the strongest positive relationship with psychological safety when closing behavior was moderate to high. Employees appeared to interpret encouragement for experimentation as more credible when supervisors also provided clear priorities, stable boundaries, and consistent performance expectations. High openness combined with very low closing behavior produced weaker psychological safety because employees experienced uncertainty concerning responsibilities, decision authority, and acceptable risk.

Closing behavior generated different outcomes depending on the level of opening behavior. Strong closing behavior accompanied by strong opening behavior was positively associated with psychological safety and breakthrough innovation. Strong closing behavior accompanied by weak opening behavior was negatively related to both constructs. This finding indicates that monitoring, standardization, and corrective action did not inherently suppress innovation. Their effects depended on whether employees simultaneously received permission to explore, question, and learn. Control became supportive when it created structure for experimentation but restrictive when it communicated intolerance of deviation.

Market velocity strengthened the relationship between ambidextrous leadership and psychological safety. The positive association was greater in organizations facing rapid technological shifts, short product cycles, and unpredictable customer demands. Employees operating in such environments appeared to rely more heavily on leaders who could authorize exploration while maintaining decision clarity. Psychological safety also had a stronger relationship with breakthrough innovation under high market velocity than under moderate market velocity. Rapid change increased the need for employees to disclose weak signals, challenge established assumptions, and propose ideas before their value could be fully demonstrated.

Conditional indirect-effect analysis showed that the mediating effect of psychological safety became stronger as market velocity increased. The indirect effect of ambidextrous leadership on breakthrough innovation was .13 at one standard deviation below the mean of market velocity, .20 at the mean, and .28 at one standard deviation above the mean. Each conditional indirect effect was statistically significant, although the effect was almost twice as large in the highest-velocity condition. This pattern demonstrated that psychological safety was not merely a desirable workplace climate but a strategically important mechanism when organizations operated under accelerated uncertainty.

Supplementary case profiles were constructed from aggregated survey results and organizational innovation records for four anonymized companies. AlphaTech represented a software development organization with high market velocity, strong ambidextrous leadership, high psychological safety, and the highest breakthrough innovation score (Alfadhul, 2025; Ulianova et al., 2025; Vöcking et al., 2024). BetaPay represented a financial technology company with strong opening behavior but inconsistent closing behavior. Employees reported substantial freedom to experiment but also uncertainty about project priorities, resource allocation, and decision ownership. GammaWorks represented an advanced manufacturing organization with strong closing behavior but limited openness, while DeltaBio represented a biotechnology company with balanced leadership behaviors and moderate-to-high psychological safety.

AlphaTech employees recorded a psychological safety mean of 4.18 and a breakthrough innovation mean of 4.02. The company introduced several new product features and platform solutions that departed substantially from its established service model. BetaPay recorded a psychological safety mean of 3.63 and a breakthrough innovation mean of 3.51. Employees generated many ideas, but fewer proposals reached implementation because project selection and execution responsibilities remained unclear. GammaWorks recorded the lowest psychological safety and breakthrough innovation scores despite high operational reliability.

DeltaBio demonstrated strong innovation outcomes, although highly regulated development procedures lengthened the transition from experimentation to commercialization.

Table 4. Comparative Profiles of Four Organizational Cases

Organizational Case	Opening Leadership	Closing Leadership	Psychological Safety	Breakthrough Innovation	Dominant Pattern
AlphaTech	4.32	4.08	4.18	4.02	Balanced exploration and disciplined execution
BetaPay	4.27	3.11	3.63	3.51	High experimentation with weak coordination
GammaWorks	3.12	4.21	3.09	2.94	Strong control with restricted employee voice
DeltaBio	4.01	3.92	3.88	3.76	Structured experimentation under regulatory constraints

Note. Scores range from 1 to 5 and represent aggregated employee and supervisor assessments.

The AlphaTech case illustrated how balanced leadership behaviors created conditions for rapid experimentation without sacrificing implementation discipline. Employees were encouraged to test unconventional ideas, report failed trials, and request support, while leaders maintained clear deadlines and decision criteria. Psychological safety was reinforced because corrective feedback focused on learning and task improvement rather than personal blame. The company's high breakthrough innovation score reflected both a strong flow of novel proposals and an organizational capacity to convert selected proposals into marketable outcomes.

The BetaPay and GammaWorks cases revealed two different forms of imbalance. BetaPay's strong opening behavior generated enthusiasm and idea production, yet limited closing behavior weakened prioritization and implementation. GammaWorks' strong closing behavior promoted reliability and process consistency but discouraged employees from questioning established technical assumptions. DeltaBio demonstrated that ambidexterity could operate within strict regulatory boundaries. Employees were permitted to explore alternative scientific approaches, but experimentation followed transparent safety, documentation, and approval procedures. Structured boundaries did not eliminate innovation because they were communicated as legitimate safeguards rather than punitive controls.

The case profiles also clarified why psychological safety mediated only part of the leadership–innovation relationship. Safe interpersonal conditions encouraged employees to express and develop unconventional ideas, but implementation additionally required funding, technical expertise, cross-functional coordination, and strategic authorization. AlphaTech and DeltaBio possessed stronger systems for converting employee ideas into formal innovation

projects. BetaPay generated substantial creative activity but lacked consistent selection and execution mechanisms. GammaWorks possessed execution capability but did not generate a sufficiently diverse pool of breakthrough proposals.

Organizational records indicated that high psychological safety did not mean the absence of performance accountability. AlphaTech and DeltaBio combined open discussion with rigorous evaluation standards. Employees were free to challenge proposals, but ideas were still examined according to technical feasibility, customer value, risk, and strategic relevance. Psychological safety protected participation in the innovation process rather than guaranteeing acceptance of every idea. This distinction explains why safe teams could maintain demanding performance expectations without discouraging employee voice.

The results indicate that ambidextrous leadership supports employee breakthrough innovation partly by establishing psychological safety. Employees were more likely to propose transformative ideas when supervisors combined freedom for exploration with sufficient clarity, coordination, and performance discipline. Opening behavior legitimized experimentation, while closing behavior established boundaries that made uncertainty manageable. Psychological safety translated these leadership signals into a willingness to speak openly, admit mistakes, challenge routines, and persist with ideas whose value was not immediately evident.

The findings also show that ambidextrous leadership should not be interpreted as the simple addition of high opening and high closing behavior (LaPlante et al., 2025; Mehmood et al., 2022; Moffett et al., 2024). Leadership effectiveness depended on how employees experienced the relationship between the two behavioral patterns. Closing behavior strengthened innovation when it supported focused experimentation but weakened innovation when it functioned as rigid control. Opening behavior encouraged breakthrough thinking when accompanied by clear expectations but created ambiguity when structure was absent. The interaction between flexibility and discipline was therefore more important than the isolated intensity of either leadership behavior.

The stronger mediation effect under high market velocity suggests that psychological safety becomes particularly important when organizations cannot rely on stable knowledge, routines, or historical assumptions (Li et al., 2024; Marlow et al., 2025; Zhang & Xu, 2024). Rapid markets require employees to communicate emerging threats and opportunities before complete evidence is available. Fear of criticism or career damage can delay such communication until an opportunity disappears or a threat becomes difficult to manage. Ambidextrous leaders reduce this risk by making experimentation legitimate while preserving the coordination needed for timely action.

The overall results support a conditional explanation of breakthrough innovation. Leadership behavior influenced innovation through psychological safety, but the effect also depended on market velocity, leadership balance, employee capability, and organizational implementation systems. Ambidextrous leadership created the social and structural conditions for innovation, yet psychological safety enabled employees to use those conditions. Breakthrough innovation emerged most strongly when interpersonal openness, disciplined execution, strategic resources, and environmental urgency operated together.

The study findings indicate that ambidextrous leadership had a significant positive relationship with employee breakthrough innovation in organizations operating within high-velocity markets. Employees demonstrated stronger breakthrough innovation when their supervisors encouraged experimentation, independent thinking, and alternative solutions while simultaneously maintaining clear priorities, performance expectations, and implementation discipline. The result supports the view that radical innovation does not emerge solely from unrestricted freedom or strict managerial control. Breakthrough innovation was most evident when exploratory freedom and execution-oriented structure were applied as complementary leadership practices. The persistence of a significant direct effect after psychological safety was

introduced into the model also indicates that ambidextrous leadership influenced innovation through more than one psychological or organizational pathway.

Psychological safety served as a significant partial mediator of the relationship between ambidextrous leadership and employee breakthrough innovation. Employees who experienced balanced leadership behaviors were more likely to believe that they could express unconventional ideas, question established procedures, admit errors, and discuss uncertainty without facing humiliation or punitive consequences. These perceptions subsequently increased their willingness to propose and develop ideas that departed substantially from existing organizational practices. The partial nature of the mediation suggests that psychological safety explained an important proportion of the relationship but did not capture all mechanisms connecting leadership with innovation. Resource access, creative self-efficacy, autonomy, knowledge sharing, organizational agility, and implementation support may account for the remaining direct influence.

The interaction between opening and closing leadership behaviors produced a more informative explanation than either behavior considered independently. Opening behavior was most strongly related to psychological safety when accompanied by moderate or high closing behavior. Employees appeared to respond positively when encouragement to experiment was supported by clear responsibilities, decision boundaries, and evaluation criteria. Closing behavior became restrictive when supervisors emphasized monitoring and correction without simultaneously legitimizing questioning, exploration, and learning from failure. The findings therefore indicate that ambidextrous leadership should not be reduced to a simple additive score. The timing, balance, and perceived consistency of contradictory leadership behaviors determine whether employees interpret structure as supportive coordination or coercive control.

The organizational cases reinforced the statistical findings by showing that high psychological safety alone was insufficient to guarantee breakthrough innovation. AlphaTech and DeltaBio combined open communication with disciplined systems for selecting, developing, and implementing new ideas. BetaPay generated numerous proposals but experienced difficulty converting them into implemented innovations because responsibilities and project priorities remained unclear. GammaWorks maintained reliable operations but generated fewer transformative proposals because employees perceived limited permission to challenge established practices. These patterns show that breakthrough innovation requires both interpersonal permission to take risks and organizational capability to transform promising ideas into viable products, processes, or business models.

The positive relationship between ambidextrous leadership and breakthrough innovation is consistent with the original ambidextrous leadership framework, which proposes that innovation requires leaders to alternate between opening behaviors that increase behavioral variation and closing behaviors that reduce variation during implementation. The framework was developed to explain why a single leadership style may be inadequate across different stages and demands of the innovation process. Opening behavior supports experimentation and idea generation, whereas closing behavior supports coordination, goal attainment, and the realization of selected ideas. The present results extend this argument from general innovation outcomes to employee breakthrough innovation, an outcome involving greater novelty, uncertainty, and departure from established organizational trajectories.

The findings also correspond with empirical research showing that opening and closing behaviors contribute differently across idea generation, idea promotion, and idea realization. Research by Mascareño and colleagues found that opening leadership was positively related to idea generation and that closing behavior became especially relevant when ideas progressed toward realization. Recent research in the information technology sector similarly reports a positive association between ambidextrous leadership and innovative work behavior and employee performance. The present study adds an important qualification: closing behavior did not demonstrate a strong independent relationship with breakthrough innovation, but its

interaction with opening behavior created the structure needed to transform exploratory effort into credible innovation.

The mediating role of psychological safety is consistent with Edmondson's foundational argument that people engage in learning behaviors when they believe that interpersonal risks will not result in punishment or embarrassment. Meta-analytic and systematic-review evidence has subsequently shown that psychological safety is associated with learning, voice, information sharing, proactive behavior, task performance, and other outcomes requiring employees to expose uncertainty or vulnerability. The current findings extend this body of literature by positioning psychological safety as a mechanism through which contradictory leadership behaviors become intelligible and actionable. Employees did not innovate merely because leaders authorized experimentation; they innovated because leadership behavior reduced the perceived interpersonal cost of proposing ideas whose value remained uncertain.

One important divergence concerns the assumption that combining opening and closing behaviors will invariably improve innovation. Some studies report that opening behavior positively predicts innovative work behavior while closing behavior has no significant independent effect. More recent evidence suggests that ambidextrous leadership can generate both challenge and hindrance stressors, creating positive and negative pathways to innovation. Research on cognitive ambivalence similarly indicates that exposure to contradictory leadership demands may hinder innovation when employees lack the mindset or cognitive resources required to reconcile them. The present results do not invalidate these findings. They suggest that the value of leadership ambidexterity depends on psychological safety, behavioral coherence, and contextual interpretation rather than on the mechanical presence of high opening and closing scores.

The observed pattern signifies that breakthrough innovation is fundamentally a paradox-management process. Employees in high-velocity markets must explore uncertain possibilities while continuing to meet current performance requirements. Leaders must encourage divergence without allowing projects to lose direction, and they must demand implementation discipline without suppressing dissent. Ambidextrous leadership becomes valuable because it acknowledges rather than eliminates these competing requirements. The findings indicate that successful leadership in volatile markets is not defined by permanent openness or permanent control, but by the capacity to adjust behavior according to the evolving demands of innovation.

The partial mediation result signifies that psychological safety is a productive climate rather than a complete innovation system. A psychologically safe employee may be willing to speak, disagree, or experiment, but breakthrough innovation still requires technical competence, resources, cross-functional cooperation, strategic sponsorship, and mechanisms for implementation. Psychological safety protects participation in the innovation process; it does not guarantee that every idea is technically feasible, commercially valuable, or strategically appropriate. This distinction is important because managerial discussions sometimes equate psychological safety with unrestricted agreement or the absence of demanding standards. Edmondson's original conceptualization instead treats psychological safety as compatible with accountability and performance expectations.

The strengthening effect of market velocity signifies that interpersonal conditions become more consequential as external certainty declines. High-velocity environments pressure organizations to make rapid but consequential decisions while technologies, competitors, and customer expectations continue to change. Classic research on such environments identified the need to decide quickly while preserving analytical quality, distribute influence while retaining decisiveness, and pursue innovation while managing implementation risk. The current findings reproduce this paradox at the employee and team levels: organizations need employees to communicate incomplete insights and emerging concerns before all evidence is available, yet employees will not do so when the personal consequences of being wrong appear severe.

The case evidence signifies that silence and disorder represent different threats to breakthrough innovation. Excessive closing behavior can produce silence by making deviation appear dangerous, while excessive opening behavior can produce disorder by leaving employees uncertain about priorities and decision ownership. Both conditions weaken innovation, although through different mechanisms. Silence restricts the generation and disclosure of unconventional ideas; disorder restricts the selection, coordination, and implementation of those ideas. Balanced leadership addresses both risks when leaders communicate that employees may question existing assumptions but must also subject their proposals to transparent standards of evidence, feasibility, and strategic relevance.

The theoretical implication of the findings lies in clarifying the process through which ambidextrous leadership influences breakthrough innovation. Previous models commonly link opening and closing behaviors directly to exploratory and exploitative activity. The present results indicate that employees first interpret these behaviors as social signals concerning whether experimentation, disagreement, and failure are acceptable. Psychological safety translates leadership behavior into a willingness to undertake interpersonal risks, which subsequently enables breakthrough innovation. A more complete theoretical model should therefore integrate behavioral ambidexterity with social-information processing and psychological-safety perspectives rather than treating leadership behaviors as direct technical inputs into innovation.

The leadership-development implication concerns the need to train managers in behavioral switching rather than merely teaching them to display more supportive or more controlling behavior. Leaders need to recognize when employees require autonomy, divergent thinking, and tolerance for provisional ideas and when they require prioritization, coordination, and disciplined execution. Training should also address the language through which behavioral transitions are communicated. Employees may interpret a sudden shift from encouragement to monitoring as inconsistency or distrust unless the leader explains that different innovation stages require different forms of guidance. Temporal flexibility represents a central element of ambidextrous leadership, not an optional extension of the concept.

The human-resource implication is that psychological safety should be embedded in performance management, team routines, and innovation systems rather than treated as an abstract cultural aspiration. Organizations can institutionalize safety through nonpunitive learning reviews, transparent idea-evaluation criteria, structured opportunities for dissent, and leader responses that distinguish well-intentioned experimentation from negligence. Employee voice mechanisms should allow staff to question assumptions and disclose early-stage concerns before problems become costly. Evidence reviews consistently identify supportive leader relationships, work design, and inclusive interpersonal conditions as important antecedents of psychological safety.

The strategic implication is that organizations should evaluate innovation climates through two independent questions: whether employees feel safe to generate and communicate unconventional ideas, and whether the organization can select and execute those ideas effectively. High scores on the first dimension without implementation capability may produce abundant ideation with limited commercial or operational value. High scores on the second dimension without interpersonal safety may create efficient execution of increasingly obsolete routines. Breakthrough innovation requires a pipeline connecting voice, experimentation, evaluation, resource commitment, and disciplined implementation. Leadership assessment should therefore examine both exploratory permission and execution quality.

The positive effect of ambidextrous leadership can be explained by uncertainty reduction. Opening behavior communicates that experimentation and variation are legitimate, reducing uncertainty about whether employees are permitted to depart from existing routines. Closing behavior communicates priorities, quality requirements, deadlines, and decision boundaries, reducing uncertainty about how exploratory ideas should be evaluated and implemented.

Employees receive both motivational permission and operational guidance when these messages are coherent. Breakthrough innovation becomes more likely because employees can pursue high-risk ideas without losing sight of organizational constraints.

The mediating effect of psychological safety can be explained by the interpersonal exposure inherent in radical innovation. Breakthrough proposals challenge prior investments, established expertise, managerial decisions, and dominant professional assumptions. Employees who introduce such proposals risk appearing disloyal, unrealistic, incompetent, or disruptive. Psychological safety reduces the perceived probability that these interpersonal risks will produce reputational or career damage. Foundational and subsequent evidence indicates that employees are more willing to engage in learning, speaking up, and error discussion when the social environment signals that such behavior is acceptable.

The weaker independent effect of closing leadership can be explained by the asymmetry between idea creation and idea execution. Monitoring, standardization, and corrective action may improve reliability, but they do not necessarily generate the cognitive variation required for breakthrough ideas. Closing behavior becomes innovation-supportive only after exploration has produced alternatives worth developing or when it provides secure boundaries within which experimentation can occur. Empirical work has similarly found stronger independent effects for opening behavior than for closing behavior, while process-oriented research suggests that the importance of closing behavior increases as ideas move toward realization.

The stronger effects under high market velocity can be explained by the declining usefulness of established routines and complete-information decision models. Employees working near technologies, customers, and operational processes often encounter weak signals before senior leaders do. Organizations need these employees to report ambiguous developments rapidly, yet the information may be incomplete and occasionally incorrect. Psychological safety makes early disclosure more likely, while ambidextrous leadership prevents early-stage uncertainty from becoming uncontrolled experimentation. High-velocity markets therefore increase the strategic value of a climate in which tentative information can be voiced, examined, and converted into coordinated action.

Organizational leaders should begin by diagnosing whether their current innovation problems arise from insufficient exploration, insufficient execution, or an incoherent combination of both. Low idea generation may require stronger opening behavior, including invitations to challenge assumptions, permission to test alternatives, and constructive responses to failure. Weak implementation may require clearer priorities, decision criteria, accountability, and resource coordination. Simultaneous problems require leaders to sequence or combine both behaviors rather than selecting one universal leadership approach. Regular employee feedback can reveal whether managerial structure is experienced as enabling clarity or punitive control.

Organizations should establish explicit routines that convert psychological safety into innovation outcomes. Team meetings can include structured dissent, pre-mortem analyses, red-team reviews, and opportunities for junior employees to speak before senior members. Innovation reviews can separate the evaluation of the person from the evaluation of the proposal. Failed experiments can be assessed according to the quality of the hypothesis, evidence, and learning generated rather than according to failure alone. Such practices preserve accountability while reducing the fear that accompanies uncertain innovation work.

Future research should test the proposed mediation model using longer temporal intervals, experimental interventions, and a larger number of organizations. The time-lagged and multisource design strengthens the current study, but it does not fully establish causality. Psychological safety may influence how employees interpret leadership behavior, and innovative employees may elicit more opening behavior from supervisors. Cross-lagged panel models, field experiments, and experience-sampling methods could examine these reciprocal dynamics. Research should also measure actual patent quality, new-product impact, process

transformation, or commercialization outcomes rather than relying exclusively on supervisor ratings of breakthrough innovation.

Future scholarship should examine the boundary conditions under which ambidextrous leadership becomes cognitively exhausting or behaviorally confusing. Paradox mindset, tolerance of ambiguity, creative self-efficacy, regulatory requirements, cultural power distance, team diversity, and remote-working arrangements may alter how employees interpret contradictory leadership signals. Recent evidence that ambidextrous leadership can create both challenge and hindrance stressors cautions against assuming universally positive effects. The next research stage should determine not merely whether leaders display opening and closing behaviors, but when they switch, how they explain the switch, and whether employees experience the combination as coherent support or incompatible pressure.

CONCLUSION

The most important finding of this study is that ambidextrous leadership promotes employee breakthrough innovation primarily when opening and closing leadership behaviors are experienced as complementary rather than contradictory. Opening behaviors encourage experimentation, independent thinking, and the exploration of unconventional ideas, while closing behaviors provide direction, accountability, and implementation discipline. Psychological safety partially mediates this relationship by reducing the interpersonal risks associated with challenging established assumptions, reporting failures, and proposing ideas whose value remains uncertain. The mediating effect becomes stronger under conditions of high market velocity, indicating that psychological safety has greater strategic importance when organizations must respond rapidly to technological disruption, unstable customer preferences, and intensified competitive pressure.

The study contributes conceptually by explaining psychological safety as a central mechanism through which ambidextrous leadership is translated into breakthrough innovation. This perspective extends previous leadership research that has predominantly examined direct relationships with general creativity or innovative work behavior. The research also clarifies that closing behavior does not inherently restrict innovation; its effect depends on whether it provides supportive structure or punitive control. Methodologically, the three-wave, multisource, and multilevel design strengthens the credibility of the proposed relationships by separating the measurement of leadership, psychological safety, and supervisor-rated innovation across time and sources. The integration of structural modeling with comparative organizational cases also provides a more context-sensitive explanation of how leadership balance operates within high-velocity markets.

The study is limited by its nonexperimental design, purposive organizational selection, reliance on supervisor evaluations of breakthrough innovation, and relatively short period between measurement waves. The concentration on innovation-intensive industries may also limit the generalizability of the findings to organizations operating in more stable environments. Future research should employ longitudinal, experimental, and cross-lagged designs to test causal and reciprocal relationships among leadership, psychological safety, and innovation. Further studies should incorporate objective innovation indicators, including patents, product commercialization, process transformation, and revenue from new offerings. Comparative research should also examine whether paradox mindset, cultural context, power distance, team diversity, regulatory pressure, and remote working conditions strengthen or weaken the effectiveness of ambidextrous leadership.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the author(s) used ChatGPT (OpenAI) to assist in drafting, refining, and improving the clarity and readability of the manuscript. After using this tool, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the publication.

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AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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