

The Impact of Employee Psychological Resilience on Conflicts In Semiconductor R & D Teams: The Moderating Effect of Mindfulness Leadership

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Abstract

Background: Semiconductor R & D is technology-intensive and under high environmental pressure, often causing team conflicts and affecting innovation efficiency. According to Self-Determination Theory (SDT), resilience is the key resource to reduce conflict by meeting the basic needs of autonomy, ability and relevance. The existence of mindful leadership will play a moderating role in this effect.

Methods: Based on SDT, a questionnaire survey was conducted among 411 R&D personnel from semiconductor enterprises in Guangdong Province. Structural equation modeling and moderation analysis were applied.

Results: Research indicates that psychological resilience reduces all three forms of team conflict: task, relationship, and process. Besides this, mindful leadership further helps. It enables psychological resilience to significantly alleviate three types of team conflicts, relative process conflicts, and is more effective in reducing task and interpersonal relationship conflicts.

Conclusion: Employee psychological resilience exhibits a substantial negative correlation with task conflict, interpersonal conflict, and process conflict. Mindfulness leadership significantly alleviates the impact of psychological resilience on three types of team conflicts, with a particularly prominent moderating effect on task and relationship conflicts.

Keywords: Employee Psychological Resilience; Mindful Leadership; SDT; Semiconductor R&D Teams; Team Conflict.

1. Introduction

The semiconductor sector is essential to the contemporary technological economy. It is strongly dependent on advanced technology, experiences swift invention cycles, and encounters fierce global competition. (Li & Rasiah, 2025). R&D teams are the main drivers of technical progress in this high-pressure environment. However, conflict among team members are almost inevitable when dealing with complex problems. According to Jehn's model (Jehn, 1995, 1997), team conflicts are generally classified into three categories: task conflict (disagreements regarding work content and objectives), relationship conflict (personal tension and discord), and process conflict (disputes concerning task allocation and responsibilities). Moderate task conflict may foster creative thinking; however, excessive conflict, particularly in interpersonal relations and procedural matters, can undermine team cohesion, diminish decision-making quality, and obstruct creativity. This could slow down research and development by a lot.

Consequently, discerning effective strategies to manage and mitigate team conflict poses a considerable challenge for both semiconductor companies and management scholars. The concept of psychological resilience is gaining more and more attention in this context. (Anasori et al., 2023; Carmeli et al., 2021; Fey & Kock, 2022). Psychological resilience refers to an individual's ability to sustain positivity, adapt, and grow in the presence of adversity and stress. According to SDT (Deci & Ryan, 2000), people do their best work when their basic psychological needs for autonomy, competence, and connection are met. Psychological resilience helps meet these needs in a research and development setting with a lot of pressure. In real life, when things get tough, resilient employees can use their inner strength to focus on finding solutions. (Aslam & Ul Islam, 2024; Cooke et al., 2019; Li & Wang, 2025). This method helps keep disagreements about work from turning into personal problems or problems with the workflow.

The psychological resilience resources of individual employees are interconnected and significantly influenced by leadership styles. (Njaramba & Olukuru, 2025). In recent years, mindfulness leadership - a leadership style in which leaders consciously and nonjudgmental focus on the present to maintain awareness and care for themselves and team members (Doornich & Lynch, 2024; Glomb et al., 2011) - has demonstrated strong situational shaping power. Mindfulness leaders can create a psychologically safe environment for their team, and their nonjudgmental awareness helps to intervene objectively in the early stages of conflict. By regulating their emotions, employees can prevent task conflicts from escalating into relational ones. Mindful leadership naturally fosters the satisfaction of SDT's basic needs—

autonomy (via empowerment), competence (via feedback), and relatedness (via empathy) (Bright, 2021; Liu, 2024; Ryan et al., 2021) — thereby creating a supportive context. It is therefore proposed that mindful leadership may moderate the relationship between psychological resilience and conflict, in addition to exerting direct effects.

Drawing on the above rationale, this study adopts SDT as its overarching framework to explore how employee psychological resilience influences multi-dimensional team conflict in semiconductor R&D, and how mindful leadership moderates this relationship. This study not only hopes to reveal the internal "black box" of psychological resilience affecting team conflict from the perspective of meeting basic psychological needs, but also hopes to provide practical theoretical basis and management enlightenment for semiconductor enterprises on how to build excellent R&D teams with high performance and low internal friction by verifying the boundary conditions of mindfulness leadership.

2. Theory and Hypothesis

2.1. SDT

Guided by SDT (Deci & Ryan, 2000), this study adopts the view that satisfaction of the basic needs for autonomy, competence, and relatedness is central to positive workplace outcomes. Accordingly, employee psychological resilience is theorized as an intra-individual capacity that actively promotes need satisfaction. Mindful leadership, in turn, is framed as an interpersonal and situational resource that externally supports these same needs within the team context. Thus, team conflict is examined as a consequential team dynamic that is shaped by the extent to which these psychological needs are met through the interplay of personal resilience and leadership context.

2.2. SDT and psychological resilience

SDT helps us understand psychological resilience better. This is because psychological resilience is closely related to meeting a person's basic psychological needs. (Deci & Ryan, 2000; Liu & Huang, 2021; Trigueros et al., 2019). Psychological resilience effectively supports the satisfaction of individuals' autonomous needs by maintaining their autonomy in common situations and interpersonal interactions.

In general stressful situations, psychological resilience enables individuals to mobilize resources for self-regulation even in adversity, maintain an internal sense of choice (Pillay et al., 2022), and actively choose coping strategies rather than being passively influenced by the environment (Gardner, 2020). In specific interpersonal interactions such as workplace friction, individuals with strong psychological resilience are better able to maintain emotional stability and self-identity, helping their behavioral responses stem more from internal values and choices rather than external coercion, thereby protecting their sense of autonomy (Varshney & Varshney, 2024; Guay, 2022; IJntema et al., 2023).

Psychological resilience can effectively meet the ability needs of individuals by shaping positive cognition of challenges and driving active problem-solving behavior. It urges individuals to reevaluate difficulties as manageable challenges and growth opportunities, and maintain their faith in their own abilities (Koval & Pidluzhna, 2025). This positive cognitive framework and the sense of self-efficacy it brings not only directly meet the ability needs, but also promote individuals to take constructive action to solve problems, thus forming a continuously strengthened "assessment action" cycle and effectively improving their sense of control over the environment (Cannon & Rucker, 2022; Qin et al., 2023; Kong & Pan, 2023; Booth & Neill, 2017).

In terms of relationship needs, psychological resilience helps individuals maintain constructive interaction in conflict and maintain the willingness of relationship repair (Govender, 2022). By promoting emotion regulation and stress management, it reduces defensive or avoidance behaviors caused by a sense of threat, so as to maintain basic respect and communication and avoid relationship breakdown (Polizzi & Lynn, 2021). In addition, people with strong psychological resilience tend to regard interpersonal challenges as situations that can be dealt with and repaired, and take the initiative to adopt relationship oriented strategies (such as seeking consensus and expressing understanding), committed to repairing rather than destroying connections (Rice & Liu, 2016; Denckla et al., 2020). Therefore, even if interpersonal relationships fluctuate temporarily, psychological resilience can still ensure that relationship needs are met in a dynamic interpersonal environment.

2.3. Psychological resilience and team conflict

Psychological resilience refers to the ability of individuals to effectively cope with crisis and pressure when facing psychological or emotional distress, and protect themselves from potential negative effects through psychological adjustment, so as to keep calm and recover in time in turmoil (Vella & Pai, 2019; Bonanno et al., 2023; Spytka, 2024). Team conflicts are usually divided into three dimensions: task conflict, relationship conflict and process conflict (Dennis et al., 2023). Based on the framework of SDT, the psychological resilience of employees will have a significant differentiated impact on these three types of conflicts (Kim Quy et al., 2023).

2.3.1. Psychological resilience and task conflict

Starting from the essential characteristics and dynamic evolution process of task conflicts, psychological resilience systematically influences an individual's coping performance in task conflicts by shaping their cognitive patterns and behavioral choices (Somaraju et al., 2022). The main cause of task conflicts is the cognitive differences among team members regarding task content, goal setting and execution methods. The actual effects that such conflicts can produce largely depend on the way members interpret each other's cognitive differences and their coping strategies (Al-Ghazali & Afsar, 2021; Jehn & Mannix, 2001). When workers are mentally strong, they feel more confident and at ease, which makes them more likely to see differences in a good light. This indicates that individuals perceive divergent perspectives as opportunities for learning and enhancing solutions, rather than as threats to their self-esteem (Harrison et al., 2024). As a result, people can keep an open mind, put solving problems ahead of their own successes or failures, and take part in or even start task-oriented discussions more actively and constructively.

Psychological resilience is not only used to prevent the generation of differences, but may promote individuals to more actively participate in the exchange of views and maintain a constructive attitude, which helps to maintain or even strengthen the task oriented open discussion in the team. This interaction therefore increases the possibility of transforming work task conflict into a beneficial process of information processing and innovation (O'Neill, 2022). However, given the complexity of task conflicts and the potential risk of their transformation

into relational conflicts, the relationship between psychological resilience and the severity of task conflicts may not be a simple linear negative correlation (Baek & Kim, 2020). After a comprehensive theoretical analysis, the subsequent concepts are proposed:

H1a: Employee psychological resilience is negatively correlated with team task conflict.

2.3.2. Psychological resilience and relationship conflict

Emotions such as friction, stress, and aversion in interpersonal communication can lead to relationship issues, adversely affecting teams and collaboration. Psychological resilience enables individuals to regulate their emotions, hence reducing the likelihood of relationship issues arising (Folger et al., 2024; Jehn & Mannix, 2001).

Highly resilient employees can distinguish the issue from the individual, so preventing work-related disputes from escalating into personal assaults (Carmeli et al., 2021). This indicates that in reality, a statement such as "I don't agree with this approach" is less likely to be interpreted as "You're wrong" and more likely to remain a professional divergence of opinion.

Resilience does not prevent problems in relationships, but it aids in maintaining them within acceptable limits. It prevents interpersonal conflict from escalating by regulating emotions and altering perceptions.

Building on the foregoing analysis, psychological resilience enhances constructive emotional management and objective attribution. This process protects relational need satisfaction at the individual level and helps maintain interpersonal harmony at the team level. It is therefore hypothesized that:

H1b: Employee psychological resilience will be negatively correlated with team relationship conflict.

2.3.3. Psychological resilience and process conflict

Psychological resilience serves as a regulatory mechanism in the domain of process conflict, which concerns disagreements over task execution (e.g., responsibility, resources, workflow). It functions primarily by strengthening individuals' adaptive negotiation strategies and flexibility. These conflicts are more likely to trigger emotional opposition due to their frequent involvement with individual autonomy needs (perception of job control) and relationship needs (perception of fairness in resource allocation) (Jehn & Mannix, 2001). Employees with high psychological resilience have stronger self-regulation ability and psychological flexibility, and can more effectively cope with the ambiguity and pressure arising from it (Kashdan & Rottenberg, 2010; Nakhostin-Khayyat et al., 2024). At the behavioral level, employees with high psychological resilience are more inclined to adopt constructive negotiation strategies, and they are adept at seeking alternative solutions under resource constraints and using a problem-oriented approach to solve problems (Harrison et al., 2024).

Based on the above mechanism, psychological resilience helps reduce friction caused by unclear rights and responsibilities and unfair procedures, and suppresses their transformation into relationship conflicts. Thus, it is hypothesized that:

H1c: Employee psychological resilience will be negatively associated with team process conflict.

2.4. The regulatory role of mindfulness leadership

Mindfulness leadership refers to a behavioral pattern in which leaders influence team processes and outcomes through their own focused, present aware, and nonjudgmental cognitive states form the foundation for actively shaping a supportive team environment (Glomb et al., 2011). Mindful leaders can better manage their emotions, have empathy for team members, and be less influenced by biases when making decisions (Harvey & Kudesia, 2023).

Based on SDT and combined with the cognitive-behavioral perspective of leadership, mindful leadership creates a critical team environment that effectively supports employees' basic psychological needs (autonomy, ability, and relationship) through its endogenous focus, present awareness, and non-judgmental cognitive state (Celestin & Vanitha, 2020; Glomb et al., 2011). This kind of leadership is specifically manifested as maintaining emotional management, deep listening and empathy in interaction, thereby reducing decision-making bias and laying the foundation of a high psychological safety and high supportive atmosphere for the team (Ihl et al., 2022). This environment enables the psychological resources of employees to be fully activated and integrated.

Specifically, mindful leadership supports the basic needs of employees through three pathways, thereby providing an ideal situation for psychological resilience to play a role: First, in terms of autonomous support, leaders give employees sufficient space to express their views and choose their working methods through non-judgmental listening and respect (Lysander et al., 2025). Second, in terms of capability support, they can provide objective, timely feedback and constructive guidance, effectively enhancing employees' sense of self-efficacy (Hosseinzadeh, 2024; Sharma et al., 2024). Thirdly, in terms of relationship support, their stable emotional state and caring nature have helped team members trust and understand each other better (Adham, 2023; Ahsan & Tahir, 2025; Panditharathne & Chen, 2021). This demand-supportive environment creates a key "synergistic effect" with employees' natural psychological resilience. A highly supportive environment makes it less likely that employees will see conflicts as threats (Adham, 2023; Hosseinzadeh, 2024). On the other hand, when employees with high psychological resilience try to recover from conflicts and take positive steps, the support of their leaders will make their efforts more likely to work, which will strengthen the positive effects of psychological resilience (Franken, 2019; Richard, 2020).

If leaders are oblivious to ongoing issues, spend excessive time to address difficulties, or utilize authoritarian or emotionally-driven coping mechanisms, it will hinder employees' ability to fulfill their fundamental needs and foster a "toxic" team atmosphere (Stapleton, 2025). In this circumstance, even with an employee's considerable psychological resilience, their recovery and productivity may still be hindered, hence reducing the protective effect of psychological resilience on disputes (Zaghmout, 2025).

Thus, the environmental attributes fostered by conscientious leadership may systematically influence the mitigating effect of psychological resilience on three types of team conflicts. Propose the subsequent hypotheses:

H2: Mindful leadership moderates the relationship between employee psychological resilience and team conflict.

H2a: Specifically, mindful leadership strengthens the negative relationship between psychological resilience and task conflict. In teams with higher levels of mindful leadership, employees' psychological resilience will exert a stronger attenuating effect on task conflict.

H2b: Mindfulness oriented leadership reinforces the negative impact of psychological resilience on relationship conflicts. Specifically, in teams with high levels of mindfulness leadership, employees' psychological resilience has a stronger inhibitory effect on relationship conflicts.

H2c: Mindfulness based leadership reinforces the negative impact of psychological resilience on process conflict. Specifically, in teams with a high level of mindful leadership, the inhibitory effect of employees' psychological resilience on process conflicts is stronger.

In conclusion, the conceptual model of this study is shown in the following figure 1.

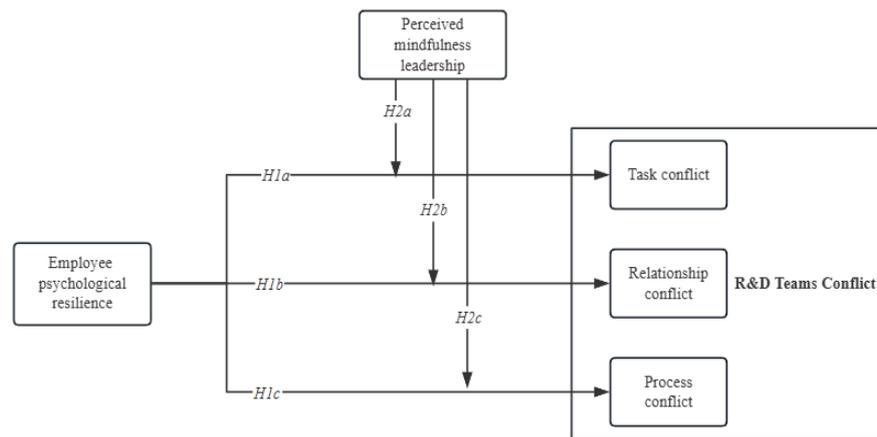


Fig. 1: The Conceptual Framework Based on SDT (SDT).

3. Research Methods

3.1. Research process and samples

This study examines the members of the R&D team within the semiconductor industry in Guangdong Province, China, focusing on the interplay between mindful leadership, team conflicts (encompassing task conflicts, relationship conflicts, and process conflicts), employee psychological resilience, perceived supervisor support, and employee innovative behavior. The choice of this sample is predicated on the subsequent considerations. First, the semiconductor industry represents a state-prioritized, high-tech sector characterized by R&D intensity, high innovation demands, and complex collaboration, making it a theoretically salient context for investigating team conflict and leadership dynamics (Grimes & Du, 2022; Lamsal et al., 2023). Second, Guangdong Province is a leading national hub for the semiconductor and integrated circuit industry. It features a large-scale industrial cluster, substantial policy support, vibrant innovation activity, and a dense concentration of enterprises and R&D professionals (Tong & Wan, 2023) (“Guangdong Province Action Plan for Fostering Strategic Emerging Industrial Clusters in Semiconductors and Integrated Circuits (2023–2025),” n.d.). This setting thus provides a rich, relevant, and representative sample source for the research.

The sample selection and data collection procedures are as follows: (1) Based on the “2023 White Paper on the Development of Integrated Circuit Industry in Guangdong Province”, 217 large enterprises have been preliminarily identified as the sample pool. (2) Obtain the contact information of the head of the R&D department of the enterprise through the Guangdong Semiconductor Industry Association, establish a contact database, and strive for their support and participation agreement. (3) A mixed sampling strategy—incorporating snowball sampling to reach qualified R&D professionals (Biernacki & Waldorf, 1981) and convenience sampling for feasibility (Etikan et al., 2016)—was used to distribute the questionnaire. This study used the sample size calculation method proposed by Yamane (1967) to determine the sample size. The research subjects were approximately 36,600 members of the semiconductor R&D team. This study set a confidence level of 95% and an error margin of 5%. After calculation, approximately 400 sample sizes were obtained.

We distributed an online questionnaire to gather data for this research. Drawing on relevant existing literature, we further polished the survey with insights from subject-matter experts, to ensure the survey’s relevance and content validity in the context of this study. Each questionnaire in this study began with a letter, in which the purpose of the study was clearly stated, as well as the requirements of voluntary participation, anonymity, confidentiality, and strict compliance with recognized research ethics guidelines, to ensure that the participants in the questionnaire survey fully understood the ethical requirements of the questionnaire and the study (Drolet et al., 2023). The scales selected for this study are mature ones that have been researched by previous researchers. These scales have been used by researchers many times and are reliable and useful. Since the subjects of this research were semiconductor R&D teams in China and the questionnaire was conducted in China, and the English scale was used, to ensure that there were no language deviations in the understanding of the scale, we invited language experts to translate the questionnaire from English to Chinese and then from Chinese to English, checked the language differences, and made appropriate adjustments. To ensure that the scale conveys its true meaning in translation (Behr, 2017) A total of 500 questionnaires were sent to gather data. After screening and removing invalid responses (e.g., incomplete surveys or those with obvious logical inconsistencies), 411 valid questionnaires were retained, resulting in an effective response rate of 82.2%.

3.2. Measuring tools

All constructs in this study were measured using a five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree). The specific measurement tools are detailed below.

Mindfulness leadership was measured using the 9-item mindful communication scale developed by Arendt et al. (Arendt et al., 2019), which assesses leaders’ traits of focus, listening, and emotional calmness in communication (e.g., “When I speak, my supervisor gives me their full attention”).

Task Conflict was assessed with the 4-item scale adapted by Liu et al. (L. Liu et al., 2022) from Jehn’s (Jehn, 1995, 1997) original measure (e.g., “In my work team, members often have disagreements about work-related opinions”).

Relationship Conflict was gauged using Jehn’s (Jehn, 1995) 4-item scale, as employed by Liu et al. (S. Liu et al., 2022) (e.g., “There is a lot of friction among members in my work team”).

Process Conflict was measured with the 4-item scale developed by Jehn (Jehn, 1997) and used by Dennis et al. (Dennis et al., 2023) (e.g., “We have disagreements about who should do what in our team”).

Employee psychological resilience was measured using the 10-item scale adapted from Aguiar-Quintana et al. (Aguiar-Quintana et al., 2021), Items such as “I am able to adapt when changes occur” capture an individual’s capacity to recover from and positively adjust to work-related stressors.

Demographic and occupational factors served as control variables to clarify the relationships of interest. Incorporating control variables such as age, gender, educational level, duration of team tenure, and position within the team can reduce the credibility of other theories and more clearly reveal the synergy mechanism among resilience, leadership, and conflict.

3.3. Data processing

Due to the fact that this study involves multiple latent variables and moderating effect tests, a covariance-based structural equation model (CB-SEM) will be adopted for hypothesis testing. CB-SEM is applicable to large samples ($n > 400$), can provide model fitting indices, and conduct effective analysis (Dash & Paul, 2021; Vuković, 2024).

This study will adopt the covariance-based structural equation model (CB-SEM) to carry out the hypothesis verification work. CB-SEM is a classic method adapted to the analysis of large sample data. The sample size of this study is approximately 400, which meets the sample requirements of this model. Meanwhile, this method can output multi-dimensional model fitting indices, which can scientifically test the degree of fit between theoretical models and research data. It can also effectively achieve precise analysis of the relationships between latent variables and hypothesis verification. It is a commonly used analytical tool for testing the relationships of complex variables in the field of management (Trail et al., 2024). In the specific data analysis stage, this study will use SPSS 26.0 software to complete the reliability and validity test of the research scale and the descriptive statistical analysis of each research variable, and AMOS 26.0 software will be used to carry out the construction and test of the structural equation model. The moderating effects in the study were hierarchically tested and the results verified by using the PROCESS macro program (Abu-Bader & Jones, 2021).

4. Result

4.1. Descriptive information about respondents

This study collected a total of 411 valid questionnaires from the semiconductor R&D team in Guangdong Province, China. Table 1 presents the demographic and occupational profile of the sample.

The sample consisted primarily of young and middle-aged professionals, with the following age distribution: 30–39 years (32.6%), 20–29 years (29.2%), 40–49 years (22.4%), and 50 years or above (15.8%). In terms of gender, there are more male respondents (271, accounting for 65.9%) than female respondents (140, accounting for 34.1%), which is consistent with the current gender structure of technical talents in the semiconductor research and development field.

The respondents generally have a high level of education. The participants with a bachelor's degree had the highest number, totaling 157 people (38.2%), followed by 135 people with a master's degree (32.8%). There are 61 participants with doctoral degrees or other advanced degrees, accounting for 14.8%. A total of 58 participants (14.1%) have a college degree or below, which is a relatively small proportion and reflects the general requirement for employees' education in the high-tech research and development industry.

In terms of work experience, the respondents have a wide distribution of tenure in the R&D team, showing certain polarization and deepening characteristics. The participants with 25-30 years of research and development experience have the highest number, with 63 people (15.3%). Meanwhile, there are a total of 115 senior R&D personnel with over 30 years of experience (including 30-35 years and over 35 years), accounting for 28.0% of the total sample. On the other hand, there were 49 newcomers (11.9%) with 0-5 years of experience and 42 junior staff (10.2%) with 5-10 years of experience, respectively. The distribution of the remaining time periods (10-15 years, 15-20 years, and 20-25 years) is relatively even, each accounting for approximately 12% to 14%. This distribution indicates that the sample is representative, as it contains a large number of experienced core technical personnel, as well as those at different stages of career development.

From the perspective of team job composition, the respondents cover a wide range of different functional roles. About a quarter (25.3%, $n=104$) were in management or leadership roles, and another quarter (24.6%, $n=101$) were in core R&D roles. Support and collaboration roles also made up just under a quarter (22.9%, $n=94$). In addition, 112 respondents (27.3%) chose "other possible roles", which may include diversified functions such as technical interfaces, test verification or project management. Overall, the sample covers the main job types in the R&D team and can well reflect the overall interaction situation of the team.

Table 1: Sample Characteristics (N = 411)

Construct	Items	Number	Percentage
Age	20-29	120	29.20%
	30-39	134	32.60%
	40-49	92	22.40%
	50-59	65	15.80%
gender	Female	140	34.10%
	Male	271	65.90%
Education Level	High school or below	10	2.40%
	Junior college	48	11.70%
	Bachelor degree	157	38.20%
	Master degree	135	32.80%
	Doctoral degree or above	61	14.80%
Tenure at the R&D team	0-5 years	49	11.90%
	5-10 years	42	10.20%
	10-15 years	58	14.10%
	15-20 years	31	7.50%
	20-25 years	53	12.90%
	25-30 years	63	15.30%
	30-35 years	61	14.80%
Position within the R&D team	35-40 years	54	13.10%
	Management & Leadership	104	25.30%
	Core R&D Roles	101	24.60%
	Support & Collaboration Roles	94	22.90%
	Other Possible Roles	112	27.30%

4.2. Reliability and validity

Before running the structural equation model, it is also necessary to conduct reliability and validity analyses on the data to make sure it is valid (Kimberlin & Winterstein, 2008). The scales employed in this study were derived from those utilized in prior research. Consequently, the reliability and validity of the questionnaire scales were reassessed within the framework of the Chinese semiconductor R&D team.

4.2.1. Reliability

Reliability denotes the consistency or stability of results derived from the questionnaire scale, indicating the authenticity of the measurement characteristics (Bolarinwa, 2015). This study employed Cronbach's α coefficient and composite reliability (CR) to assess the reliability of all variables. Fornell and Larcker (1981) say that the Cronbach's α coefficient of all possible variables should be higher than 0.7 in order to be accepted (Fornell & Larcker, 1981). The Cronbach's alpha coefficient values for all potential variables in this study ranged from 0.939 to 0.961, exceeding the acceptable threshold of 0.7.

Compound reliability (CR) indicates the internal consistency of all latent variables (Ab Hamid et al., 2017). In general, 0.7 is a good level for composite reliability. The composite reliability (CR) values for all of the latent variables were between 0.93 and 0.96, which is higher than the recommended value of 0.7. So, the questionnaire scale used in this study is very reliable. The reliability values of all the structures are shown in Table 2.

Table 2: Reliability Estimates for the Latent Constructs

Variable	Cronbach's alpha	CR
ML	0.959	0.9587
TC	0.939	0.9389
RC	0.945	0.9452
PC	0.939	0.9389
EPR	0.961	0.9614

Note: ML = Mindful leadership, TC = Task conflict, RC = Relationship conflict, PC = Process conflict, EPR = Employee Psychological resilience.

4.2.2. Validity

Given that the study's theoretical model and all variable measures were adapted from established scales in prior literature, confirmatory factor analysis (CFA) was conducted to assess the validity of the measurement model (Anderson & Gerbing, 1991).

The convergent validity of confirmatory factor analysis refers to whether the measured variables in the model can effectively measure their corresponding latent factors (Cheung & Wang, 2017). In CFA, convergent validity is commonly evaluated using factor loadings and the average variance extracted (AVE). Following established criteria (Cheung & Wang, 2017), factor loadings above 0.5 and AVE values exceeding 0.5 are considered acceptable. As presented in Table 3, all factor loadings in this study exceed 0.6, and all AVE values are above 0.5, demonstrating good convergent validity for the measurement model.

Table 3: Factor Loadings and Average Variance Extracted (AVE) for Convergent Validity

Construct	Item	Factor Loading	AVE
ML	ML1	0.859	0.7209
	ML2	0.851	
	ML3	0.855	
	ML4	0.858	
	ML5	0.849	
	ML6	0.856	
	ML7	0.839	
	ML8	0.835	
	ML9	0.839	
TC	TC1	0.886	0.7935
	TC2	0.891	
	TC3	0.883	
	TC4	0.903	
RC	RC1	0.895	0.8119
	RC2	0.903	
	RC3	0.913	
	RC4	0.893	
PC	PC1	0.901	0.7936
	PC2	0.905	
	PC3	0.877	
	PC4	0.88	
EPR	EPR1	0.842	0.7134
	EPR2	0.837	
	EPR3	0.855	
	EPR4	0.841	
	EPR5	0.849	
	EPR6	0.843	
	EPR7	0.848	
	EPR8	0.852	
	EPR9	0.854	
	EPR10	0.825	

Note: ML = Mindful leadership, TC = Task conflict, RC = Relationship conflict, PC = Process conflict, EPR = Employee Psychological resilience.

To assess how well the measurement model fits the data, a set of commonly reported goodness-of-fit indices was examined. These included χ^2/df , RMR, RMSEA, GFI, AGFI, NFI, IFI, CFI, and TLI—standard metrics in structural equation modeling for evaluating model adequacy. As summarized in Table 4, the results of the confirmatory factor analysis indicate excellent model fit: $\chi^2/df = 1.115$, RMR = 0.038, RMSEA = 0.017, GFI = 0.930, AGFI = 0.919, NFI = 0.962, IFI = 0.996, CFI = 0.996, and TLI = 0.996. All fit indices either met or surpassed their

4.3.2. Test the moderating effect

A moderating variable (M) specifies the conditions under which the relationship between an independent variable (X) and a dependent variable (Y) is altered. Conceptually, it influences the strength, direction, or presence of this relationship (Baron & Kenny, 1986). Empirically, moderation is tested by including an interaction term (X × M) in the analysis. A statistically significant coefficient for this interaction term indicates a significant moderating effect. To explain the traits of a big interaction, researchers often do a simple slope analysis (Finsaas & Goldstein, 2021). This means calculating and graphing how X affects Y at certain, representative values of the moderator M. Usually, this is done at the mean and one standard deviation above and below the mean. Under the quantitative analysis framework of this study, this method can clearly reveal the dynamic change law of the correlation between X and Y under different value levels of the moderating variable M, and further clarify the mechanism of the moderating effect of M.

This study employed hierarchical regression analysis using the PROCESS macro program to test the moderating effects in the research hypotheses (Hayes, 2021). The specific implementation steps are as follows: First, perform mean centralization on the independent variable and the moderating variable, and then construct the interaction term by calculating the product term of the two.

This study employed a significance level of $\alpha = 0.05$ to evaluate the statistical significance of the aforementioned effects, use a bias-corrected self-help confidence interval based on 5,000 samples. Utilizing bootstrapping instead of conventional significance testing provides a more robust method for assessing the stability of interactions, particularly in intricate models where normalcy assumptions may be violated.

4.3.2.1. The moderating effect of ML on the relationship between EPR and TC

The analysis investigated whether mindful leadership (ML) modifies the relationship between employee psychological resilience (EPR) and task conflict (TC) by concentrating on the interaction term EPR × ML. Table 7 indicates that this term was statistically significant ($\beta = 0.355, p < 0.001$). To interpret the interaction, simple slopes were estimated (see Table 8 and Figure 3). The conditional effect of EPR was significant and negative at low levels of ML ($\beta = -0.794, 95\% \text{ CI } [-0.947, -0.641], p < 0.001$) but non-significant at high levels of ML ($\beta = -0.070, 95\% \text{ CI } [-0.216, 0.076], p = 0.345$). Thus, mindfulness leadership significantly strengthens the negative impact of employees' psychological resilience on task conflict: at low mindfulness leadership level, the inhibition effect of the improvement of psychological resilience on task conflict is more prominent, while at high mindfulness leadership level, the inhibition effect of the improvement of psychological resilience on task conflict almost disappears.

Table 7: Parameter Estimates (n=411)

	coeff	se	t	p
constant	2.572	0.054	47.284	0.000***
EPR	-0.432	0.055	-7.923	0.000***
ML	-0.103	0.054	-1.908	0.057
EPR*ML	0.355	0.052	6.813	0.000***
R2	0.206			
F	F (5, 407) = 35.285, p = 0.000			

Note: Dependent Variable: Task conflict, ML = Mindful leadership, EPR = Employee Psychological resilience, *p<0.05, **p<0.01, ***p<0.001.

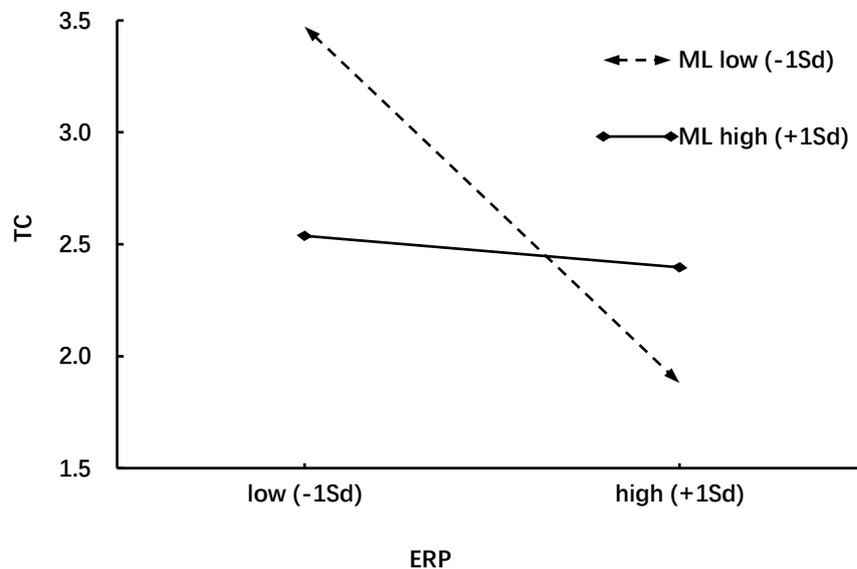


Fig. 3: Moderation Effect.

Table 8: Moderation Effect

Level	Effect (β)	se	t	p	LLCI	ULCI
Low (-1SD)	-0.794	0.078	-10.184	0.000	-0.947	-0.641
Mean	-0.432	0.055	-7.923	0.000	-0.539	-0.325
High (+1SD)	-0.070	0.074	-0.946	0.345	-0.216	0.076

4.3.2.2. The moderating effect of ML on the relationship between EPR and RC

Moderation was tested via the EPR × ML interaction term, which was a significant predictor of relationship conflict ($\beta = 0.360, p < 0.001$; Table 9). Simple slope analysis (Figure 4, Table 10) detailed the conditional effects: at low ML, EPR strongly reduced RC ($\beta = -0.687, 95\% \text{ CI } [-0.835, -0.539], p < 0.001$); at high ML, the effect was non-significant ($\beta = 0.046, 95\% \text{ CI } [-0.095, 0.187], p = 0.521$). Therefore,

mindfulness leadership significantly strengthens the negative impact of employees' psychological resilience on relationship conflict: at low mindfulness leadership level, the inhibition effect of psychological resilience on relationship conflict is more prominent, while at high mindfulness leadership level, the inhibition effect of psychological resilience on relationship conflict almost disappears.

Table 9: Parameter Estimates (n=411)

	coeff	se	t	p
constant	2.244	0.053	42.792	0.000***
EPR	-0.321	0.053	-6.094	0.000***
ML	-0.124	0.052	-2.387	0.018*
EPR*ML	0.360	0.050	7.155	0.000***
R2	0.172			
F	F(3,407)=28.101, p=0.000			

Note: Dependent Variable: Relationship conflict, ML = Mindful leadership, EPR = Employee Psychological resilience, *p<0.05, **p<0.01, ***p<0.001.

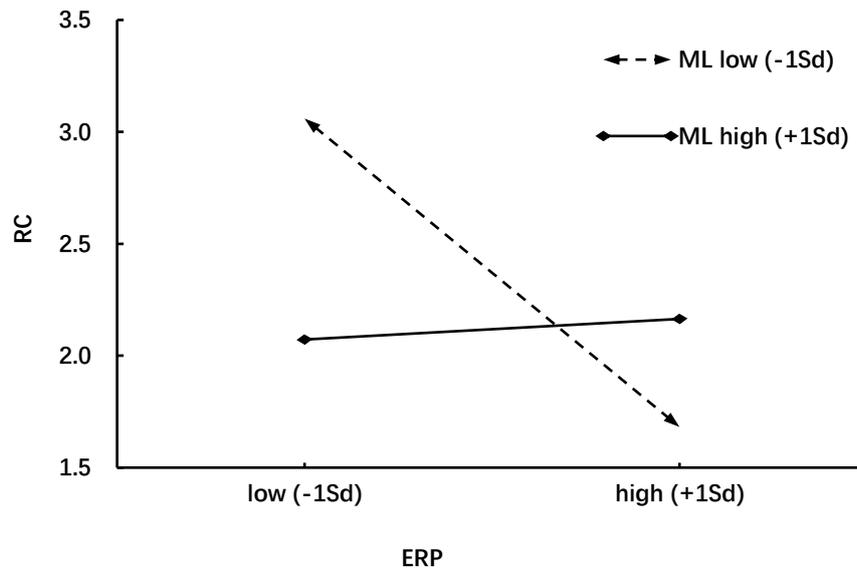


Fig. 4: Moderation Effect.

Table 10: Moderation Effect

Level	Effect (β)	se	t	p	LLCI	ULCI
Low (-1SD)	-0.687	0.075	-9.138	0.000	-0.835	-0.539
Mean	-0.321	0.053	-6.094	0.000	-0.424	-0.217
High (+1SD)	0.046	0.072	0.642	0.521	-0.095	0.187

4.3.2.3. The moderating effect of ML on the relationship between EPR and PC

The moderating effect was tested via the significant EPR × ML interaction term (β = 0.295, p< 0.001; Table 11). Simple slope analysis (Figure 5, Table 12) revealed the conditional effects: at low ML, EPR strongly reduced PC (β = -0.683, 95% CI [-0.827, -0.538], p < 0.001); at high ML, the effect was non-significant (β = -0.081, 95% CI [-0.218, 0.057], p = 0.249). Therefore, mindfulness leadership significantly strengthens the negative impact of employees' resilience on process conflict: at low mindfulness leadership level, the inhibition effect of psychological resilience on process conflict is more prominent, while at high mindfulness leadership level, the inhibition effect of psychological resilience on process conflict almost disappears.

Table 11: Parameter Estimates (n=411)

	coeff	se	t	p
constant	2.228	0.051	43.527	0.000***
EPR	-0.382	0.051	-7.434	0.000***
ML	-0.086	0.051	-1.703	0.089
EPR*ML	0.295	0.049	6.018	0.000***
R2	0.179			
F	F(3,407)=29.662, p=0.000			

Note: Dependent Variable: Process conflict, ML = Mindful leadership, EPR = Employee Psychological resilience, *p<0.05, **p<0.01, ***p<0.001.

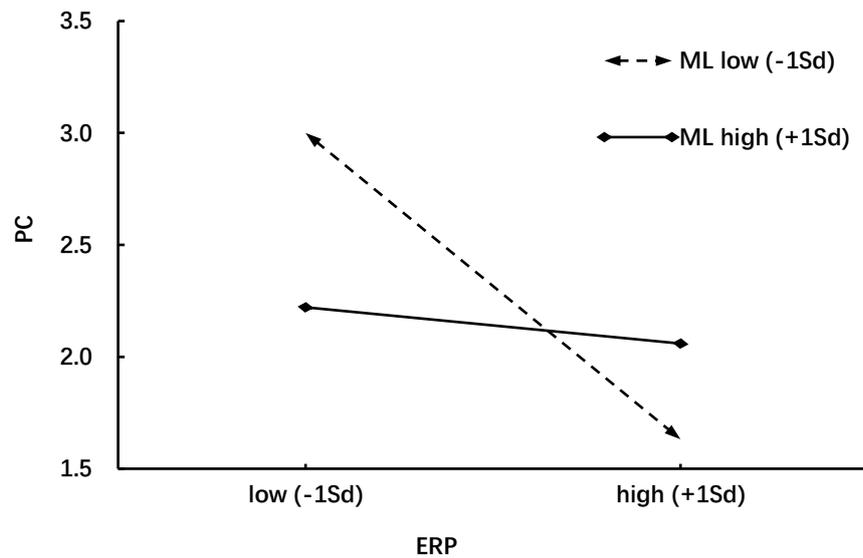


Fig. 5: Moderation Effect.

Table 12: Moderation Effect

Level	Effect (β)	se	t	p	LLCI	ULCI
Low (-1SD)	-0.683	0.073	-9.300	0.000	-0.827	-0.538
Mean	-0.382	0.051	-7.434	0.000	-0.483	-0.281
High (+1SD)	-0.081	0.070	-1.155	0.249	-0.218	0.057

Based on the detailed analysis process above, Table 13 summarizes the test results of all direct research hypotheses and moderation effect hypotheses.

Table 13: Summary of Results

Category & Hypothesis	Description	Result
A. Direct Effects of Psychological Resilience		
H1a	Negative association with Task Conflict.	Supported
H1b	Negative association with Relationship Conflict.	Supported
H1c	Negative association with Process Conflict.	Supported
B. Moderating Effects of Mindful Leadership		
H2a	Moderates the resilience-task conflict link.	Supported
H2b	Moderates the resilience-relationship conflict link.	Supported
H2c	Moderates the resilience-process conflict link.	Supported

5. Discuss

This study based on the SDT, explores the impact of employees' psychological resilience on three types of conflicts (task conflict, relationship conflict, and process conflict) in semiconductor R&D teams, and examines the moderating role of mindful leadership in this relationship. Through a questionnaire survey and data analysis of 411 semiconductor R&D personnel in Guangdong Province, all the research hypotheses were supported. The research results not only reveal the positive role of psychological resilience in alleviating team conflicts, but also clarify the reinforcement mechanism of mindful-minded leadership as a key situational factor, providing a new theoretical perspective and practical inspiration for understanding conflict management in high-pressure technical teams.

Firstly, this study confirmed the universal dampening effect of employees' psychological resilience on team conflicts. An employee's psychological resilience directly affects their ability to reduce task conflicts, relationship conflicts, and process conflicts in a team. This study indicates that employees with stronger psychological resilience have better conflict management capabilities. This finding is consistent with SDT(Deci & Ryan, 2000), which holds that psychological resilience can meet employees' needs for autonomy, ability, and relevance. This encourages employees to use more constructive coping strategies when facing conflict and pressure. They do not resort to defensiveness or confrontation. In relationship and process conflicts, psychological resilience mitigates interpersonal friction and disputes over responsibility. It achieves this by fostering emotional regulation and cognitive reevaluation. This preserves the stability of team collaboration. Recent research has shown a key point that psychological resilience is a way to deal with stress, and is a way to get along with others(Stoverink et al., 2020). Psychological resilience helps teams adapt and work together.

Secondly, the moderating effect analysis of this study further reveals that mindful leadership significantly enhanced the mitigation effect of psychological resilience on task conflicts, relationship conflicts and process conflict. In teams with a high level of mindful leadership, the negative emotional responses of employees with high psychological resilience to conflicts are further reduced, and the destructive nature of conflicts is effectively suppressed. This indicates that mindful leadership provides a "supportive soil" for the functioning of psychological resilience by creating a psychologically safe and non-judgmental team atmosphere(Subrahmanyam, 2025). It is worth noting that in process conflicts, although the moderating effect of mindful leadership is significant, its buffering effect is relatively weak. This might be because process conflicts involve more structural factors such as resource allocation and definition of rights and responsibilities, and it is difficult to completely resolve them merely through the interaction between leadership style and individual psychological resources. This suggests that in process conflict management, it is still necessary to combine clear process design with institutional support (Alshurideh et al., 2024).

This research has the following theoretical contributions: First, it applies the SDT to the study of team conflicts, explaining the internal mechanism by which psychological resilience affects conflicts from the perspective of meeting basic psychological needs, and enriching

the theoretical connotation of psychological resilience at the team level. Second, for the first time, in the high-pressure and high-tech context of semiconductor research and development, the interactive influence of psychological resilience and mindful leadership on three types of conflicts was simultaneously examined, expanding the research on the boundary conditions of mindful leadership in conflict management. Third, the research results support the "individual-context" interaction perspective, emphasizing that when understanding team behavior, attention should be paid simultaneously to the synergy of individual resources and leadership context (Tan et al., 2024).

At the practical level, this study offers the following insights for the management of R&D teams in semiconductor enterprises: Firstly, enterprises should attach importance to the assessment and improvement of psychological resilience in talent selection and training, especially in high-pressure positions like R&D, where psychological resilience can serve as an important competency indicator. Secondly, organizations should enhance mindfulness training for leaders of R&D teams, improving their emotional awareness, non-judgmental listening, and empathy skills, thereby fostering a supportive leadership atmosphere and amplifying the positive effects of psychological resilience. Finally, in response to process conflicts, it is recommended that enterprises supplement with clear division of responsibilities, transparent resource allocation mechanisms and conflict negotiation processes to reduce structural frictions at the system level.

Our study has some limitations, which point out the direction for future research: on the one hand, it is difficult to infer the causal relationship between variables using cross-sectional data. In the future, longitudinal or experimental designs can be adopted for further verification. On the other hand, the sample is concentrated on semiconductor enterprises in Guangdong Province. The conclusion should be promoted with caution in other regions or industries. Furthermore, the research mainly focuses on individual psychological resilience. In the subsequent future, it is possible to explore the cross-level impact of the overall psychological resilience of a team or resilience culture on conflicts. In conjunction with this, other situational variables (such as team cohesion, sense of organizational justice, etc.) can be further introduced to construct a more complete moderation-mediation model.

6. Conclusion

In conclusion, this study confirms that employee psychological resilience can significantly reduce task conflicts, relationship conflicts, and process conflicts within semiconductor R&D teams, and that mindful leadership plays a positive moderating role in this process. The research results support the applicability of the SDT in the field of team conflicts and emphasize the importance of combining individual psychological resources with supportive leadership practices for conflict management in high-pressure technical teams.

Future research should adopt a longitudinal design to track the changes of the team over time. This will enable researchers to study how the development of resilience and the adoption of prudent leadership practices dynamically affect the emergence and evolution of team conflict. Experimental or quasi experimental designs, such as field interventions to train leaders' mindfulness, can provide more powerful causal evidence for the proposed effects. Collect data from multiple sources (e.g., employee flexibility assessed by colleagues, leadership behavior assessed by subordinates, conflicts assessed by team leaders) to improve effectiveness. In addition, using hierarchical linear modeling (HLM) to explicitly model the nested structure of individuals in a team will produce more accurate estimates.

Although this study positioned mindfulness leadership as a mediator, future work can re-examine and empirically test the SDT recommendations of the intermediary "black box". Research can investigate whether variables such as team psychological security, trust or shared mental model play a mediating role between resilience (individual or team) and conflict reduction.

Based on the critical findings of mindfulness leadership, future action oriented research should design, implement and strictly evaluate mindfulness based leadership development plans tailored for Semiconductor R&D managers. Similarly, the effectiveness of the engineers' flexible construction seminar should be tested, not only to measure its impact on conflict, but also to measure its impact on direct innovation indicators (such as patent output or project cycle).

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