

When too little or too much hurts: Evidence for a curvilinear relationship between team faultlines and performance

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Published online: 27 April 2017

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Abstract Faultlines are inherent to many workgroups, but the literature has not fully explained what faultlines mean for team functioning. In this study, we investigate the curvilinear relationship between faultlines and team performance from a cross-categorization perspective. Analyses of multisource data obtained from 61 workgroups located in China support an inverted U-shaped relationship between faultlines and team performance. Additionally, we find that this curvilinear relationship is moderated by a team's climate of psychological safety such that the curvilinear relationship is more pronounced among teams with a weaker psychological safety climate. The findings contribute to elaborating the nature of and advancing a contingency view of the relationship between faultlines and team performance. Theoretical implications are discussed along with possible limitations and directions for future research.

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Keywords Team composition · Team faultlines · Team performance · Team psychological safety climate · Curvilinear relationship

Because it consistently presents a challenge for managers, managing a mixed workforce must not be overlooked (Horwitz & Horwitz, 2007). More research is needed that addresses the nature of a workgroup's demographic composition and its impact on group outcomes. Faultlines (i.e., the compositional patterns of multiple demographic attributes of a group) are particularly relevant for team interactions and outcomes (Chung, Liao, Jackson, Subramony, Colakoglu, & Jiang, 2015; Lau & Murnighan, 2005; Li & Hambrick, 2005; Thatcher, Jehn, & Zanutto, 2003). Based on individual members' alignment along multiple demographic attributes, a team is likely to be divided into several homogeneous subgroups, and the hypothetical dividing lines among these subgroups are defined as faultlines (adapted from Lau & Murnighan, 1998).

In an attempt to explain the effects of faultlines on team functioning, several empirical studies have been undertaken; the overwhelming majority of these studies have agreed on a negative linkage between faultlines and team performance (e.g., Li & Hambrick, 2005; Rico, Molleman, Sánchez-Manzanares, & Van der Vegt, 2007; Thatcher & Patel, 2011). However, inconsistent evidence can still be found in certain studies (Lau & Murnighan, 2005; Thatcher et al., 2003). In parallel, we also see a divergence in theories that explain the relationship between faultlines and team performance. On the one hand, self-categorization (Turner, 1982) and social identity (Tajfel, 1978) theories predict that faultlines will dampen team performance by encouraging a social categorization process; on the other hand, the categorization-elaboration model (van Knippenberg, De Dreu, & Homan, 2004) argues that information/decision-making processes may interact with the social categorization process, suggesting that faultlines can have both positive and negative effects on team performance.

We propose that this inconsistent phenomenon reflects the need to examine the potential moderators and curvilinear nature of the linkage between faultlines and team performance. Specifically, we adopt a cross-categorization perspective to help explain these inconsistent findings. Extended to the faultline literature, cross-categorization theory examines the overlapping memberships that may reduce the degree of distance (or differences) between subgroups (Bezrukova, Jehn, Zanutto, & Thatcher, 2009; Mäs, Flache, Takács, & Jehn, 2013). For example, group members are divided into subgroups based on two demographic attributes (e.g., gender and age); however, the hypothetical dividing lines between gender-based subgroup and age-based subgroup are crossed (when they are aligned, the faultline is strong). In this manner, memberships overlap based on different attributes. According to the cross-categorization perspective, team structures with moderate faultlines, in which multiple demographic attributes are crossed, might help reduce the divergence between subgroups and enhance information elaboration (Migdal, Hewstone, & Mullen, 1998; Thatcher & Patel, 2012). Following this line of reasoning, we postulate that faultlines of a certain degree (rather than maximal or minimal faultlines) are beneficial for team performance.

Furthermore, to provide depth to our framework, we theorize about a potential moderator of the relationship between faultlines and team performance, that is, the climate of psychological safety, or a shared belief held by members of a team that interpersonal

risk-taking is safe and that there is no reason to fear negative consequences related to self-image, status, or career (Edmondson, 1999; Koopmann, Lanaj, Wang, Zhou, & Shi, 2016). We argue that team climate constitutes an important contextual factor that is likely to influence the effect of faultlines on team performance (Sun, Xu, & Shang, 2014). The psychological safety climate is considered a relevant contextual factor not only for inducing individual- and team-level learning, innovation and performance outcomes (Baer & Frese, 2003; Edmondson, 1999; Kark & Carmeli, 2009) but also for regulating interpersonal interaction (Koopmann et al., 2016; Singh & Winkel, 2012). Researchers have suggested that a climate of psychological safety should influence how team members address and utilize their differing perspectives to perform team tasks (Kirkman, Cordery, Mathieu, Rosen, & Kukenberger, 2013; Martins, Schilpzand, Kirkman, Ivanaj, & Ivanaj, 2013). In particular, when social exchange relationships are less likely to form between subgroups in a faultline team (Meyer, Schermuly, & Kauffeld, 2016), a climate of psychological safety may establish a channel for different subgroups to interact, exchange, and even cooperate (Edmondson & Lei, 2014). Therefore, we propose and examine the potential moderating effect of the psychological safety climate on shaping the relationship between faultlines and team performance.

Finally, we attempt to discover whether faultline theory (Lau & Murnighan, 1998), which was developed in the West, can be transferred to Eastern contexts. The majority of previously published studies on the topic of faultlines have been conducted in Western societies. However, the social bases for establishing faultlines in China are rather different from those in the West (Li, Barner-Rasmussen, & Bjorkman, 2007; Luo, 2000; Xiao & Tsui, 2007). Whereas social categorization in Western countries is mainly based on race and religion (Thomas, 1990), Chinese people are likely to categorize themselves basing on other characteristics such as age, kinship, hometown, educational background, work experiences, or other shared experiences (Farh, Tsui, Xin, & Cheng, 1998; Xiao & Tsui, 2007). Despite of the varying social bases in different social contexts, we still have reason to expect the transferability of the faultline effect into the Chinese context. For example, there is evidence that most Western models of interpersonal attraction, social identification and categorization operate in China (Farh et al., 1998).

In summary, our study extends previous research in several ways. First, we theorize and investigate the relationship between faultlines and team performance building upon a cross-categorization perspective. Second, we contribute to a more thorough understanding of the nature of the faultline-performance relationship by focusing on the moderating effect of a team's psychological safety climate. Third, we address the generalizability of faultline theory into an Eastern context by adopting a Chinese sample.

Theory and hypotheses

Team faultlines

Faultlines are formed based on the distribution of multiple attributes, including demographic (i.e., age, education) and non-demographic (i.e., personality, religion) ones. In

this study, we focus on demographic attributes (age, gender, educational specialization, education level, and industrial experience). These chosen attributes reflect the principal aspects of diversity in the Chinese workforce. China has witnessed an increase in workforce diversity. First, high levels of female employment imply gender diversity. According to recent statistics on the Chinese workplace, female employment rates have reached 73%, and females account for nearly half of all employees (Zeng & Thorneman, 2014). Second, the generation born in the 1990s continues to enter the job market. Meanwhile, older employees, such as those born in the 1950s, are voluntarily or involuntarily prolonging their work lives. Employed populations are therefore more diverse in terms of their age, industrial experience, educational specialization and education level.

Faultlines can vary from high levels, to moderate levels, and then to low levels. Lau and Murnighan (1998) and Thatcher et al. (2003) illustrated the conceptualization of faultlines by using sets of hypothetical groups. An example is a team composed of “two 50-ish white male plant managers and two 30-ish black female clerical staff” (Thatcher et al., 2003). When all the demographic attributes align—such that homogeneous subgroups are created—the group has high levels of faultlines (Lau & Murnighan, 1998).

We consider that, in contrast to high levels of faultlines, moderate levels of faultlines occur when demographic attributes are crossed, reducing the distance between subgroups. For example, a team is considered moderately faultlined when it comprises a 50-year-old white male plant manager, a 31-year-old white female clerical staff member, a 55-year-old black male clerical staff member, and a 35-year-old black female plant manager (adopted from Lau & Murnighan, 1998). In this particular group, members are most likely to be split into two subgroups based on the categories of gender and age. However, there is overlapping membership across the emerging subgroups (Ancona & Caldwell, 1992). In other words, the subgroups here are not as clear as the ones that are presented in a faultlined group.

Finally, faultlines are weakened as the subgroup boundary becomes vague (Lau & Murnighan, 1998; Thatcher et al., 2003). A group with a low level of faultlines, for instance, includes “a 20-year-old Native American female who is an unskilled worker, a 30-year-old white male supervisor, a 65-year-old black female executive, and a 50-year-old Asian male machinist” (Thatcher et al., 2003). As illustrated in this example, team members are different in terms of nearly all demographic attributes. In other words, each member has difficulty finding a fellow team member with whom he or she has common attributes.¹

Theoretical background

The theories that are most relevant to group faultlines include self-categorization (Turner, 1982) and social identity (Tajfel, 1978) theories, the categorization-

¹ Lau and Murnighan (1998) noted that groups will have no faultlines when they are completely homogeneous. Although this situation is possible in theory, the authors argued that it is unusual for workgroups to have members with completely similar demographic attributes in practice. Thus, we do not consider the extreme situation of no faultlines because the group is entirely homogeneous.

elaboration model (van Knippenberg et al., 2004), and the cross-categorization model (Crisp, Ensari, Hewstone, & Miller, 2002).

Self-categorization and social identity theories suggest that people tend to classify themselves and others into different social categories on the basis of demographic attributes (Ashforth & Mael, 1989). Then, these individuals derive their self-concept and define themselves in terms of the social categories to which they belong; their social identity arises from this process (Linnehan, Chrobot-Mason, & Konrad, 2006). As a consequence, favored ingroups and unfavored outgroups are formed (Brewer, 1979).

Extending the self-categorization and social identity theories, the categorization-elaboration model posits three conditions that may engender social categorization (i.e., comparative fit, normative fit and cognitive accessibility). Comparative fit is the extent to which the categorization reflects high intergroup differences and high intragroup similarity. Normative fit is the extent to which this categorization is meaningful to group members. Cognitive accessibility is the extent to which members are able to easily retrieve and activate this categorization (Thatcher & Patel, 2012; van Knippenberg et al., 2004). As an integrative theory, the categorization-elaboration model suggests that social categorization and the information/decision-making processes of faultlined teams interact, irrespective of the types of faultlines (van Knippenberg et al., 2004).

The cross-categorization model expands our understanding of faultline configurations. Rather than considering situations with extremely strong intergroup differences and intragroup similarities (faultline teams, according to the principle of comparative fit), the cross-categorization model concentrates on lower levels of comparative fit. Specifically, cross-categorization occurs when there are demographic similarities across subgroups. Overlapping memberships reduce the psychological distance between divergent social categories, narrowing the perceived gulf between “us” and “them” (Bezrukova et al., 2009; Jetten, Spears, & Postmes, 2004).

Team faultlines and performance

Combining the cross-categorization model with self-categorization and social identity theories, we anticipate that team performance varies with different levels of faultlines. Self-categorization theory and social identity theory suggest that high levels of faultlines will dampen performance. The alignment of multiple demographic attributes (defined as high levels of faultlines) may result in the formation of homogeneous subgroups into which team members categorize themselves as insiders or outsiders (Bezrukova et al., 2009; Lau & Murnighan, 1998). Subgroup alignment along the faultlines then leads to boundaries that bring about team members’ perceptions of emotional contradiction, mistrust, and dislike (Choi & Sy, 2010; Lau & Murnighan, 1998). Negative perceptions tend to limit the effective communication and information utilization that are necessary to accomplish a task (Polzer, Mannix, & Neale, 1998). Meanwhile, each subgroup’s unique goals and approaches will hinder cooperation and coordination across subgroups (Bezrukova, Thatcher, Jehn, & Spell, 2012). Furthermore, as more time is spent resolving the divergence of opinions caused by high levels of demographic faultlines, work efficiency declines (Li & Hambrick, 2005). All these processes increase the likelihood that team performance is impeded.

With the perspective of the cross-categorization model, we argue that moderate faultlines may contribute to enhanced team functioning by reducing the psychological distance between subgroups and creating bridges across subgroups (Bezrukova et al., 2009; Jetten et al., 2004). On the one hand, cross-categorization complicates social categorization processes by weakening boundaries between subgroups (Brewer, 1996; Homan, Hollenbeck, Humphrey, van Knippenberg, Ilgen, & Van Kleef, 2008). When there are more overlapping attributes between in-subgroup and out-subgroup members, team members will identify with multiple social identities, which reduces inter-subgroup bias and stereotyping and increases interpersonal liking (Brown & Abrams, 1986; Migdal et al., 1998; van Knippenberg et al., 2004). On the other hand, rather than having discussions only within each subgroup, teams with cross-categorization structures are likely to extend the scope of information elaboration and make use of every member's knowledge and perspectives (Homan et al., 2008; Iseke, Kocks, Schneider, & Schulze-Bentrop, 2015; Sawyer, Houlette, & Yeagley, 2006). Research on multipartner alliances has also yielded clues that cross-categorization might help a faultline team to overcome any malfunctioning. As Heidl, Steensma, and Phelps (2014) suggested, given their connection to the two alliance partners, third parties within multipartner alliances help resolve internal conflict and reduce the likelihood that the alliance will dissolve. In accordance with the above theorizing, we expect that moderate faultlines promote team performance.

Finally, low levels of faultlines indicate that every member is a distinct person in terms of the given demographic attributes. Although demographic diversity may provide teams with widely varying information and perspectives, the effective management of diverse people has emerged as a challenge for group leaders (Horwitz & Horwitz, 2007; van Knippenberg et al., 2004). The potential value of the group's composition may not be utilized when team members are separated by a divergence of opinions and perspectives (van Knippenberg et al., 2004). In that case, information dispersed among individual members cannot be forced to converge into a more accurate and complete information base from which decisions are made (Stasser & Stewart, 1992). There are also difficulties in reaching a consensus and resolving problems (Horwitz & Horwitz, 2007). A further related concern is that the divergence may turn into increased interpersonal tension and conflict and diminished morale and cohesion (Williams & O'Reilly, 1998). As a result, groups with low levels of faultlines may experience lower levels of team performance.

Hypothesis 1 The relationship between faultlines and team performance is of inverted U-shape.

The moderating role of psychological safety climate

Although the concept of psychological safety originated at the individual level, we refer to it at the team level through the concept of psychological safety climate. A team's psychological safety climate refers to a shared belief held by team members that interpersonal risk-taking is safe and that there is no reason to fear negative consequences to self-image, status, or career (Edmondson, 1999; Koopmann et al., 2016). Because team members tend to face the same work practices and procedures and have shared experiences, they are likely to develop the "taken-for-granted"

shared belief about how work is performed and how people interact (Kuenzi & Schminke, 2009). Nonetheless, shared beliefs among team members may vary across different teams, as Edmondson (1999) observed. A team's climate of psychological safety is believed to be strong when there are "predictable, consistent, clear, and nonthreatening" situations in which all team members agree that they are safe to be and express themselves, even if it may cause disputes or disagreements (Kahn, 1990: 708). We propose that the psychological safety climate may affect the dynamics of faultlines in a workgroup, thus potentially moderating the effects of faultlines on team performance.

Earlier, we argued that teams with high levels or low levels of faultlines perform worse due to a lack of bridges across subgroups or individuals. However, we believe that a strong psychological safety climate may function as a bridge connecting the separate subgroups or individuals and, therefore, may reduce ingroup-outgroup bias (Edmondson & Lei, 2014; Gibson & Gibbs, 2006). The effect of psychological safety climate, we think, is similar to overlapping memberships in cross-categorization. Therefore, with a strong psychological safety climate, the performance of teams characterized by both high levels of and low levels of faultlines may be enhanced.

When there is a climate of high psychological safety, in which team members of different demographic categories feel free to take risks, share unique information, and cooperate effectively (Edmondson, 1999), the negative effects of faultlines may be counteracted, and their potential advantages may be activated. First, a psychological safety climate helps faultlined subgroups feel positively distinct and mutually respectful (Cramton & Hinds, 2005). The ingroup-outgroup bias within a faultline team is then reduced (Gibson & Gibbs, 2006). Second, team members of different demographic categories tend to develop a shared cognition and mental model when in a psychologically safe climate (Klimoski & Mohammed, 1994). Third, a psychologically safe climate acts as a bridge connecting subgroups of different demographic categories, allowing them to comfortably express and share their different opinions, challenge and seek the elaboration of ideas, and thus utilize and integrate heterogeneous information into a team solution (Edmondson, 1999; Gibson & Gibbs, 2006). Therefore, towards high levels of faultlines (where the hypothesized inverted U-shaped curve has a downward trend), the negative relationship between faultlines and team performance is likely to be generally weaker for teams with a strong psychological safety climate.

We have also argued that low levels of faultlines might lead to poor team performance. Again, this relationship is likely to vary as a function of a team's climate of psychological safety. In other words, although members are distinct from their colleagues (in the case of low levels of faultlines) and often diverge based on different opinions and perspectives (van Knippenberg et al., 2004), a psychologically safe climate should help leverage the advantage of the diverse information base through more open conversations and more respectful, engaged interactions (Edmondson & Lei, 2014). Indeed, empirical findings show that a psychologically safe climate moderates the relationship between team diversity and its outcomes (Gibson & Gibbs, 2006; Martins et al., 2013). For example, Gibson and Gibbs (2006) found that a psychologically safe communication climate tended to mitigate the challenges that national diversity posed for team innovation. Therefore, when faultlines increase from low to moderate levels, teams with a stronger climate of psychological safety are more likely

to make effective use of the informational resources to perform better, augmenting the positive side of low levels of faultlines. In summary, we hypothesize the following:

Hypothesis 2 A team's psychological safety climate moderates the inverted U-shaped relationship between faultlines and team performance such that this relationship is weaker among teams with a strong psychological safety climate than among teams with a weak psychological safety climate.

Methods

Sample

The authors approached work units via personal contacts with the top management (e.g., Chairmen/women or senior executives) of different companies. Fifty-seven of them agreed to provide support. The participating companies represented a wide range of industries, such as IT, communications, medical, pharmaceutical, and financial services. With the support of these managers, staff members were assigned to administer our survey. Two different questionnaires were presented: a team manager questionnaire and a team member questionnaire. The team manager questionnaire was used primarily to collect team performance data, whereas the team member questionnaire was used primarily to collect data on team members' demographic information, the team psychological safety climate and task characteristics. We asked the staff who assisted us to persuade all team members to participate, when possible. Participants independently finished their surveys and enclosed them in envelopes provided by the researchers. The sealed surveys were then collected by the assistant.

We first contacted and invited 187 workgroups to participate; 172 workgroups returned their questionnaire, yielding an initial response rate of 92.0%. The workgroups included various functional teams (e.g., marketing/sales, manufacturing, human resources, etc.). We excluded data from teams that lacked adequate observations (teams with less than half the team members responding to the questionnaire or no team manager/leader responses), which led to 146 teams with 579 individuals. We further eliminated individual responses with incomplete demographic information, which were required to measure faultlines (Thatcher et al., 2003). Additionally, teams with fewer than four members were dropped because subgroups within these teams were shown to exhibit different dynamics (Bezrukova, Spell, & Perry, 2010). Eventually, the effective sample size was 61 teams (including 61 team leaders and 327 team members).

The average team size of the final 61-team sample was 9.02 people ($SD = 3.47$). The mean number of respondents from each team was 6.36 ($SD = 1.30$), for a mean within-group response rate of 70.5%. Of these teams, 18% were marketing/sales teams, 24.6% were R&D or technical support teams, 11.5% were manufacturing teams, 18% were human resource teams, 13.1% were financial or administrative teams, and the remaining teams were categorized as serving other functions. Among the 61 leaders, 70% were men, and 71.7% held a science degree. The average age of these leaders was 34.52 years ($SD = 7.63$). Among the 327 member respondents, 58% were men, and 56.8% held a science degree. Their average age was 29.07 ($SD = 6.20$).

Measures

Faultlines

Faultlines in our study were measured along five demographic characteristics (i.e., age, gender, educational specialization, education level, and industrial experience). At the beginning of the questionnaire, respondents were required to report information about their age, educational specialization and industrial experience. Concerning gender and education level, respondents were given a list of options and asked to mark the one that best matched their attributes. In view of a variety of educational specializations, we coded the data into 12 categories according to “the Undergraduate Specialty Catalogue of Higher Institutions,” edited by the Chinese Ministry of Education in 2012. The 12 fields are philosophy, economics, law, pedagogy, literature, history, science, engineering, agriculture, medical science, management science, and the arts.

We examined faultlines by considering their strength and distance simultaneously. Faultline strength is defined as the extent of alignment across members on the basis of demographic attributes within a group (Bezrukova et al., 2009). To measure faultline strength, we adopted the faultline algorithm developed by Thatcher et al. (2003); this algorithm has also been extensively utilized by other faultline studies (Bezrukova et al., 2009, 2010; Molleman, 2005). Adapted from the multivariate statistical clustering analysis literature, this measure was developed to indicate the proportion of variability within a group explained by the presence of a group split (Bezrukova et al., 2009; Thatcher et al., 2003). Thatcher et al.’s (2003) faultline algorithm took into consideration only faultlines that split groups into two subgroups. It was reasonable because groups with a two-subgroup configuration tended to be more divergent than did those with more than two subgroups (Carton & Cummings, 2013; Polzer, Crisp, Jarvenpaa, & Kim, 2006; Thatcher & Patel, 2012).

Calculated as the percent of total variation in overall group characteristics accounted for by the strongest group split (the ratio of the between-group sum of squares to the total sum of squares), faultline strength could vary from 0 to 1, with larger values indicating greater strength. The values of faultline strength ranged from .33 to .87 in our sample.

Faultline distance was the extent to which subgroups diverged as a result of accumulated demographic differences between subgroups, or how far away the subgroups were from one another. Based on a formula developed by Bezrukova et al. (2009), faultline distance was operationalized as the distance between the faultline variable centroids for the subgroups, which reflected distance theory (Brewer, Manzi, & Shaw, 1993). This statistic could take on values equal to or greater than 0, with larger values indicating larger distances. The values of faultline distance ranged from .18 to 6.20 in our sample data. Finally, to examine the joint effect of faultline strength and distance, we calculated the overall faultline score by multiplying the standardized strength and distance scores (Bezrukova et al., 2010, 2012; Bezrukova, Spell, Caldwell, & Burger, 2016; Spell, Bezrukova, Haar, & Spell, 2011).

Psychological safety climate

Psychological safety climate was measured with seven items developed by Edmondson (1999). Because the original scale was in English, we conducted a standard process of translation and back-translation to make sure that the Chinese version corresponded to the

original version (e.g., Bozionelos et al., 2016). Responses were made on a 5-point Likert-type scale (1 = strongly disagree; 5 = strongly agree). The coefficient alpha was .85. Sample items were “It is safe to take a risk in our team” and “When working with members of our team, my unique skills and talents are valued and utilized.”

Team performance

We used the 6-item measure (including efficiency, quality, technical innovation, adherence to schedules, adherence to budgets, and work excellence) of team performance that was developed by Ancona and Caldwell (1992) and translated into a Chinese version by Zhang, Hempel, Han, and Tjosvold (2007). Leaders rated the team’s performance using a 5-point Likert-type scale (1 = strongly disagree; 5 = strongly agree). We dropped the “adherence to budgets” item due to low loading on the team performance construct ($r < .4$) (Jarvenpaa & Majchrzak, 2008). The loadings of the remaining five items on the construct were all above .6, and the coefficient alpha was .86. Sample items were “Our team adheres to schedules” and “Our team can ensure the quality of technical innovations produced.”

Control variables

We controlled for team interaction period and task routineness because they might be related to the main variables in this study (Barkema & Shvyrkov, 2007; Gibson & Vermeulen, 2003).

The team interaction period was operationalized as the averaged pair-wise overlap in tenure for all possible pairs in the team; this measure was proposed by Carroll and Harrison (1998) and used in later research (Barkema & Shvyrkov, 2007). We used the logarithmic transformation of tenure overlap to reflect the diminishing marginal effects of social interaction between team members over time, consistent with prior research (Barkema & Shvyrkov, 2007; Carroll & Harrison, 1998). Values of log tenure overlap ranged from .21 to 2.14 in our sample data.

We used the 4-item measure of task routineness adapted from Dewar, Whetten, and Boje (1980). Similarly, a standard process of translation and back-translation was conducted. Responses were made on a 5-point Likert-type scale (1 = strongly disagree; 5 = strongly agree). The coefficient alpha was .83. A sample item was, “Members of our team do the same job in the same way every day.”

Data aggregation

All our constructs were explicitly conceptualized at the team level. Nevertheless, because some of the data were collected from individual responses, it was important to evaluate whether the aggregation of data from individual team members to create team data was appropriate. This evaluation was first investigated by calculating the interrater agreement coefficient (r_{wg}) for the variables (James, Demaree, & Wolf, 1984). Median r_{wg} values were .84 for task routineness (mean = .80) and .95 for team psychological safety climate (mean = .94). These numbers suggested that team members agreed in their ratings of these variables.

In addition, the evaluation was investigated by computing the intraclass correlation coefficients (ICC[1] and ICC[2]) to determine whether the ratings of members of the

same team were more similar to one another than to those of members of other teams (Bliese, 2000). One-way analyses of variance suggested that task routineness and psychological safety climate scales all differed significantly ($p < .01$) between teams. The ICC(1) values were .20 for task routineness and .35 for psychological safety climate. These figures indicated that a considerable amount of the variance in ratings was due to team membership. The reliability of the group means was examined by calculating the ICC(2) coefficients. The ICC(2) values were .57 for task routineness and .74 for psychological safety climate. Together, these results supported the aggregation of individual team member responses to create team-level variables for all the constructs.

Results

Descriptive statistics

Table 1 provides the means, standard deviations, coefficient alphas and correlations of all the variables. It shows that team psychological safety climate was positively related to team performance ($r = .47, p < .001$). However, the linear term of faultlines was not correlated with team performance ($r = -.17, n.s.$).

Hypotheses testing

Following the recommendations of Aiken and West (1991), we grand-mean-centered all the predictor variables to reduce problems caused by multicollinearity. Table 2 presents the results of the regression analysis regarding our hypotheses. To test the relationship between faultlines and team performance, as indicated in Hypothesis 1, we first introduced into a regression equation the control variables and the linear term of faultlines (Table 2, Model 1), followed by the quadratic term of faultlines (labeled as faultlines squared in Model 2). As shown in Table 2 (Model 2), the effect of the linear term of faultlines on team performance was nonsignificant ($\beta = -.03, t = -.21, n.s.$), but the estimate of faultlines squared was negative and significant ($\beta = -.55, t = -4.69, p < .001$), as predicted in Hypothesis 1. This curvilinear relationship remained significant even after taking team psychological safety climate into account (Table 2, Model

Table 1 The descriptive statistics and correlation matrix

| Variable | Mean | SD | 1 | 2 | 3 | 4 |
|-------------------------|------|-----|------|--------|-------|-------|
| 1. Faultlines | .12 | .85 | | | | |
| 2. Psychological safety | 4.03 | .42 | -.06 | (.85) | | |
| 3. Team performance | 4.09 | .68 | -.17 | .47*** | (.86) | |
| 4. Task routineness | 3.45 | .49 | -.02 | .13 | .01 | (.83) |
| 5. Log tenure overlap | 1.30 | .38 | -.02 | -.03 | -.05 | .21 |

$N = 61$. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 2 Results of regression analysis

| Variables | Team performance | | | |
|---|------------------|----------|---------|---------|
| | Model1 | Model2 | Model3 | Model4 |
| Log tenure overlap | -.06 | .06 | .06 | .06 |
| Task routineness | .02 | .03 | -.03 | -.01 |
| Faultlines | -.17 | -.03 | -.03 | .12 |
| Faultlines squared | | -.55*** | -.47*** | -.17 |
| Psychological safety climate | | | .37** | .27* |
| Faultlines × Psychological safety climate | | | | .10 |
| Faultlines squared × Psychological safety climate | | | | .40* |
| R^2 | .03 | .30 | .42 | .48 |
| Adjusted R^2 | -.02 | .25 | .38 | .42 |
| ΔR^2 | .03 | .27 | .12 | .06 |
| F | .60 | 6.11*** | 8.23*** | 7.11*** |
| ΔF | .60 | 21.97*** | 11.92** | 2.89* |

$N = 61$. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

3). To demonstrate the exact nature of the relationship between faultlines and team performance, we plotted the relationship, as shown in Fig. 1. As revealed, team performance differed significantly depending on the level of the faultlines within a team. Teams with moderate faultlines had the highest level of team performance, whereas teams characterized by higher or lower levels of faultlines had lower levels of team performance. Taking these results together, Hypothesis 1 was supported, which predicted that faultlines would have a curvilinear relationship with team performance.

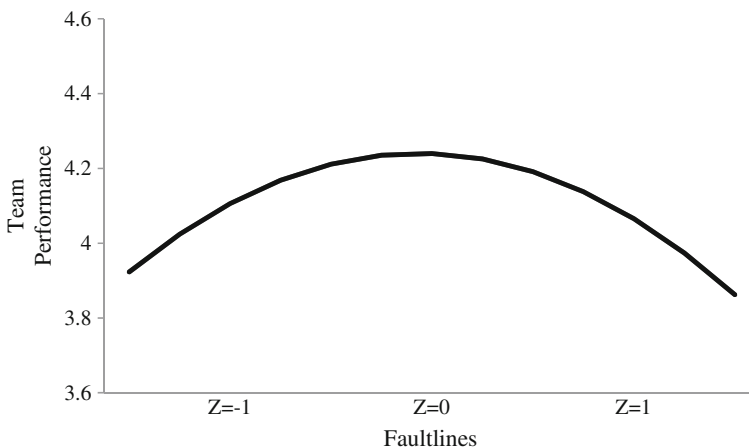


Fig. 1 The nonlinear relationship between faultlines and team performance

Hypothesis 2 predicted a moderating effect of a team's psychological safety climate on the curvilinear relationships between faultlines and team performance. As suggested by Aiken and West (1991), we examined the moderating effect of psychological safety climate by regressing team performance on faultlines squared \times psychological safety climate, controlling for all other variables (Table 2, Model 4). The results indicated that the interaction term between psychological safety climate and faultlines squared was positive and significant ($\beta = .40$, $t = 2.14$, $p < .05$). Figure 2 presents the regression curves for the relationship between faultlines squared and team performance on strong and weak psychological safety climates. As shown in Fig. 2, there is a curvilinear inverted U-shaped relationship between faultlines and team performance ($\beta = -.22$, $t = -4.30$, $p < .001$) for teams with a weak psychological safety climate. For teams with a strong psychological safety climate, faultlines were not associated with team performance, suggesting that team performance does not vary based on different levels of faultlines. As an additional analysis, we examined simple slopes, following Chung and Jackson's (2013) method. The results revealed that on teams with a weak psychological safety climate, the simple slope of a high level of faultlines (+1SD) was significant and negative ($b = -.41$, $t = -3.95$, $p < .001$), the simple slope of moderate faultlines (mean) was nonsignificant ($b = .01$, $t = .10$, $n.s.$), and the simple slope of low level of faultlines (-1SD) was significant and positive ($b = .33$, $t = 2.08$, $p < .05$). When the psychological safety climate was strong, the simple slopes of high, moderate and low levels of faultlines were nonsignificant. Thus, support was found for Hypothesis 2.

The values of the variance inflation factors (VIFs) for all the above models showed a range of 1.0 to 3.6, which fell within acceptable limits, suggesting no multicollinearity concerns.

Post hoc robustness analysis

We tested the robustness of our findings by reconsidering and adding the 30 teams with only three respondent members (subgroups within these teams were believed to exhibit different dynamics in the previous studies). As a result, a sample of 91 team leaders and 417 team members from 91 workgroups was used to conduct the post hoc robustness analysis. The results of this post hoc analysis exactly replicated the pattern of our

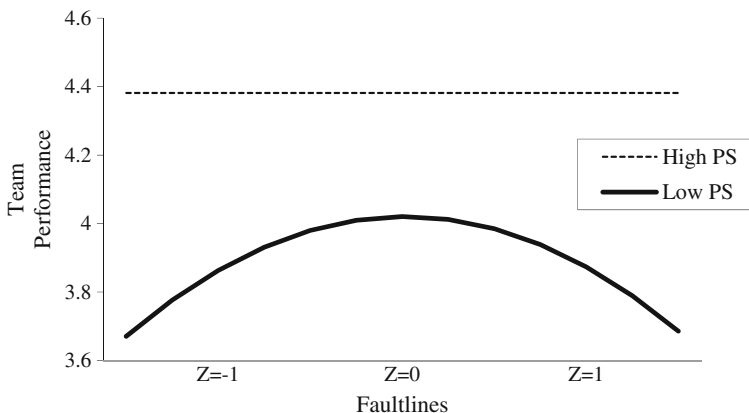


Fig. 2 The interaction effect of faultlines and psychological safety climate on team performance

original findings. Specifically, the estimate of faultlines squared was negative and significant ($\beta = -0.37$, $t = -2.21$, $p < .05$), after controlling for the effect of the linear term of faultlines on team performance ($\beta = -0.28$, $t = -1.64$, *n.s.*). Thus, Hypothesis 1 was supported. Furthermore, in line with our original results, the interaction term between psychological safety climate and faultlines squared was positive and significant ($\beta = .40$, $t = 3.02$, $p < .01$), supporting Hypothesis 2. Overall, this analysis demonstrated the robustness of our findings and indicated that three-person groups with “token” splits (i.e., subgroups consisting of only one member) function as the same.

Discussion

The purpose of this research was to uncover the relationship between faultlines and team performance. Specifically, based on the inconsistent conclusions in previous literature, we predicted that the relationship would be curvilinear. Our empirical test on the basis of actual workgroups generated results that were consistent with the quadratic relationship proposition. Furthermore, team psychological safety climate moderated the relationship between faultlines and team performance: in a weak psychological safety climate, there was an inverted U-shaped relationship between faultlines and team performance, while in a strong psychological safety climate, there were no differences in performance at varying levels of faultlines.

Theoretical implications

This study provides essential evidence supporting the cross-categorization perspective. Our empirical findings suggest that the cross-categorization model received solid support, extending the faultline literature. According to self-categorization theory and social identity theory, researchers have focused mainly on teams characterized by salient subgroups (high levels of faultlines), in contrast to those with no subgroups (low levels of faultlines) (Lau & Murnighan, 1998; Thatcher & Patel, 2012). However, this line of research has lacked consideration of the situations between the two extreme points, such as the cross-categorization with moderate faultlines. As such, we consider that the cross-categorization model might function as a supplement for traditional self-categorization theory and social identity theory in explaining the effects of faultlines. We also contribute to the literature on the categorization-elaboration model by identifying when the benefits of demographic subgroups or diversity can be leveraged. According to the categorization-elaboration model, the elaboration of task-relevant information in faultline teams depends on the team’s task characteristics (Cooper, Patel, & Thatcher, 2014; Ellis, Mai, & Christian, 2013; van Knippenberg et al., 2004). Extending the categorization-elaboration model, we argue that the effects of elaboration and categorization might also be contingent on team climate. Specifically, team psychological safety climate enables teams to make use of the potential informational resources of faultline teams.

While our findings resonate with some studies (Gibson & Vermeulen, 2003; Thatcher et al., 2003), they contradict the findings of research indicating linear negative effects of faultlines (e.g., Li & Hambrick, 2005; Rico et al., 2007). There are various explanations for the discrepancy between these results and those of our study. One

possible explanation is the differences in the research and methodology. In their meta-analysis concerning the effects of demographic faultlines on team performance, Thatcher and Patel (2011) proposed that the study setting (field setting vs. lab setting) might influence the relationship between faultlines and team performance. Their study finally confirms this proposition, indicating that studies conducted in lab settings report a stronger negative relationship than studies conducted in field settings. This evidence helps explain why our study, which used a field setting, hardly found a significant negative relationship, as some previous studies have. A related reasoning is that extreme demographic faultlines might be more difficult to observe in field research than in laboratory studies (Thatcher & Patel, 2011). That is, studies conducted in lab settings are able to manipulate team composition—creating maximal and minimal degrees of faultlines—and to adopt a broader range of values than studies conducted in field settings. With a narrower range of values for faultlines (from .32 to .87 in our study compared with theoretical values between 0 and 1), our data collected from the field investigation might yield different results from those of previous lab studies. Finally, a quadratic relationship may have existed but was not tested—Thatcher et al. (2003) conducted a quadratic relationship test in a supplementary analysis only when they found a positive relationship between faultlines and team performance, in contrast to their hypothesis.

Additionally, we demonstrate the different patterns of faultline-performance relationship given different levels of team psychological safety climate. These findings not only help elaborate the related theories, such as the cross-categorization model and the categorization-elaboration model, but also help add value to the team faultline and diversity literature. Our results for the moderating effect of psychological safety climate is in general agreement with both findings from the empirical studies (Gibson & Gibbs, 2006; Martins et al., 2013) and Edmondson and Lei's (2014) theoretical framework. What is more, our research provides a new lens for investigating the question of the impact of psychological safety climate on the curvilinear relationship between faultlines and team performance.

Finally, our study demonstrates the generalizability of faultline theory. On the one hand, the result of negative effects of strong faultlines suggests that self categorization and social identification processes characterize the Chinese setting and function within it, as implied by previous studies (e.g., Farh et al., 1998). On the other hand, the facilitating effects of moderate faultlines suggest that subgroups within a team are likely to evolve through some overlapping memberships into a larger network. That is, although China is characterized as collectivism orientation with dense ingroup networks in a traditional sense (Xiao & Tsui, 2007), we find that the boundary of an existing ingroup network is adjustable and ready to be expanded to take in more resources.

Limitations and future directions

Similar to other studies, this study contains several limitations, suggesting directions for further research. First, although we attempted to partial out the influence of some potential control variables, we were unable to contain all the confounding variables. For example, possible moderators included the processes of conflict, communication, social integration and information utilization (Choi & Sy, 2010; Homan et al., 2008; Jehn &

Bezrukova, 2010; Li & Hambrick, 2005; Polzer et al., 2006), which were demonstrated to be significant intermediators in previous studies.

We were also aware that inaccurate informant reports and the nonresponses of team members might distort the faultline measures and bias the results, given our use of self-reported survey data. Unfortunately, we were unable to obtain useful archival data that reflected more accurate personal information. As a solution, we collected data from the respondents and elaborately designed our study to eliminate the possibility of informant inaccuracy. For example, we presented the personal information section at the very beginning of the questionnaire to capture respondents' attention. Additionally, we eliminated teams for which demographic data on the respondents were omitted. Considering the nonresponse bias, which is common in demography research (Allen, Stanley, Williams, & Ross, 2007), we handled our less-than-complete teams with decision rules, requiring a response rate of at least 50% and four respondents per group. As a result, the mean within-group response rate was 70.5% in our study.

In addition, there might be certain biases concerning the validity of the team performance measure, given that the leaders might have been motivated to report their teams in a positive light. However, we believed that there would be an overall increase in the reporting and, crucially, that this bias would not depend on faultlines. Thus, we believe that our findings were not affected by this bias. Additionally, the cross-sectional design used in this study was likely to limit the ability to infer causality. Although we used multisource data to rule out common-method biases, all data were collected simultaneously. As a result, causality between faultlines and team performance might be reserved.

Given these limitations, the results raise many interesting possibilities for future research. For example, the intermediate processes under different patterns of the faultline-performance relationship deserve further investigation. Possible processes include team conflict, communication, and information utilization. These processes have been well examined within the framework of the linear relationship between faultlines and team performance, opening the door for future research from diverse perspectives on the effects of faultlines.

It could be interesting and valuable to move research from a team-level to subgroup-level framework (Meyer, Glenz, Antino, Rico, & González-Romá, 2014; Meyer, Shemla, Li, & Wegge, 2015; Meyer et al., 2016). For example, configurational properties (such as the number and the balance of subgroups in a team) affect team processes and outcomes (Carton & Cummings, 2012, 2013). Therefore, we believe that future studies might be elaborated by investigating whether the given moderators (such as the psychological safety climate in our study) might be more influential for one subgroup than for others. Therefore, to refine the faultline literature, it is necessary to further explore the dynamics of subgroups.

Finally, we suggest that more research be conducted in Eastern countries. Specifically, more demographic dimensions specific to the Chinese context might be taken into consideration. Although race and religion are believed to categorize people as different subgroups, as shown in earlier faultline literature, Chinese people are likely to categorize themselves based on a wide variety of other characteristics, such as age, educational background, kinship, or other shared experiences (Li et al., 2007; Luo, 2000). Many different attributes may be examined in Chinese context (Farh et al., 1998).

Acknowledgements The authors would like to thank Zhenxiong Chen, Zhaoli Song and Chuding Ling for their helpful comments on early drafts of this paper. This work was supported by the National Science Foundation of China (Grant No. 71502162), the Natural Science Foundation of Zhejiang Province (Grant No. LQ14G020010), and the Soft Science Research Program of Zhejiang Province (Grant No. 2016C25015).

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