Things Are Not Always What They Seem: The Origins and Evolution of Intragroup Conflict*

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Teams scholars have historically conceptualized and measured intragroup conflict at the team level. But emerging evidence suggests that perceptions of intragroup conflict are often not uniform, shared, or static. These findings suggest important questions about the microfoundations of intragroup conflict: Where does conflict within teams originate? And how does it evolve over time? We address these and other questions in three abductive studies. We consider four origination points—an individual, dyad, subgroup, or team—and three evolutionary trajectories—conflict continuity, contagion, and concentration. Study 1, a qualitative study of narrative accounts, and Study 2, a longitudinal social networks study of student teams, reveal that fewer than 30 percent of teams experience team-level conflict. Instead, conflict more commonly originates and persists at individual, dyadic, or subgroup levels. Study 2 further demonstrates that traditional psychometric intragroup conflict scales mask the existence of these various origins and trajectories of conflict. Study 3, a field study of manufacturing teams, reveals that individual and dyadic task conflict origins positively predict team performance, whereas traditional intragroup task conflict measures negatively predict team performance. The results raise serious concerns about current methods and theory in the team conflict literature and suggest that researchers must go beyond team-level conceptualizations of conflict.

Keywords: dyadic conflict, intragroup conflict, subgroups, temporal dynamics

A long legacy of research on intragroup conflict assumes, measures, and provides evidence of conflict occurring at the team level. But increasingly conflict scholars have started to understand that, as Phaedrus cautioned in the Plato dialogues (circa 370 BC), "Things are not always what they seem; the first appearance deceives many." By definition, intragroup conflict is a team-level "state of discord" based on real or perceived incompatibilities or differences among members (McGrath, 1984; Hackman, 1987; Jehn, Northcraft, and Neale, 1999; De Dreu and Weingart, 2003). Existing theories of team conflict focus on team-level processes, and researchers survey team members about team-level conflict and aggregate responses at the team level based on intragroup agreement (Kozlowski and Klein, 2000; De Dreu and Weingart, 2003; de Wit, Greer, and Jehn, 2012). Thus, compositional approaches (Kozlowski and Klein, 2000) to theorizing and modeling team conflict dominate the literature and steer research on intragroup conflict and its effects on team outcomes. For example, scholars use this approach to categorize conflict types, including task, relationship, process, and status conflict; to identify various outcomes; and to suggest mitigating strategies (Jehn, 1995, 1997; De Dreu and Weingart, 2003; Behfar et al., 2008, 2011; Bendersky and Hays, 2012; de Wit, Greer, and Jehn, 2012).

But the long-held assumption that intragroup conflict occurs primarily at the team level is being challenged. Specifically, scholars have begun to question whether intragroup conflict experiences are truly *uniform*. For example, Humphrey et al. (2017) argued that dyadic relationships serve as the foundation for team conflict and reported independent effects of dyadic conflict within teams on information exchange and team performance. And Park, Mathieu, and Grosser (2020) recommended scholars use social network approaches to model team conflict to reveal unique, individual conflict experiences that would better highlight why there is non-uniformity of team conflict. Further, scholars have begun to question whether team conflict perceptions are truly *shared*. Jehn, Rispens, and Thatcher (2010) noted that individual team members often have asymmetric perceptions about the level of team conflict, and this asymmetry predicts team performance over and above the mean-level aggregation of team conflict (see also Sinha et al., 2016). Finally, scholars have questioned whether team conflict can be considered as something *static* that can be measured at a single point in time. Arrow, McGrath, and Berdahl (2000) pointed out that a more dynamic view of intragroup conflict is needed, but progress addressing that call was slow. A number of scholars have recently been conceptualizing and measuring conflict over time as well as documenting the performance implications of modeling groups more dynamically (e.g., Jehn et al., 2013; Ferguson and Peterson, 2015; Weingart et al., 2015; Cronin and Bezrukova, 2019).

The emerging doubts about whether intragroup conflict is uniform, shared, and static raise critical questions about what conflict really looks like in teams and how it ultimately influences team performance. Do differences in exposure to conflict, direct behavioral involvement in conflict, or observations of conflict cause non-uniformity of team conflict or asymmetric conflict perceptions? Could temporal dynamics influence these differing experiences and perceptions? Importantly, would a better understanding of where conflict originates and how it evolves resolve conundrums in the intragroup conflict literature, such as the inconsistent relationship between task conflict and team effectiveness (De Dreu and Weingart, 2003; de Wit, Greer, and Jehn, 2012)?

Although we have substantial knowledge about intragroup conflict, past assumptions about its nature severely limit our ability to answer these many pressing questions about it. Current efforts, such as examining team-level moderators of the conflict–performance relationship (De Dreu and Weingart, 2003; Jehn and Bendersky, 2003), are unable to answer these questions because they continue to take a bird's-eye view by focusing on the extent of conflict within teams but remain agnostic to where conflict originates or how it evolves. In contrast, we propose closely inspecting the individuals involved in generating intragroup conflict, as well as the evolution of the team's internal conflict structure. By doing so, we can unearth unique insights into the true nature of intragroup conflict and how it affects team outcomes.

In this article, we map the microfoundations of intragroup conflict. We drop the assumptions that intragroup conflict is uniform, shared, and static and ask where team conflict originates and how it evolves over time. We adopt an abductive research philosophy that is well-suited for exploring understudied phenomena and developing new insights (Bartel and Garud, 2003; Behfar and Okhuysen, 2018). Rather than build theory from a blank slate, abductive reasoning relies on knowledge and experiences to generate plausible conjectures in order to categorize new issues or anomalies and provide future direction (Weick 1989; Van de Ven, 2007). We chose this approach because our line of inquiry challenges basic assumptions in the intragroup conflict literature and calls for reframing the phenomenon (Van de Ven, 2007). Therefore, our research questions and theoretical conjectures are suggested in the spirit of exploration and discovery rather than through a priori hypotheses (Behfar and Okhuysen, 2018).

We ask four research questions: (1) Where does conflict within teams originate? (2) How does it evolve over time? (3) How do conflict origins and evolutionary trajectories relate to traditional intragroup assessments of conflict? (4) How do different conflict origins affect team performance? We conducted three studies to examine plausible conjectures about each question. Study 1 is a qualitative study of narratives about how conflict incidents begin and evolve. Study 2 is a longitudinal social network analysis of student project teams that examines conflict origins, evolutionary trajectories, and their relationships to traditional intragroup assessments of conflict. Study 3 is a field study of manufacturing teams that examines the effect of traditional assessments and conflict origins on team effectiveness. Each study addresses one or more of the research questions and furthers our understanding of the origins and evolution of intragroup conflict. Our abductive inquiry thus advances team conflict research by focusing on its microfoundations and provides new conceptual and methodological approaches.

RESEARCH QUESTIONS AND PLAUSIBLE CONJECTURES

Research Question 1 (RQ1): Where Does Conflict within Teams Originate?

A key starting point for examining the microfoundations of team conflict is to ask where it originates. Although we know that it "does not simply emerge at the group level" (Cronin and

Bezrukova, 2019: 794), the actual origins are obscure. For example, does team conflict occur most often because two team members hotly disagree, while their teammates either steer clear or take sides? Or does a single argumentative member cause conflict? Such simple, relatable examples show that conflict may have various origins and interpersonal foundations, which may contribute to different conflict experiences, perceptions, and ultimately team performance outcomes, but few studies capture this level of group dynamics.

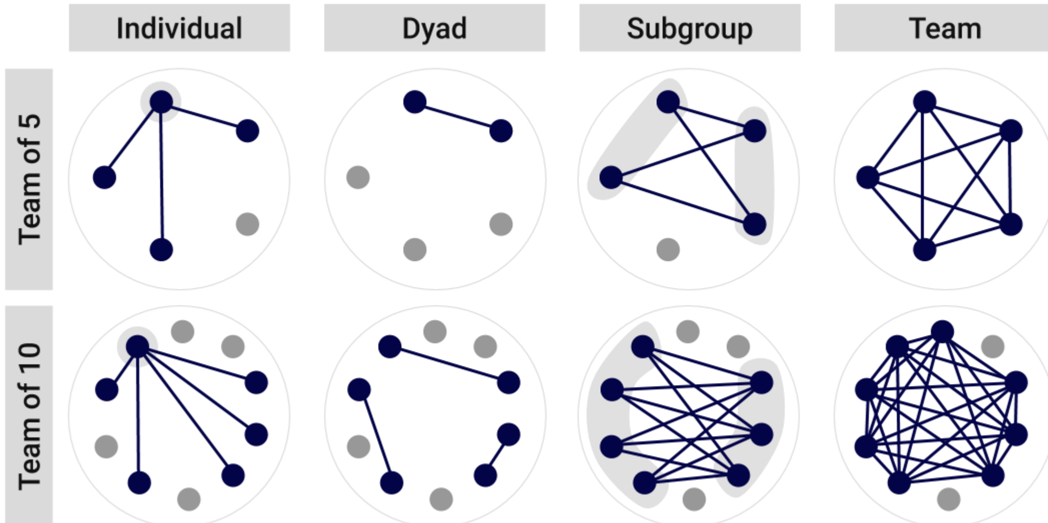
Conflict origins and configurations. We use the word *origin* to refer to generators or instigators of team conflict. Conflict origin differs from conflict *configuration* that denotes conflict-related social network ties (Park, Mathieu, and Grosser, 2020). Configurations detail the roles team members play vis-à-vis conflict: some are behaviorally involved (Jehn et al., 2013), while others are passive observers.

Our conceptualization of conflict origins diverges from conflict configurations in at least three ways. First, an origin implies an attributional account of the source of the conflict—that is, we can identify one or more individuals who drive the conflict experiences for the team. This can be inferred not only from examining conflict configurations using social network analysis but also via attributions of team members and outside observers, beyond social network analysis. Second, behaviorally involved team members may differ from the origins. For instance, several team members might be engaged in conflict, but one difficult individual may be the instigator. The top left circle of Figure 1 illustrates this scenario: in a team of five, three are behaviorally involved in conflict with a common fourth individual but not with each other; one is an observer with no conflict ties. Although the configurational pattern reveals the behavioral involvement of four, one individual is the origin.

The third distinction is that many configurations could be used to explain a given origin. For example, a five-person team may report team conflict when two members are behaviorally involved in conflict, whereas another team may report conflict because multiple dyads are behaviorally involved in conflict with one another. The second column of Figure 1, which depicts dyadic conflict for teams of different sizes, illustrates this: in the smaller team of five, conflict is attributed to one dyad; in the larger team of ten, conflict is attributed to three different dyads. The larger team reveals a different configuration than the smaller team, but the conflict origins for both teams are best categorized as dyadic. In short, because configurations are complex, detailed, and rich, many configurational patterns could be used to infer the same team conflict origin.

Again, we start with the origins of team conflict as we begin to explore the 'whys' behind mounting evidence that conflict is not uniform, shared, or static. Uncovering different origins helps us better understand why conflict experiences and perceptions tend to differ among team members, and perhaps why the link between task conflict and performance has been so elusive. We begin by positing potential origins of team conflict. To generate plausible categories of team origins, we draw from research across different fields of study, levels of analysis, and methodological perspectives to develop a broad classification system

Figure 1. Example Conflict Network Configurations and Their Origins*



* Each circle depicts a team conflict network. Darker network nodes represent team members who are behaviorally involved in the conflict; lighter nodes represent team members who are observers of the conflict. Network ties represent conflict between teammates. The shaded areas in the first and third columns highlight the team members who define the individual or subgroup origins.

that accounts for team conflict experiences (Weick 1989; Van de Ven, 2007). We also considered task and relationship conflict, which represent the dominant dichotomy of conflict types. Task conflict is cognitive or informational; relationship conflict is affective or interpersonal (Jehn, 1995). Task and relationship conflict may co-exist and be recursive (Simons and Peterson, 2000; De Dreu and Weingart, 2003; Cronin and Bezrukova, 2019). To align our findings with current knowledge, our empirical studies examine both types of conflict.

Our literature review identifies four potential origins of team conflict: individuals (Felps, Mitchell, and Byington, 2006), dyads (e.g., Humphrey et al., 2017), subgroups (e.g., Carton and Cummings, 2012), and the whole team (Figure 1). We also look at each origin to understand its theoretical underpinnings and consider how each could be derived from team members' conflict roles and ties. We use both narrative and network configuration languages to describe conflict roles and ties, as both are complementary to describing possible origins.

The individual: Bad apples and principled dissenters. Narratively, when one focal team member instigates or evokes conflict with other members, the origin is an individual. Using network configuration language, multiple team members can be engaged in conflict with the same individual but not with each other. In large teams, some members may be uninvolved in a conflict with the focal individual but may be aware of or observe conflict instigated by this individual. Multiple individuals may also serve as focal points for conflict in large teams.

The small-group literature demonstrates that the behavior and actions of a single individual can easily cause team conflict (Keyton, 1999; Felps, Mitchell, and Byington, 2006; Peterson, Davidson, and Moynihan, 2007). "Bad apples" are toxic "individuals who chronically display behaviors that asymmetrically impair group functioning" (Felps, Mitchell, and Byington, 2006: 180). Their low level of agreeableness causes them to disregard interpersonal relationships; their lack of conscientiousness causes them to show minimal concern about contributing to team tasks; and their emotional instability restricts their ability to manage external stressors—all of which create turmoil that potentially spreads through the team (LePine et al., 1997; Barrick et al., 1998; Neuman and Wright, 1999; Bono et al., 2002). Bad apples are distinct from "principled dissenters" who push teams to think critically, explore options, or evaluate different perspectives. Embracing dissent is sufficiently critical for team success that some scholars suggest manufacturing disagreement in the form of "devil's advocate" roles (e.g., Maier, 1967; Janis, 1972; Delbecq, Van de Ven, and Gustafson, 1975). Bad apples create relationship conflict, devil's advocates create task conflict, and both can be individual instigators of intragroup conflict.

The dyad: Bad blood. Narratively, intragroup conflict between two members indicates a dyadic origin. Others may observe the conflict without being behaviorally involved. In configurational terms, two teammates are in conflict with each other but not with other members. Other members do not engage in conflict with either member of the dyad. In large teams, multiple dyads may be engaged in conflict, but the conflict is experienced within, not across, dyads.

Several studies advocate for the importance of dyadic conflict as an origin of team conflict. Humphrey and colleagues (2017) argued that dyadic conflict is the most relevant context in which team conflict is expressed and experienced. Dyadic conflict can result from perceptual differences leading to distrust, miscommunications leading to misunderstandings and insults, poor interactions, and power struggles (Wall and Callister, 1995); incongruent goals or competing interests in negotiations (Fisher, Ury, and Patton, 2011); or differences in power and status (Bendersky and Hays, 2012; Anicich et al., 2015). Thus two members may experience relationship conflict as they clash due to incompatible priorities or differences in values or world views. Alternatively, two members may experience task conflict as they have different ideas for approaching team tasks because of diverse backgrounds, training, experience, or expertise. Hence our second category of the origin of intragroup conflict is the dyad.

Subgroups: Warring factions. Narratively, subgroups may be the origin of intragroup conflict when it occurs across two or more factions within a team. Configurationally, conflict is directed toward members of the other subgroup but does not exist within subgroups. In large teams, some members may not be part of any subgroup but may simply observe the conflict that exists between subgroups around them.

The literature related to subgroup origins typically investigates team member diversity, power, and politics in mixed-motive teams. Studies of team member composition and diversity show that different characteristics or interests among subgroups frequently produce conflict (Jehn, Northcraft, and Neale, 1999; Pelled, Eisenhardt, and Xin, 1999; Polzer, Milton, and Swarm, 2002; Carton and Cummings, 2012). This literature suggests that demographic and non-demographic attributes can divide a team into subgroups across faultlines, particularly when faultlines emerge in a similar form across multiple attributes (Lau and Murnighan, 1998). The heightened salience of social categories can interfere with communication and information sharing, causing task and relationship conflict across subgroups (Jehn, Northcraft, and Neale, 1999; Polzer, Milton, and Swarm, 2002; Lau and Murnighan, 2005).

Subgroup conflict may also depend on whether the teammates have aligned interests. Research in this area focuses on coalitions, or subsets of the team, that pool their resources or power to influence the entire team (Murnighan and Brass, 1991; Carton and Cummings, 2012). Conflicting coalitions are likely to form when team members face social dilemmas—when collective and individual interests are misaligned (Korsgaard, Ployhart, and Ulrich, 2014). Although subgroups based on social categories are apt to be transparent and stable, coalitions based on interests may be more dynamic, frequently forming, reforming, and disbanding (Mannix, 1993).

Conflict researchers have rarely considered subgroups as a potential foundation of intragroup conflict (Korsgaard, Ployhart, and Ulrich, 2014; Humphrey et al., 2017) even though conflicts often exist among demographic or interest-based subgroups. Subgroups are thus our third category of intragroup conflict origin.

The whole team: All-encompassing conflict. Narratively, whole team conflict as a point of origin is a pattern in which most team members are in direct conflict with each other. Whole team conflict as we describe it here is not a global perception of the team but denotes actual disagreements among most team members that highlight interpersonal incompatibilities or differing viewpoints. While observers may exist, the majority of team members are behaviorally involved in conflict. In configurational terms, team members engage in conflict with multiple others such that conflict is broadly dispersed through the team without showing discernable individual, dyad, or subgroup patterns.

Most intragroup conflict literature focuses explicitly or implicitly on the team level and typically assumes shared perceptions among team members, but team members may have varying involvement in the conflict. Thus the origin remains ambiguous. Is broad behavioral involvement necessary to indicate intragroup conflict? Are subset behaviors sufficient to create shared perceptions of conflict? To compare with other origins, we operationalize the whole team conflict origin as the broad involvement of a majority of team members as described in the configuration language used above. The approach aligns with the assumption that team members share a social context in which they create and adhere to conflict norms (Jehn et al., 2008). Whole-team conflict then represents a routinized pattern of interactions (Marks, Mathieu, and Zaccaro, 2001). This approach may contrast with traditional measures of intragroup conflict, however—a point we address in Research Question 3 below.

Research Question 2 (RQ2): How Does Team Conflict Evolve over Time?

Equally important as *where* intragroup conflict originates is *how* it evolves over time and across levels. Team researchers largely overlook time (Cronin, Weingart, and Todorova, 2011; Waller, Okhuysen, and Saghafian, 2016), but examining conflict across time and levels of analysis typically provides great insight into recurring patterns affecting teams. Investigations of intragroup conflict as it evolves focus primarily on how teams experience different types of conflict over time, such as from task to relationship conflict or vice versa; or they look at the ebb and flow of conflict as task demands change (Simons and Peterson, 2000; Jehn and Mannix, 2001; Humphrey et al., 2017; Maltarich et al., 2017).

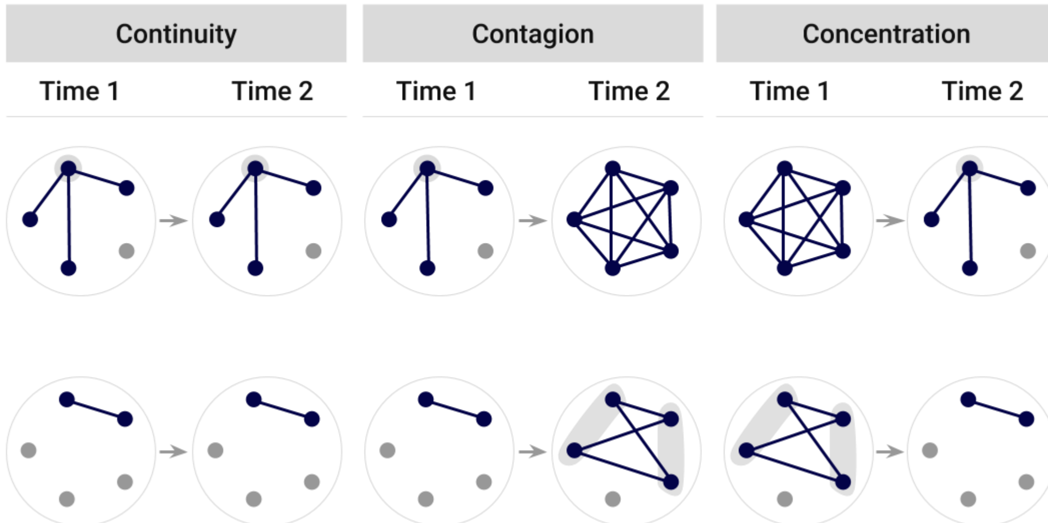
Empirical studies have yet to fully reveal how conflict emerges across origins and over time. For example, we have limited knowledge of whether dyadic disputes evolve into whole-team conflict or whether whole-team disputes splinter into oppositional factions. The origin categories are useful in this regard to identify evolution patterns. Recall that we use the term *origin* to designate a source rather than temporal beginning. Adhering to this definition, we discuss origins of conflict both at the commencement and at later periods in a team's existence.

Our literature review suggests three plausible trajectories in the evolution of conflict: continuity, contagion, and concentration (see Figure 2). Continuity occurs when conflict remains stable at its origin. Contagion occurs when conflict diffuses from lower-level origins to higher-level origins, such as from individual to dyad or dyad to team. Concentration happens when conflict at a higher-level origin reduces or focuses at a lower-level origin, such as from subgroup to dyad. As we consider each trajectory, we again use narrative and network configuration language to describe our abductive reasoning.

Conflict continuity. Narratively, conflict continuity implies that conflict continues at the same level as its origin, without expanding or contracting. In contrast to conflict resolution, which implies that conflicts are solved or disappear, conflict continuity indicates continued, unresolved conflict among the same team members over time. In configurational terms, conflict continuity occurs when conflict starts at one origin and remains there; for example, an initial dyadic conflict continues as dyadic conflict (Figure 2, bottom left).

The key mechanisms for conflict continuity are isolation, entrenchment, and norm development (Schachter, 1951; Boulding, 1964; Bettenhausen and Murnighan, 1985; Kramer, Shah, and Woerner, 1995). Conflict may start and continue with a challenging individual, while other team members enjoy relatively cooperative relations (Figure 2, top left). Principled dissenters who present challenges, differing viewpoints, and dissenting opinions can be perceived as ego threatening and destructive to team dynamics, as was shown in early experimental work investigating minority influence in teams (Schachter, 1951; Boulding, 1964;

Figure 2. Example Conflict Trajectories*



* Each pair of circles depicts the temporal evolution of a team conflict network. Darker network nodes represent team members who are behaviorally involved in the conflict; lighter nodes represent team members who are observers of the conflict. Network ties represent conflict between teammates.

Nemeth, Brown, and Rogers, 2001; Jehn and Bendersky, 2003; Swann et al., 2004). Although dissenters can improve team performance, they are often ridiculed, censured, rejected, and assigned peripheral team roles (Schachter, 1951; Boulding, 1964; Nemeth, Brown, and Rogers, 2001; Elder, Sutton, and Douglas, 2005). Ostracizing dissenters or bad apples serves a dual purpose of both isolating them and ensuring that others do not follow suit for fear of similar retribution and rejection. Thus conflict is contained and persists at its individual point of origin.

Another example of conflict continuity is conflict that remains between a dyad despite being enmeshed in third-party relationships. This may occur when other team members avoid involvement in a distinctly interpersonal feud or combative debate (Thomas, 1992; De Dreu et al., 2001). Intervention in a conflict between other parties may mitigate or resolve conflict but can be costly to the third party (Carment and Rowlands, 1998). Such costs may mean that dyadic conflict continues over time.

Conflict contagion. Narratively, conflict that originates with one or more team members could spread to other teammates (Jehn et al., 2013) through negative encounters or social contagion (Korsgaard, Ployhart, and Ulrich, 2014). From a configuration perspective, conflict contagion can originate at the individual, dyadic, or subgroup levels but over time manifest at higher-level origins, perhaps ultimately at the whole team level (Figure 2, top middle).

The primary theoretical mechanisms underlying contagion are the diffusion of negative affect and the motivation to declare allegiances. The literature on affective contagion suggests that high activation moods such as hostility, irritability, or active unpleasantness, as depicted by bad apples, are apt to spread throughout a team (Bartel and Saavedra, 2000; Barsade, 2002). Similarly, when one individual intensely expresses opposition to others, conflict may spiral throughout the team (Ferguson and Peterson, 2015; Weingart et al., 2015).

Another possibility is that observers may be motivated to declare allegiances in dyadic conflicts; negative sentiments and disagreements may lure others into the fray (Labianca, Brass, and Gray, 1998; Jehn et al., 2013). According to balance theory, people try to maintain equilibrium states with people they like; they readily agree with others they like and disagree with those they dislike (Heider, 1946; Krackhardt, 1999; Krackhardt and Handcock, 2007). Thus we are more likely to perceive conflict with others when our friends have negative ties with them (Labianca, Brass, and Gray, 1998). As such, conflict within isolated dyads may be relatively unstable as team members who are affectively connected to either dyadic member may feel compelled to join sides, expanding the conflict into subgroups (Figure 2, bottom middle).

Conflict concentration. Narratively, conflict concentration occurs when widespread conflict is later attributed to a smaller set of team members. Using configurational language, conflict concentration occurs when conflict starts at a higher-level origin but then becomes more concentrated at a lower-level origin. For example, whole-team conflict might become concentrated when it is attributed to a bad apple or principled dissenter (Figure 2, top right).

Scapegoating, one principal mechanism of conflict concentration, occurs when team members attribute "dysfunctions and difficulties within the system to the personal failings and inadequacies of an individual member" (Gemmill, 1989: 410). Blaming even blameless others for negative situations often brings catharsis (Konecni and Doob, 1972), minimizes feelings of responsibility, maintains personal control over negative situations, provides clear excuses (Rothschild et al., 2012), and may push specific, underlying agendas (Gemmill, 1989). Thus team members experiencing widespread conflict and distress may look for specific groups or individuals to blame and direct their aggression toward them, causing conflict concentration among individuals, dyads, or subgroups.

For instance, conflict that began as a dyadic dispute may narrow to one scapegoated individual as the initial observers of the dyadic dispute take sides against that person. Initial subgroup conflict could eventually become dyadic conflict as two members become outspoken contenders for opposing courses of action or resources (Figure 2, bottom right). Self-categorization theory suggests that when group membership is salient, the most prototypical exemplars emerge as leaders (Hogg and Terry, 2000; Hogg et al., 2004). Initial cross-subgroup conflict may therefore increase the salience and influence of prototypical subgroup members so that the dyad comprising each subgroup's leader might primarily maintain the conflict.

Research Question 3 (RQ3): How Do Conflict Origins and Evolutionary Trajectories Relate to Traditional Intragroup Assessments of Conflict?

The third research question compares our conjectures about the origins and evolution of team conflict with past implicit assumptions about intragroup conflict being uniform, shared, and static because team members share tasks and social contexts that provide similar exposure to conflict, even when they are not behaviorally involved (Korsgaard, Ployhart, and Ulrich, 2014). Nascent evidence disputes these assumptions (e.g., Jehn, Rispens, and Thatcher, 2010; Sinha et al, 2016; Humphrey et al., 2017), and we argue that intragroup conflict has different origins and evolutionary trajectories, which contrasts with current theoretical and empirical practice.

We ask RQ3 because conjectures should be compared with standard assumptions when theorizing (Weick, 1989). That is, our conjectures about team conflict origins should be compared with traditional intragroup conflict measures. Perhaps all origins equally predict consensus-driven aggregations of intragroup conflict, or perhaps certain origins are more predictive than others.

Empirically, our approach involves capturing team conflict networks to identify team conflict origins and evolution trajectories and comparing the origins and trajectories with intragroup conflict ratings using a traditional team-referent scale (Crawford and Lepine, 2013). These comparisons can initiate a reframing of the intragroup conflict literature using a microfoundations view and perhaps address anomalies in the current literature. For example, current intragroup conflict assessments may not be sensitive enough to capture important distinctions in conflict origins that matter for team effectiveness, which we turn to in our last research question.

Research Question 4 (RQ4): How Do Different Conflict Origins Affect Team Performance?

The fourth research question addresses the quintessential reason that conflict origins matter by focusing on whether conflict origins predict team performance. Conventional aggregation of individual perceptions of team conflict at a single point in time is typically empirically justifiable, but it may obscure the true causes of team performance. We know that existing empirical evidence using this approach is at best mixed. Some studies have shown a strong positive relationship between task conflict and performance (Jehn, 1995), while others have shown a negative relationship (Jehn, Northcraft, and Neale, 1999; Lovelace, Shapiro and Weingart, 2001) or no relationship between the two (Pelled, Eisenhardt, and Xin, 1999).

Current practice to resolve these inconsistencies is to search for moderators to explain these differential effects (e.g., Simons and Peterson, 2000; de Wit, Greer, and Jehn, 2012). Yet including additional team-level factors without fully understanding the non-uniform, non-shared, and dynamic nature of team conflict is likely to be problematic. Findings from the conflict asymmetry literature, for example, offer a way to address the lack of shared conflict perceptions by using different compilation models of team-level conflict such as variance or skewness in addition to more traditional measures that use means (Jehn, Rispens, and Thatcher, 2010). Sinha et al. (2016) even found that positively skewed conflict is beneficial to team performance. We acknowledge some progress using these approaches as they clearly imply different team members might be differentially involved in team conflict. But they are limited by their very nature as group-level rather than microfoundational-level measures. They show that groups with variation in perceptions of conflict within the team perform differently, but because the level of the analysis in all of these cases is still the group, they cannot tell us whether different origins of conflict predict team performance, nor can they compare specific origins against each other since they do not measure the structure of the conflict within the team.

Thus we argue that traditional compositional measures of intragroup conflict are not sufficient to fully understand how conflict affects team outcomes. Greater precision in theorizing and operationalizing conflict should provide better predictive validity or clarifications about which conflict origins affect which outcomes (Humphrey et al., 2017: 67). For example, precision in where conflict originates may provide greater insight on when task conflict is apt to transition to relationship conflict or when conflict benefits or undermines team performance. Of course, from a theory-generation perspective, the crucial question is whether our abductive conjectures and microfoundational approach represent interesting theory and motivate further research to challenge and refine the ideas (Davis, 1971, 1986; Van de Ven, 2007).

Studies

To answer our four research questions, we conducted three complementary studies. Study 1 is a qualitative examination of senior executives and students who provided intragroup conflict narratives. It addresses RQ1 and RQ2 and provides initial evidence of where conflict originates and how it evolves. Study 2 is a longitudinal field study of student teams from project introduction to completion. In Study 2, we combine traditional measures of intragroup conflict with social network measures at three points in time. It addresses RQ1 and RQ2 as well, thus providing greater confidence in our inferences from Study 1. Study 2 also addresses RQ3 and provides insight into how traditional measures of intragroup conflict relate to conflict origins and evolution. Finally, Study 3 is a field study of manufacturing teams designed primarily to address RQ4: how conflict origins impact team effectiveness. But this study also allows us to examine more complicated configurations of team conflict origins in teams of various sizes, further informing RQ1 and RQ3. Together, the studies support our abductive approach as we iteratively address each research question about the origins and evolution of team conflict using multiple methodologies.

STUDY 1: QUALITATIVE STUDY OF WRITTEN CONFLICT NARRATIVES

Method

Our sample includes written narratives of conflict from 112 participants enrolled in a one-month executive management course or semester undergraduate course (28 percent executives; 38 percent women; 66 percent U.S. nationality, 21 percent UK nationality, 13 percent other nationality). Narratives are endemic to drawing contextualized inferences in abductive research (Bartel and Garud, 2003; Garud, Dunbar, and Bartel, 2011; Bolinger, Okhuysen, and Bonner, 2019) and are recommended to "provide a significant amount of insight into the emergence process of intragroup conflict" (Korsgaard et al., 2008: 1244). Participants were asked to recall a conflict incident from a past team and answer the following prompt: "Think of a time that you experienced conflict when working in a team (e.g., your student organizations, sports team, class teams, work team, etc.) and describe the life of that conflict—what was the conflict about? How did it start, evolve, and finish? How many team members were involved when the conflict started and when it ended?"

We used the principles of content analysis to guide our analysis of the conflict narratives. Content analysis is a method that allows researchers to make valid inferences from textual data by classifying many words of text into fewer content categories (e.g., Krippendorff, 1980; Weber, 1990; Stemler, 2001; Neuendorf, 2017). It is particularly useful for our abductive approach because it can be used to generate descriptions of the content being analyzed without a guiding formal theory (Potter and Levine-Donnerstein, 1999). An important part of content analysis is developing a coding scheme that coders use to look for elements in the context that can be classified according to the constructs of interest (Krippendorf, 1980; Potter and Levine-Donnerstein, 1999; Neuendorf, 2017). Our coding scheme was developed in an iterative process in which we generated codes based on our plausible conjectures, reviewed the narratives to identify emergent codes, and clarified our coding scheme to address coders' questions.

We developed the first item in the coding scheme to identify the origin of the conflict: "The conflict started because . . . (1) of the actions of one person, (2) there was a conflict between two people, (3) there were coalitions (e.g., subgroups) within the team, or (4) there was a conflict that involved everyone." An initial review of the written narratives indicated that most could be classified using one of these four categories, but categories for conflict involving an external party or another entity were needed too. Follow-up items asked coders to make nominal judgments (i.e., answer yes/no questions) about the parties involved as the conflict evolved over time (e.g., the conflict "started because of one individual but later involved the entire group"). In the process of coding, we clarified questions about classifying the origin of conflict—noting, for example, that the category capturing whole-team conflict should be used only when the writer of the narrative indicated that most team members were behaviorally involved in the conflict. This illustrates our iterative and abductive process for developing the coding scheme. Our final coding scheme included 21 categorical questions about the parties involved when the conflict started and ended.

The 112 conflict narratives were coded by two research assistants who are not authors on this paper but who were trained to use the coding scheme by working through a small set of papers together before coding the narratives independently. Of the 112 narratives, 51 were coded by one of the research assistants and 61 were coded by both. Although several content analysis studies report smaller percentages of overlapping sampling units across coders (e.g., between 10 and 40 percent), we strove for greater than 50 percent overlap given the extensiveness and difficulty of the coding scheme (see Potter and Levine-Donnerstein, 1999). We initially assessed reliability using Cohen's kappa after the coders finished approximately one-third of the papers (Lombard, Snyder-Duch, and Bracken, 2002; Neuendorf, 2017). Next, we had coders resolve discrepancies on papers that were difficult to code to clarify their decision norms for future coding (Potter and Levine-Donnerstein, 1999). We then assessed final reliability once the coders completed the full sample. Final agreement between the two coders was strong, with an average Cohen's kappa of .97 (range: .79 to 1.0). Thus we used the data from the primary coder for each paper in our analysis as described in these conflict narratives.

Results

Of the 112 narratives, only three narratives (2 percent) were classified outside the four origins we study (e.g., an external party). We exclude these three narratives from the presentation of our results and focus on the 109 narratives that identified an individual, dyad, subgroup, or team origin.

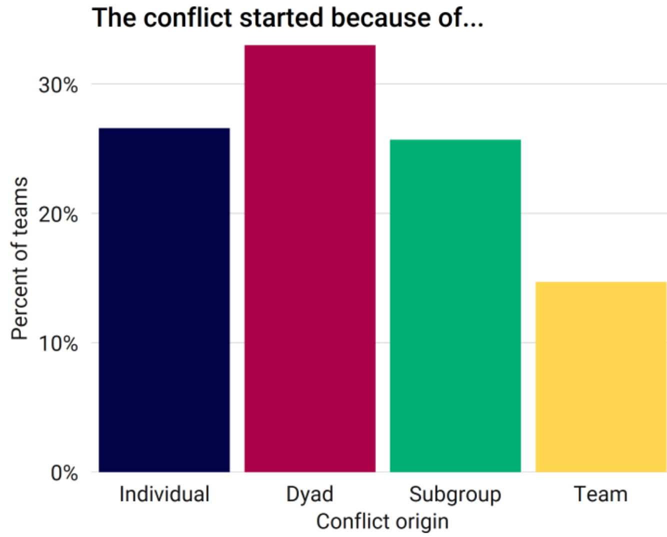
Origins of conflict (RQ1). Figure 3 presents the frequencies of each conflict origin.[1] A plurality of narratives (33 percent) were attributed to a dyad, followed by conflict that began due to actions of one individual (27 percent), closely followed by conflict originating between subgroups (26 percent). Conflict with a whole-team origin was fourth in frequency, occurring in only 15 percent of the conflict narratives. Table 1 provides quotations from the narratives to illustrate the most common origins of team conflict.

Evolution of conflict (RQ2). Table 2 presents how these conflicts evolved over time.[2] The narratives demonstrated conflict continuity in 73 percent of the teams. For example, in 18 percent of the narratives, intragroup conflict that began because of one individual's actions continued to focus on that individual for the duration of the conflict. One writer described

[1] Because we had different types of participants in our sample, we compared the frequencies of conflict origins across the executives and undergraduate students. A chi-square test revealed that there were no differences in the origin of conflict based on the type of participant in the sample ($\chi^2_{(5)} = 6.60$, $p = .25$).

[2] A chi-square test revealed that there were no differences in the evolution of conflict over time based on the type of participant in the sample ($\chi^2_{(11)} = 11.84$, $p = .38$).

Figure 3. Study 1 Frequency of Conflict Origins



the continued negative influence of one individual on a course project:

> *She was very aggressive and stubborn and was not willing to deviate from her original ideas. She had a way she wanted our project to go, and she wasn't going to let it go easily. After a couple meetings the rest of our group decided to take action and tell her there needed to be more equality within the group. While this was not taken well at first, she realized that she needed the rest of us to cooperate with her in order to get the task done and was able to step back slightly.*

In 17 percent of the narratives, conflict began and continued at the dyad level, which represents about half of the teams that began with a dyad origin. In 24 percent and 14 percent of the narratives, conflict began and persisted at the subgroup and team levels, respectively, which represents nearly all instances in which conflict began with a subgroup or the whole team. One author wrote about a team that experienced continuity in team-level conflict after holding an event to encourage high school students to attend college:

> *We had to have a board meeting just to discuss all the things that went wrong that day . . . everyone was blaming everyone, and nobody thought they were wrong. . . . In the end, I pretty much gave a speech on how we should be holding ourselves accountable and not put the blame on others. . . . From there on we just talked about what we could do better next time.*

Conflict contagion was also quite prevalent, occurring in 24 percent of the narratives. In 7 percent of the narratives, conflict that originated with one individual evolved such that the entire team experienced conflict with one another. One narrative described conflict contagion in a sports team. The writer begins,

Table 1. Study 1 Examples of Conflict Origins as Described in Conflict Episode Papers

Origin: Individual
"Many of the conflicts surrounded one girl on the committee that opposed every suggestion the committee or I made."
"One of the players on our team didn't get along with anyone else . . . he always wanted to stand out and make himself look better than everyone else. . . . Other players on the team began to get annoyed with [this team member] only thinking about himself and not caring about the success of the team."
"I was once involved in a conflict that arised [sic] with a new person, a medical director, joining the company. Rather than experiencing our culture or ways of working, the person immediately formed a silo with his medical team, shutting down information flows to the commercial part of the company."
Origin: Dyad
"At first these two debated about differing ideas on what the venue and theme should be. As time went on and neither gave way on their idea it became more about winning to them than about finding a good working solution."
"In essence, [team member] and I just did not like each other. . . . Because [team member] and I were so focused on our own position and our own goals during the conflict, our conflict became both personal and extremely competitive. We were both driven to do whatever it took to beat the other person, not just in races, but in workouts and team popularity as well."
"I had two members in my working-team . . . [who] did not like each other too much. When one was arguing in one direction, the other one made a strange face, making clear that he/she was thinking this is nonsense. It wasn't a constructive way of working with each other, showing off too much of the emotions behind it."
Origin: Subgroup
"For our team the conflict focused on what each of us believed the vision of the company should be and the approach that we should take. Three groups of people formed during this conflict. One group believed that we should focus on creating an ecommerce business plan focusing on selling men's fashion. The second group believed that we should focus on creating a plan for a slow-fast food chain that resembles Chipotle Mexican Grill, and the third group believed that we should focus our efforts on creating the next big social media platform that connects people through the use of music."
"He and a few others wanted to make this pamphlet so we could hand it out at any community events we were participating in and while we were door knocking for our candidates. . . . Both [team member] and [team member], the higher up officials, completely disagreed with the idea of the pamphlet. They thought it would separate us from the other Senate Districts, which is something that they don't want to see happen."
"The first sign of conflict came when the three people assigned to research kept putting off their research. The rest of the group was unable to start their work because the research they were supposed to be doing was imperative for us to complete our work. . . . Although there were a couple of us who were still working hard at getting the project done, the majority of the team had already checked out. The division between the slackers and workers grew."
Origin: Team
"When we had our first meeting after the challenge was announced, everybody came up with their own idea on how we could build our robot. . . . Every member thought their idea was the best and wanted to use their own."
"Last year I took part in a task force that aimed to implement a new Time & Attendance software solution for all the Business Units of the Organization I am working for. The task force was made up of 5 professionals: one project manager and one representative from each BU. We started sharing our local T&A practices and the requirements that we thought should be fulfilled by the new application. The conflict arose when all the BU representatives realized that they had different needs as far as rules and new procedure details. None of us initially wanted to grant room for changes to minimize the impact on the as-is local administration practices."
"The conflict I specifically remember was when our team was losing to a lower-ranked team than us and we knew we should be beating them. . . . Members of my team, including myself, started to point fingers at one another rather than collaborating to build team morale. . . . As members started to call names and scream and shout at one another in the locker room after the first period, we began to lose sight of our task."

Table 2. Study 1 Frequencies of Conflict Origins and Evolution*

The conflict started because of . . .	And later involved . . . Individual	Dyad	Subgroup	Team	Total
Individual	18%	1%	–	7%	**27%**
Dyad	3%	17%	9%	5%	**33%**
Subgroup	–	–	24%	2%	**26%**
Team	–	–	1%	14%	**15%**
Total	**21%**	**17%**	**34%**	**28%**	

* Sample size = 109 narratives. Margin percentages may be different due to rounding. Percentages for the three evolutionary trajectories are: continuity = 73%, contagion = 24%, concentration = 4%.

> *Early in the season, I noticed that one of my teammates was somewhat critical of the other players on our team. She tended to place blame on everyone but herself. It started out as small comments and negative, telling body language. During games, she might yell at someone for a mistake they made or appear disengaged and frustrated on the bench if she didn't approve of how the game was unfolding.*

Later, the writer notes:

> *What started out as sparse commentary to select people and general frustration evolved into on-court bickering and tension throughout the entire team.*

Similarly, in 14 percent of the teams, dyadic conflict evolved into subgroup or whole-team conflict. This represents about two out of every five teams that began with a dyad origin. An example of dyadic conflict that evolved into subgroup conflict occurred when two members of a team suggested different approaches for a team presentation. The writer states,

> *But, as the rest of the team besides [team member] and I began to make up their minds, a more personal conflict began. . . . The team essentially divided into two coalitions, each behind one of us, and this made working together more difficult.*

In contrast, conflict concentration was relatively rare and limited to dyadic conflict evolving into individual conflict in only 3 percent of the narratives. Overall, Table 2 reveals conflict continuity as the primary evolutionary trajectory followed by conflict contagion.

Discussion

We conducted Study 1 to examine the plausibility and prevalence of the origins and evolutionary trajectories of team conflict as inferred from team member narratives. The results provide initial responses for RQ1 and RQ2. Our findings suggest several team conflict origins—the most prominent being a dyad, followed by one individual or a subgroup—but that whole-team conflict appears relatively less frequently. Thus, even though team members may recognize conflict within their team, it does not mean that all team members are engaged in it or are the origin of it, suggesting unique conflict experiences that are not necessarily uniform throughout the team.

The conflict narratives also suggest that conflict continuity is the dominant evolutionary trajectory, suggesting that prior assumptions of static conflict may be appropriate. These findings support the notions that teams may isolate individuals or dyads that drive conflict and that conflict among subgroups and whole teams can persist through entrenched factions and team norms. The narratives also provide some evidence for conflict contagion, though it is much less pronounced than conflict continuity. Also noteworthy is that contagion was more likely when conflict originated at lower levels (i.e., individual or dyad), whereas continuity was more likely when conflict originated at higher levels (i.e., subgroup or team), which suggests a possible relationship between origin and evolutionary mechanisms. Evidence for conflict concentration was limited to a few narratives that indicated intragroup conflict began with a dyad and converged on an individual as the origin of conflict.

Although this study enabled us to understand the plausibility and prevalence of these different origins of conflict as well as exemplars of each, the discoveries are limited by some factors of this sample. The written narratives covered a wide variety of team types, including corporate project teams, university course groups, sports teams, and community groups. This enabled us to consider broad themes applicable to many team conflict experiences, but the differences in contextual factors across narratives (e.g., team tenure, team task, etc.) limit our ability to make finer-grained comparisons. In addition, the written narratives offer the perspective of one individual, but the perspectives of other team members are missing, which is important to more fully address the non-uniformity of conflict in which team members have different experiences or levels of involvement in it.

Our next study addresses these gaps in our "knowing" (Behfar and Okhuysen, 2018) and helps us continue abductive inquiry into our questions about the origins and evolutions of team conflict. It examines the parties involved in conflict over time in a unified context, and it captures the perspectives of all team members using a social network approach, providing both a robust setting and a different lens with which to examine RQ1 and RQ2. It also separates task from relationship conflict, and it examines the relationship between conflict origins and traditional intragroup assessments of conflict (RQ3).

STUDY 2: LONGITUDINAL PROJECT TEAM SOCIAL NETWORKS STUDY

Method

Participants and procedures. We collected intragroup conflict data from 617 students in 126 teams at a large public university in the U.S. The data were collected over two 15-week semesters in 13 sections of a management course. The course was part of the lower-division (freshman and sophomore) core for business majors. Students were randomly assigned to teams of four or five members (48 percent women, 98 percent 18–20 years old, average high school GPA of 3.89). Measurement of team friendship early in the semester (week 4) showed a friendship rate of only 8 percent within the team, suggesting that there were few well-formed relationships prior to team formation. Teams were asked to develop a team process agreement soon after they formed and then worked on a multi-week project in which they critically read and analyzed a management text and presented their analysis to peers. The team project accounted for 20 percent of the students' grades.

We surveyed students during weeks 8, 11, and 15 of the semester, which we call the project start, midpoint, and end, respectively. These three time points capture teams before, during, and after their temporal midpoint, thus representing critical junctures in team development (i.e., developing new routines, midpoint adjustments, and focused push toward task completion, respectively) at which conflict is apt to manifest (Gersick, 1988). Project end responses were collected after students presented their projects but before final grades were published. Response rates for the surveys were 87 percent, 83 percent, and 92 percent for project start, midpoint, and end, respectively. Overall, 13 percent of the observations were missing. Comparisons showed that there was no significant difference in responses between students who completed all three surveys and those who completed only one or two. An 80-percent response rate is commonly viewed as adequate for network studies (e.g., Sparrowe et al., 2001); 71 percent of the teams met the response-rate threshold in all three project periods, 84 percent met it in at least two project periods, and 96 percent met it in at least one project period. Instead of excluding teams with lower response rates from the sample (i.e., case-wise deletion), we imputed missing values as described shortly in the data subsection. We chose to use all of the teams so that we did not exclude useful information. We also conducted our analysis with no imputation using only teams that met the 80-percent threshold in all three periods; the resulting inferences remained unchanged.

Variables. We collected individuals' perceptions of interpersonal task and relationship conflict with each of their teammates at each time period. Following the method outlined in Jones and Shah (2016), we transformed a multi-item psychometric intragroup conflict scale using items from Shah to Jehn (1993), Jehn (1995), and Jehn and Mannix (2001) into single-item network measures for task and relationship conflict. Single-item scales are acceptable when the scale is sufficiently narrow or unambiguous (Sackett and Larson, 1990; Wanous, Reichers, and Hudy, 1997), and it was important to reduce fatigue as respondents provided answers for multiple alters. We conducted an online survey to verify that our single-item measures mapped to their existing multi-item psychometric scale; see Appendix A for scale construction details.

To measure *interpersonal task conflict*, students rated their level of agreement with the statement "At times, we had task-related disagreements (i.e., we had different viewpoints on the task, different ideas about the task, or differing opinions about the work being done)" for each teammate at each survey point (1 = strongly disagree; 3 = neutral; 5 = strongly agree). Using the same scale, to measure *interpersonal relationship conflict*, students rated their level of agreement with the statement "At times, we had difficulty getting along (i.e., our personalities clashed), we disagreed about personal matters and non-work things (i.e., social or personal things)" for each teammate at each survey point. We subtracted 3 from the conflict values so that they ranged from −2 to 2 because the algorithm that identifies the conflict origins uses negative values to identify the absence of a conflict tie and positive values to identify the presence of a conflict tie.

We also collected traditional team-referent psychometric measures of intragroup task and relationship conflict. *Intragroup task conflict* (coefficient α = .88) and *intragroup relationship conflict* (coefficient α = .85) were three-item measures that reflected the same ideas as the dyadic single-item measures, but the referent in the items was the team versus a peer. A sample item for task conflict is "Team members have had opposing viewpoints on the task." A sample item for relationship conflict is "Team members have had difficulty getting along with each other." The items were rated on a 5-point scale (1 = never; 5 = often). Individual responses were aggregated to create the team conflict measures (task conflict ICC(1) = .22, ICC(2) = .55, median r_{wg} = .89; relationship conflict ICC(1) = .24, ICC(2) = .68, median r_{wg} = .95).

As controls, we included the percentage of men on the team, average high school GPA on the team, team size, and whether the team was part of an honors section.

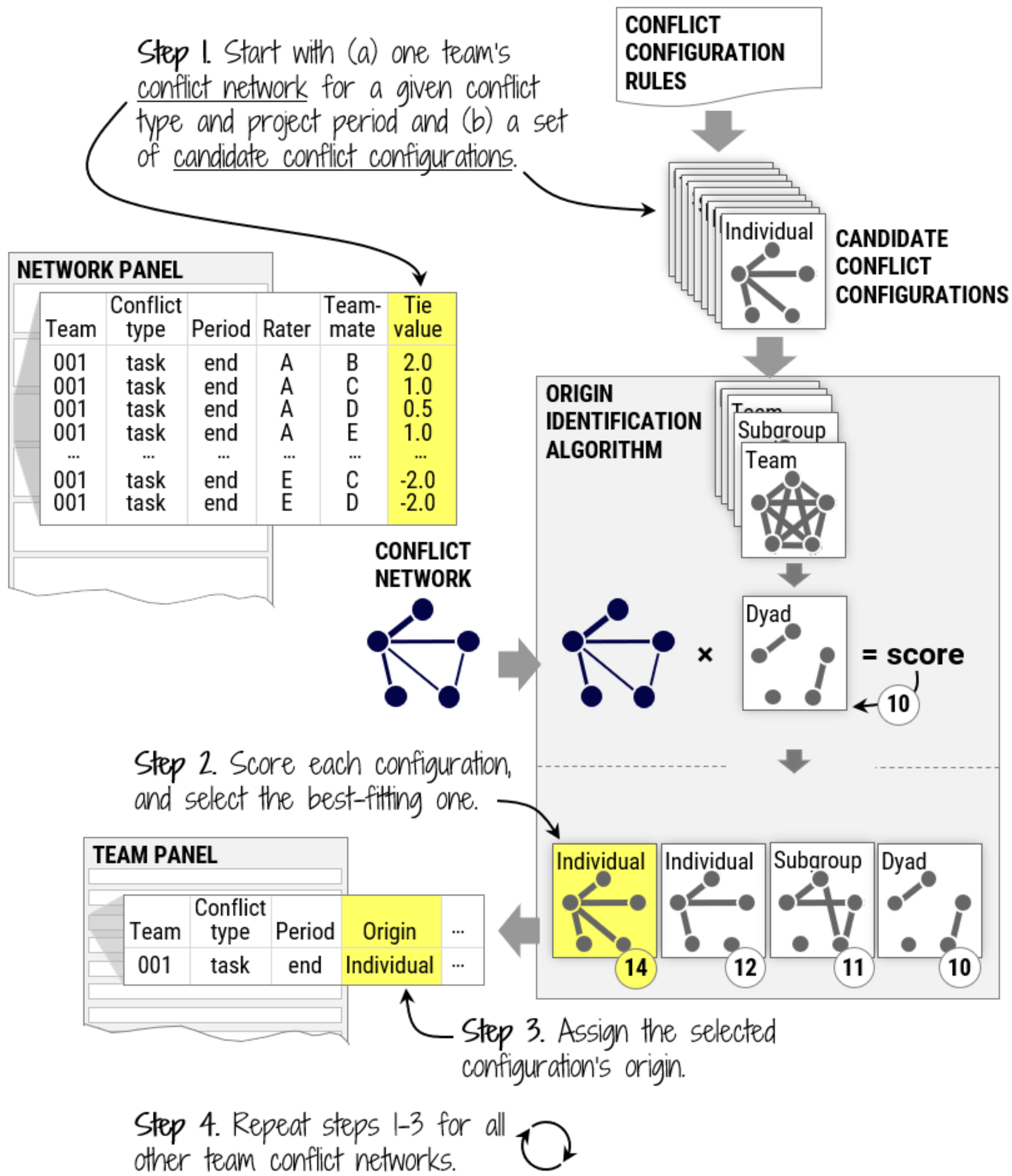
Data. The data were organized into two panels: a network panel and a team panel. The network panel included interpersonal task and relationship conflict measures. It was used to identify a team's task and relationship conflict origins at each project period, which were then assigned to the team panel in a procedure described below. The network panel was organized by rater (subject), teammate (ratee), conflict type, and time period. It included 2,416 rater–teammate conflict ties in 126 teams for two conflict types at three project periods. The team panel included the team-level measures and the teams' task and relationship conflict origins. It was used to examine the relationships between conflict origins and evolutionary trajectories and traditional assessments of intragroup conflict (RQ3). It included 126 teams for two conflict types at three project periods.

Prior to identifying conflict origins, we needed to account for rater biases and missing data. First, because the raw interpersonal conflict responses in the network panel capture not only a rater's behavioral involvement but also a rater's broader perceptions or biases regarding conflict in the team, we needed to account for those rater biases. To do this, we estimated the conflict ties using a linear mixed-effects model. The model regressed interpersonal task and relationship conflict on random effects for raters, teammates, dyads, and teams. We then used the model to derive conflict ties *excluding* rater biases captured by the rater effects (see Appendix B). This gave us unbiased estimates of behavioral involvement in conflict at the rater–teammate level. Second, the linear mixed-effects model allowed us to use regression-based imputation for missing conflict ties (Gelman and Hill, 2006). At a given project period, we used known information about a non-respondent (captured by the non-respondent's teammates or by the non-respondent's prior or future responses) to impute conflict ties. When insufficient information was available, we randomly sampled from the model's random-effects distributions; this replicated the variance in the model (Gelman and Hill, 2006) (see Appendix B for technical details about the imputation method). We also used regression-based imputation to fill missing responses to the traditional assessments of intragroup conflict before calculating team-level values.

Origin identification. Figure 4 outlines the four-step procedure we developed to identify each team's conflict origin. We summarize the steps here and then provide more detail on each in subsequent paragraphs. First, we entered a team's unbiased estimates of behavioral involvement in conflict for a given conflict type and project period (i.e., the team's conflict network) into an origin identification algorithm. We also entered a set of all possible conflict configurations that depict the conflict origins described in our literature review (i.e., candidate conflict configurations for individual, dyad, subgroup, and team origins). Second, we used the origin identification algorithm to score each possible candidate configuration based on how well it matched the observed data from the team's conflict network and to select the best-fitting configuration. Third, we assigned the selected configuration's origin to the team panel for that team. Fourth, we repeated the first three steps for each team for each conflict type and project period.

For step 1, we needed a team's observed conflict network, and we needed to generate a set of all the possible candidate conflict configurations that would, given the team's size, depict the four conflict origins we identified in our literature review. To do this, we constructed conflict configuration rules that determine "ideal type" configurations that clearly identify these origins and could be used with teams of various sizes (see Appendix C for a full list of the decision rules guiding this process). The *individual* origin rule includes configurations that place one team member as the central node with three or more teammates connected to that individual with a conflict tie. The *dyad* origin rule includes configurations that have two teammates connected with a conflict tie and who are not connected to others with conflict ties. The *subgroup* origin rule includes configurations in which there exist at least two subgroups, each of which has two or more team members who are *not* connected by conflict ties but who *are* connected with conflict ties to teammates who are in other subgroups. The *team* origin rule includes configurations in which at least four team members or the majority of team members (whichever is greater) are connected to every other team member with a conflict tie. Finally, *none* (or no conflict) includes the one configuration in which no conflict ties exist. Importantly, for each of these "ideal types" of conflict origins there can be many candidate configurations, depending upon team size (see Figure 1 for pictorial examples). Table C1 in Appendix C shows that for a team of five people, there are two possible candidate configurations for each origin, resulting in a set of eight candidate configurations depicting the four origins; for a team of 14 people, there are 167 possible can-

Figure 4. Overview of the Procedure to Identify Conflict Origins



didate configurations depicting these four origins. We used all possible candidate conflict configurations for each team in the process of identifying a team's conflict origin.

For step 2, we compared the team's observed conflict network with the set of all possible candidate conflict configurations using an origin identification algorithm in order to select the best-fitting configuration and corresponding origin. Within the algorithm, the conflict network is expressed as a sociomatrix in which every row represents a rater i and every column represents a teammate j. For any ij relationship, a positive value indicates the presence of a conflict tie and a negative value indicates the absence of a conflict tie, with larger positive (or negative) values indicating greater evidence of the presence (or absence) of a tie. Each candidate configuration is also expressed as a sociomatrix of the same size as the team's sociomatrix. In the candidate configuration sociomatrix, the expectation of a conflict tie at ij has a +1 value, and the expectation of no tie at ij has a −1 value. For example, every ij value in a *none* configuration would be −1. In a dyad configuration with one symmetric tie, only one ij, ji pair would have +1 values, and all others would be −1.

The algorithm compares a team's conflict sociomatrix with each possible candidate configuration, and it scores how well each configuration fits the actual network. For each ij relationship, the algorithm effectively multiplies the empirical ij value from the team conflict sociomatrix with the associated ij expectation in the candidate configuration sociomatrix. When an empirical value is positive and an expectation is positive, the product of the two is positive. The product is also positive when an empirical value and expectation are both negative. But if an empirical value and expectation have opposite signs—an empirical value is positive and an expectation is negative or vice versa—then the product of the two will be negative. The algorithm then sums the products to create an overall score of how well a candidate configuration fits the team's conflict network, with higher scores indicating better fit. This is illustrated in Figure 4, where four configurations have been scored at the bottom of the "origin identification algorithm" box, and the configuration with the individual origin has the highest score. (See Appendix D for a technical explanation of the algorithm.)

For step 3, we added the origin that corresponded to the best-fitting candidate configuration to the team panel for that team. As a result, each team was assigned an individual, dyad, subgroup, or team origin, or was assigned to *none* if there was no conflict. Although it is theoretically possible that teams have multiple conflict origins at any given time period, particularly if they are large, the origin identification algorithm as described above would have prioritized the best-fitting origin, which allows us to make clearer initial comparisons between origins. Future efforts could include creating a set of candidate configurations that allows for the existence of multiple origins as inputs for the origin identification algorithm (see Appendix C).

That said, the conflict origins identified for some teams using the current process could be sensitive to the random sampling we used for imputing missing data in the network panel, as described earlier. To address this, we repeated the imputation process ten times to construct ten different network panels. We then repeated our identification of the teams' conflict origins ten times. For teams with little or no missing data, the ten runs identified the same conflict origins every time. For teams with substantial missing data, the ten runs sometimes identified more than one possible origin. When this occurred, we included the multiple origins for a team and weighted the observations based on how often they appeared. For instance, if the ten runs identified an individual origin eight times and a dyadic origin two times, then both the individual and

Table 3. Study 2 Descriptive Statistics of Raw Conflict Scores*

Conflict type	Project period	Mean	S.D.	(1)	(2)	(3)	(4)	(5)
(1) Task	Start	−0.36	0.88					
(2) Task	Midpoint	0.17	1.07	0.36				
(3) Task	End	0.08	1.21	0.36	0.40			
(4) Relationship	Start	−0.72	0.60	0.47	0.18	0.20		
(5) Relationship	Midpoint	−0.28	1.01	0.18	0.58	0.22	0.23	
(6) Relationship	End	−0.39	1.07	0.17	0.22	0.65	0.24	0.31

* Sample size = 2,323 conflict ties. Conflict tie values range from −2 to 2. All correlations are significant at the .01 level.

dyad origins were included in the team panel and were given a weighting of .8 and .2, respectively. For task conflict across the three periods, 92 percent of teams identified one origin, 6 percent identified a dominant origin (or one origin for the majority of runs), and 2 percent did not identify a dominant origin. For relationship conflict, 95 percent of teams identified one origin, 4 percent identified a dominant origin, and 1 percent did not identify a dominant origin.

Finally, in step 4 we repeated the process until all team origins for all conflict types and project periods were identified and noted in the team panel.

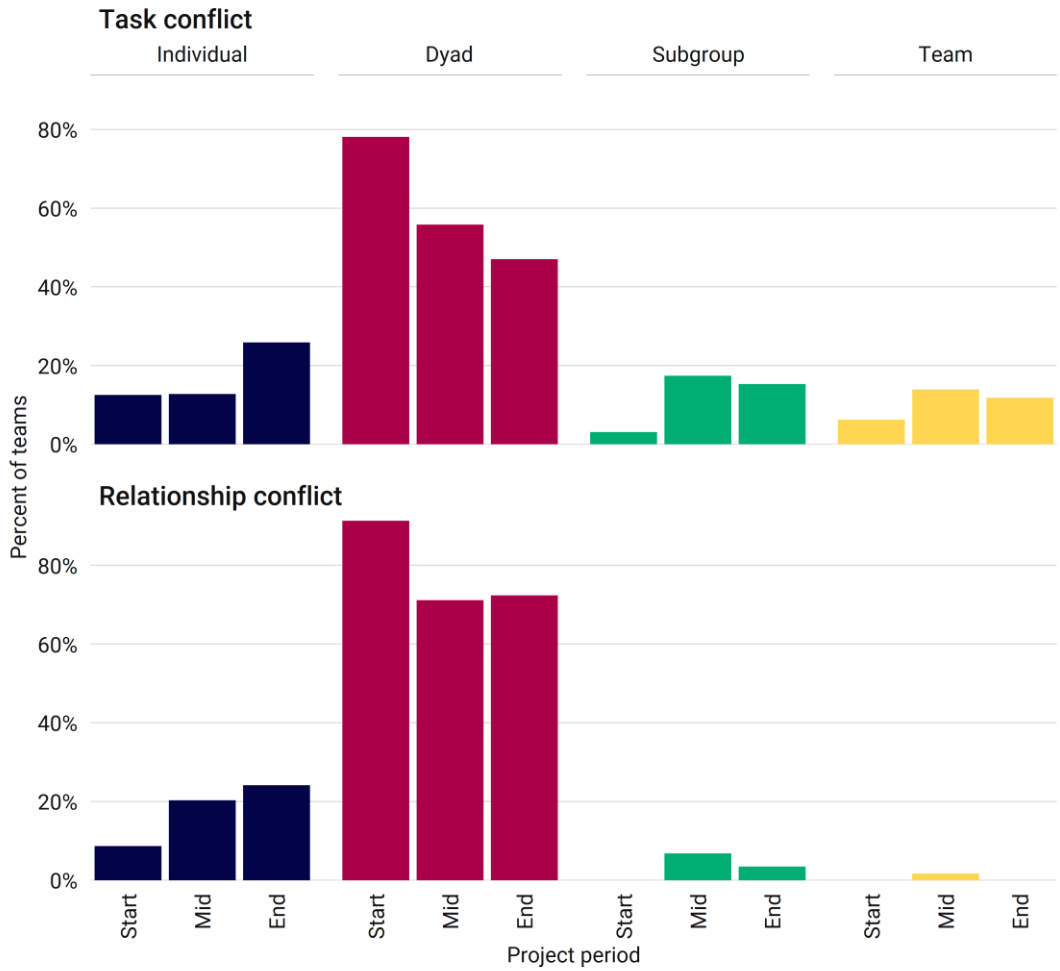
Evolution identification. Once the origins were identified, we also identified the conflict evolution trajectories. When a conflict origin moved from a lower-level origin to a higher-level origin (e.g., from individual to subgroup), the evolutionary trajectory was assigned to *contagion*. When a conflict remained at the same origin, the evolutionary trajectory was assigned to *continuity*. When a conflict origin moved from a higher-level origin to a lower-level origin (e.g., from team to dyad), the evolutionary trajectory was assigned to *concentration*. Note, conflict origins needed to be present at two consecutive time points to determine a conflict evolutionary trajectory. As such, when conflict remained at *none*, moved from *none* to an origin, or moved from an origin to *none*, the evolutionary trajectory was assigned to *none.*

Analytical strategy. Finally, after the conflict origins and evolution trajectories were assigned in the team panel, we regressed psychometric measures of intragroup task and relationship conflict at project end on the conflict origins at project midpoint and the conflict evolution trajectories from project midpoint to end. We focused on project midpoint and end because many more teams had conflict origins by the midpoint, whereas many teams did not have conflict at the project start. We stacked the team panel so that we could test both intragroup task and relationship conflict in the same model. We used pooled OLS with cluster-robust standard errors (clustered by team).

Results

Origins of conflict (RQ1). Table 3 presents descriptive statistics and correlations for the network conflict data. Of the 126 teams, we identified task conflict in 64 teams at the project start, 86 teams at the midpoint, and 85

Figure 5. Study 2 Frequency of Conflict Origins by Project Period



teams at the end. We identified relationship conflict in 23 teams at project start, 59 teams at the midpoint, and 58 teams at the end. The results presented are based on teams with an identified conflict origin. We use teams without conflict as the baseline comparison in our regression results.

Figure 5 addresses RQ1. It presents the frequency of each origin at each project period for teams experiencing task and relationship conflict. The most prevalent origin of task and relationship conflict was the dyad, followed by the individual. At project start, dyads were the origin of task conflict for 78 percent of teams; by project end, that number fell to 47 percent. Similarly, dyads were the origin of relationship conflict for 91 percent of teams at project start and 72 percent at project end. Individuals were the origin of task conflict in 13 percent of teams at project start and 26 percent of teams at project end. Similarly, the individual origin rose from 9 percent at project start to 24 percent by project end for relationship conflict.

We found fewer teams with subgroup and team conflict origins. For task conflict the subgroup origin rose from 3 to 15 percent from project start to end; the team origin rose from 6 to 12 percent. We note, however, that for task conflict the subgroup and team origins were as prevalent at project midpoint (14 and 17 percent, respectively) as the individual origin (13 percent). For relationship conflict, we identified even fewer teams with subgroup or team origins: the subgroup origin rose from 0 to 3 percent from project start to end (with 7 percent at project midpoint), and there were no instances of whole-team relationship conflict at project start or end (with 2 percent at project midpoint).

Evolution trajectories of conflict (RQ2). Figure 6 is an alluvial diagram illustrating the evolution of teams from one origin to another, including evolution from and to no conflict. The stacked bars depict the number of teams with a given conflict origin at a specific project period. The ribbons between bars depict the change in teams' conflict origins over time.

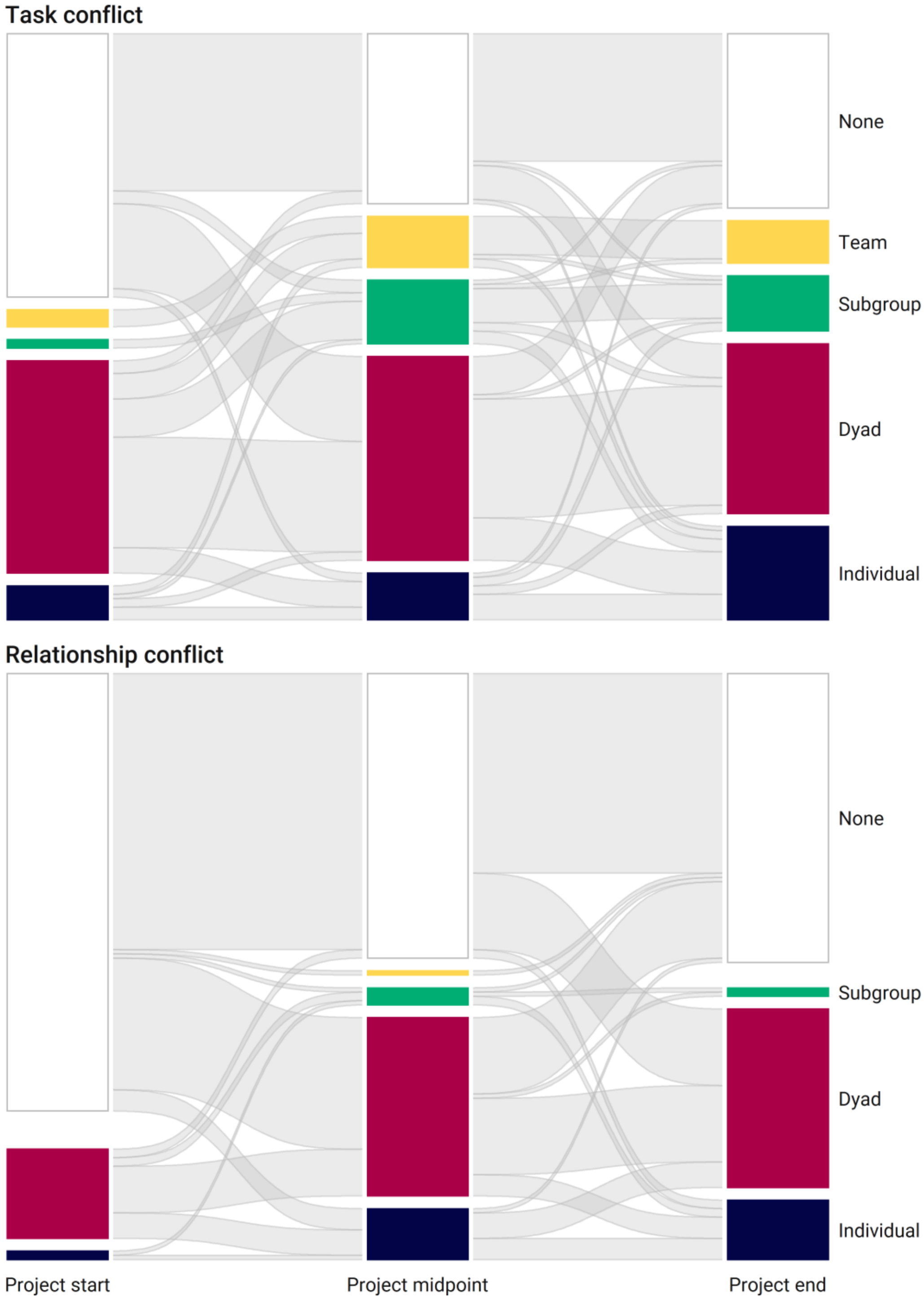
For teams with conflict, the most common evolutionary trajectory was continuity. Of the 61 teams that had a task conflict origin from project start to midpoint, 57 percent demonstrated conflict continuity; of the 21 teams with relationship conflict over the same period, 57 percent also demonstrated continuity. Continuity was found in every origin that existed at project start. Continuity became even more pronounced from project midpoint to end. Of the 75 teams with task conflict and the 38 teams with relationship conflict over that period, 68 percent and 63 percent, respectively, demonstrated continuity.

Contagion was more prevalent early on for task conflict. It constituted 33 percent of the evolution from project start to midpoint but only 8 percent from midpoint to end. Most of the early task conflict contagion was from the dyad origin to either the subgroup or team, though the individual origin also showed contagion. The contagion from the dyad origin almost completely disappeared from project midpoint to end for task conflict. There was less evidence of contagion for relationship conflict. It constituted 14 percent of the evolution from project start to midpoint and 18 percent from project midpoint to end. The most common contagion for relationship conflict was from the individual to the dyad origin during project midpoint to end.

We also observed conflict concentration at levels similar to contagion. For task conflict, concentration was less prevalent early on. It constituted only 10 percent of the evolution from project start to midpoint but 24 percent from midpoint to end. Most of the task conflict concentration was from the dyad to the individual. Similarly, most concentration for relationship conflict was from the dyad to the individual, and concentration was more prevalent early on: it constituted 29 percent of the evolution from project start to midpoint but only 18 percent from midpoint to end.

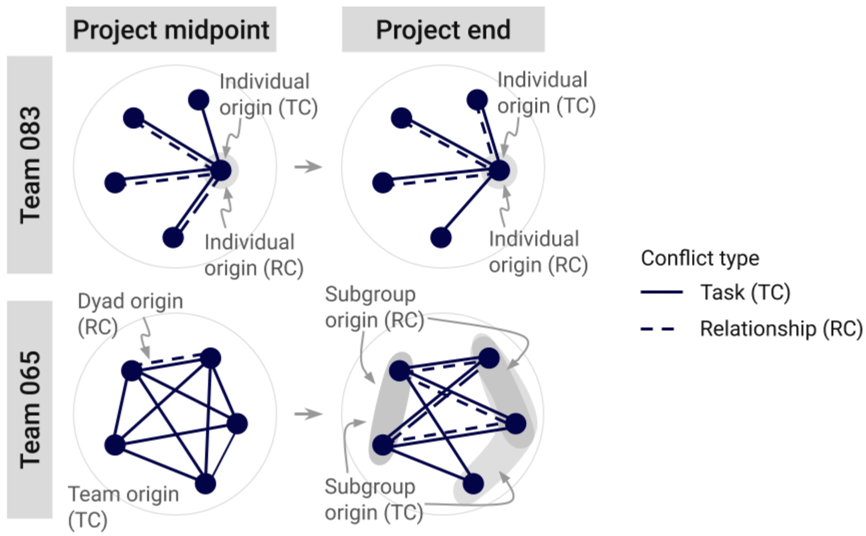
Because some teams did not have conflict, we also observed the origin of conflict when it first appeared or its origin before it was resolved. Figure 6 depicts 25 teams that did not have task conflict at project start but initiated task conflict at project midpoint. Of these 25 teams, 80 percent had conflict at the dyad origin. Similarly, of the 38 teams that initiated relationship conflict at project midpoint, 82 percent had a dyad origin. Moreover, when teams resolved conflict, the conflict that was

Figure 6. Study 2 Alluvial Diagram of Conflict Origins over Time*



* The height of the stacked bars represents the number of teams with a given conflict origin. The ribbons between bars depict the change in teams' conflict origins over time.

Figure 7. Study 2 Selected Conflict Network Configurations over Time



resolved was likely dyadic. Of the teams that resolved conflict at project end, 82 percent had task conflict with a dyad origin and 86 percent had relationship conflict with a dyad origin at the midpoint. In contrast, very little conflict with an individual origin was resolved: only one team each for task and relationship conflict resolved such conflict. And no teams resolved task conflict at the team origin.

Figure 7 provides two illustrative examples of the evolution of task and relationship conflict configurations from project midpoint to end. Team 083 is an example of conflict continuity for both task and relationship conflict. The same individual was both the "bad apple" and "principled dissenter" and remained so over time. The only difference between the task and relationship conflict configurations was that while all members were behaviorally involved in task conflict, one member was not involved in relationship conflict. Team 065 is an example of contagion for relationship conflict and concentration for task conflict. At project midpoint, relationship conflict existed only within one dyad, whereas task conflict involved everyone on the team. Over time, task conflict concentrated into two subgroups that still involved everyone. Meanwhile, relationship conflict spread to include four of the five eam members in two subgroups. The task and relationship conflict subgroups mirrored one another, with the exception of one team member who was behaviorally involved in task conflict but not relationship conflict.

Relationship with intragroup assessments of conflict (RQ3). Table E1 in Appendix E presents descriptive statistics and correlations for the team-level conflict data. Table 4 presents the regression results for the team-level analysis. Model 1 regresses intragroup task and relationship conflict on the origins of the same conflict type. Model 2 includes both task and relationship conflict origins. Model 3 regresses intragroup task and relationship conflict on the evolution trajectories of the same type. And

Table 4. Study 2 Pooled OLS Regression of Intragroup Conflict*

	Model 1		Model 2		Model 3		Model 4	
	Est.	S.E.	Est.	S.E.	Est.	S.E.	Est.	S.E.
DV: Intragroup task conflict, project end								
Task conflict origin, project midpoint								
Individual	0.40•	(0.16)	0.38••	(0.12)			0.00	(0.20)
Dyad	0.14	(0.07)	0.12	(0.09)			-0.26•	(0.12)
Subgroup	0.52•••	(0.11)	0.44•••	(0.12)			0.06	(0.14)
Team	0.33••	(0.12)	0.28•	(0.14)			-0.16	(0.16)
Relationship conflict origin, project midpoint								
Individual			0.26•	(0.13)				
Dyad			0.01	(0.09)				
Subgroup			0.25	(0.24)				
Team			-0.74•	(0.34)				
Task conflict evolution pattern, project midpoint to end								
Continuity					0.34•••	(0.08)	0.45•••	(0.12)
Contagion					0.46•••	(0.07)	0.44••	(0.16)
Concentration					0.48•••	(0.09)	0.59•••	(0.13)
DV: Intragroup relationship conflict, project end								
Relationship conflict origin, project midpoint								
Individual	0.44•	(0.19)	0.46•	(0.20)			0.42	(0.25)
Dyad	0.29•••	(0.08)	0.31•••	(0.09)			0.06	(0.06)
Subgroup	0.63••	(0.22)	0.62••	(0.21)			0.18	(0.18)
Team	0.41	(0.33)	0.35	(0.34)			0.41	(0.30)
Task conflict origin, project midpoint								
Individual			0.07	(0.13)				
Dyad			0.01	(0.08)				
Subgroup			0.02	(0.10)				
Team			-0.16	(0.13)				
Relationship conflict evolution pattern, project midpoint to end								
Continuity					0.44•••	(0.10)	0.32•••	(0.09)
Contagion					0.11	(0.09)	-0.25	(0.24)
Concentration					0.87•••	(0.23)	0.80••	(0.25)
Controls								
Team size	-0.02	(0.10)	-0.02	(0.10)	0.01	(0.09)	-0.03	(0.09)
Percent men	-0.01	(0.19)	0.00	(0.18)	0.09	(0.18)	0.05	(0.15)
GPA	-0.34	(0.23)	-0.36	(0.24)	-0.32	(0.18)	-0.38•	(0.19)
Honors section	0.17	(0.09)	0.16	(0.11)	0.13	(0.07)	0.18•	(0.08)
Task conflict intercept	3.24••	(1.05)	3.32••	(1.05)	2.93••	(0.97)	3.40•••	(0.92)
Relationship conflict intercept	2.60•	(1.05)	2.69•	(1.05)	2.37•	(0.97)	2.77••	(0.91)
R-squared	0.200		0.241		0.292		0.354	
Adjusted R-squared	0.171		0.193		0.270		0.317	

• $p < .05$; •• $p < .01$; ••• $p < .001$; two-tailed tests.

* Sample size = 126 teams; two dependent variables: intragroup task and relationship conflict. Cluster robust standard errors (clustered by team) are in parentheses. In Model 1, the individual, subgroup, and team origin effects were significantly greater than the dyad origin effect for both task and relationship conflict (χ^2 = 14.4, d.f. = 6, p = .025). In Model 2, the same significant differences appeared. In Model 3, the effect of relationship conflict contagion was significantly less than the effect of relationship conflict continuity and concentration (χ^2 = 13.7, d.f. = 2, p = .001). In Model 4, the same significant differences appeared.

Model 4 adds the conflict origins of the same type.

In Model 1, the individual, subgroup, and team origins of task conflict predicted the traditional intragroup assessment of task conflict. On average, the psychometric rating of intragroup task conflict at project end was .40 higher (95% C.I. = [.03, .65]) for teams with an individual origin at project midpoint than for teams with no conflict origin. Similarly, intragroup task conflict was .52 higher (95% C.I. = [.30, .74]) for the subgroup origin and .33 higher (95% C.I. = [.10, .55]) for the team origin. However, the dyad origin of task conflict had much less effect: on average, the psychometric rating was only .14 higher (95% C.I. = [–.01, .28]).

The individual, dyad, and subgroup origins of relationship conflict predicted the traditional intragroup assessment of relationship conflict. On average, the psychometric rating was .44 higher (95% C.I. = [.07, .82]) for teams with an individual relationship conflict origin than for teams with no conflict. Similarly, intragroup relationship conflict was .29 higher (95% C.I. = [.14, .44]) for the dyad origin and .63 higher (95% C.I. = [.21, 1.05]) for the subgroup origin of relationship conflict. We performed a joint chi-squared test to see if the effect of the dyad origin was lower than the other three origins for both task and relationship conflict. The dyad origin's effect on traditional intragroup assessments of conflict was significantly lower (χ^2 = 14.4, d.f. = 6, p = .025).

In Model 2, only one notable cross-conflict type effect was found. Intragroup task conflict was .26 higher (95% C.I. = [.03, .47]), on average, for teams with an individual origin of relationship conflict, controlling for the origins of task conflict. Also, intragroup task conflict was *lower* when relationship conflict had a team origin (est. = –0.74; 95% C.I. = [–1.41, –.07]), but so few teams had a team origin of relationship conflict (only 2 percent) that we caution against making inferences from the estimate.

In Model 3, task conflict contagion, continuity, and concentration all predicted traditional assessments of task conflict. On average, the psychometric rating of intragroup task conflict at project end was .34 higher (95% C.I. = [.19, .49]) for teams with task conflict continuity from project midpoint to end than for teams that had no task conflict over time (or that initiated or resolved task conflict). Similarly, intragroup task conflict was .46 higher (95% C.I. = [.31, .60]) for teams with task conflict contagion and .48 higher (95% C.I. = [.30, .66]) for teams with task conflict concentration. Relationship conflict continuity and concentration also predicted traditional assessments of relationship conflict. On average, the psychometric rating of intragroup relationship conflict was .44 higher (95% C.I. = [.24, .64]) for teams with relationship conflict continuity and .87 higher (95% C.I. = [.42, 1.31]) for teams with relationship conflict concentration than for teams that had no relationship conflict over time. But relationship conflict contagion had little effect on average psychometric ratings of intragroup relationship conflict (est. = .11; 95% C.I. = [–.06, .29]), and this effect was significantly lower than the effect of continuity and concentration (χ^2 = 13.7, d.f. = 2, p = .001).

In Model 4, we found that the evolution trajectories were better predictors of the traditional assessments of intragroup conflict than the conflict origins. The estimates of the evolution trajectories were similar to Model 3, but the conflict origins were no longer significant predictors. One exception is that, on average, traditional intragroup assessments of task conflict were .26 *lower* (95% C.I. = [–.49, –.03]) for teams with a dyad origin of task conflict than teams with no conflict, controlling for conflict evolution trajectories. Evolution trajectories are a function of the origins, however, making this estimate difficult to interpret.

Discussion

Study 2 affirmed the primary findings from Study 1 that addressed the origin (RQ1) and evolution (RQ2) of conflict. Like the first study, Study 2 found that the dyad was the most frequent origin of conflict and that conflict continuity was the most common evolutionary trajectory, both for task and relationship conflict. Whole-team conflict was less frequent than conflict that originated at lower levels, occurring in only 6 percent of the teams, on average, across conflict types and project periods. The consonance between the two studies is striking given that the two had dissimilar approaches—one using narratives and the other social network configurations—which converged with the same conclusions. Taken together, they confirm the idea that team conflict is not uniform in that individual team members have unique experiences, some as instigators or participants who are directly involved in conflict, and some as observers of conflict in which they are not behaviorally involved.

Study 2 also added new insights for RQ1 and RQ2 beyond those in Study 1. First, for relationship conflict, when compared with task conflict, the dyad origin was more common and the subgroup and team origins were less common. Second, for task conflict, we found that conflict contagion occurred early in the project (particularly from the dyad to the subgroup and team) but subsided later on when conflict continuity and concentration were more prevalent.

Study 2 also presented some contrasting findings from Study 1. Study 1 found very little evidence of conflict concentration; in contrast, Study 2 found evidence of concentration at frequencies similar to contagion. Yet we note that the modicum of evidence of concentration in Study 1 was primarily conflict that moved from the dyad to the individual origin; this is consonant with Study 2, which also found that most conflict concentration was from the dyad to the individual origin.

A primary aim of Study 2 was to address RQ3, which asks how conflict origins and evolution trajectories relate to traditional assessments of conflict. We found that the individual and subgroup origins were strongly associated with traditional assessments of task and relationship conflict. Further, the team origin of task conflict and the dyad origin of relationship conflict predicted intragroup task and relationship conflict, respectively. But the dyad origin for both types of conflict had a smaller predictive effect than the subgroup origin. This suggests that traditional measures of conflict may be obfuscating different conflict origins within a team and that traditional assessments may be poor at capturing conflict with a dyadic origin. This is particularly important, as the dyad—the most pervasive origin point for task conflict—is not associated with traditional assessments of intragroup task conflict.

It may be that when task conflict is contained within a dyad, other members fail to notice its existence or view it as interpersonal rather than intragroup conflict. This idea prompted us to examine whether those who were behaviorally involved in conflict perceived conflict differently. The algorithm that identifies origins also identifies which individuals are behaviorally involved in conflict and which are only observers (see Appendix D). We matched the individuals' conflict roles with their perceptions of intragroup task and relationship conflict. After accounting for variance in group means, we found those behaviorally involved in conflict (on average) rated intragroup task conflict .31 higher (95% C.I. = [.17, .45]) than their teammates who were observers; those behaviorally involved rated intragroup relationship conflict .23 higher (95% C.I. = [.10, .36]) than observers. Thus, if behavioral involvement in conflict is isolated to a single dyad within a team, it may not be salient for the whole group such that it manifests in ratings of intragroup conflict. In contrast, the individual level may still register as intragroup conflict because, while only a single individual instigates the conflict, many team members are behaviorally involved. This supplemental analysis also suggests that differences in perceptions of conflict (i.e., conflict asymmetry) can be attributed in part to non-uniformity in conflict experiences.

Study 2 also suggests that traditional assessments are related to most evolution trajectories. All three evolution trajectories predicted intragroup task conflict. But only relationship conflict continuity and concentration—not contagion—predicted intragroup relationship conflict. These findings are intriguing because contagion is often employed to explain intragroup conflict over time. Our findings suggest that contagion is not a good predictor of intragroup relationship conflict and holds no special position for predicting intragroup task conflict.

The strength of Study 2 was its longitudinal design and its prospective assessment of conflict from all team members' viewpoints within a complete project cycle. But teams were only active three months, limited to five members, and from a university setting. Our third study continues our abductive inquiry in a manufacturing setting with teams of varying sizes to investigate conflict origins (RQ1), to reexamine their relationship with traditional assessments of conflict (RQ3), and to observe their role on team performance (RQ4).

STUDY 3: SOCIAL NETWORKS STUDY AMONG WORK TEAMS

Methods

Participants and procedures. We collected conflict data from 750 employees in 84 teams at a Chinese electric bicycle manufacturer. This site was a rich context to study: it provided real-world teams of various sizes with team members working interdependently on tasks related to welding, coating, and assembling bicycles. In this setting, team members were compensated predominantly based on their team's productivity—thus increasing the need for intragroup coordination and cooperation and heightening the opportunity for conflict. The 84 teams were organized into 25 factory lines and ranged in size from three to 16 members. We limited our analysis to 698 employees (31 percent women; age range 21 to 40 years, mean age = 31) in 79 teams that ranged from four to 14 members. (Two three-person teams were not large enough to identify the conflict origins, and three 15- and 16-person teams were too large for the conflict origins algorithm to process.) Team tenure ranged from one to nine years (mean = three years), and a team leader was appointed for 39 of the 79 teams (49 percent).

We administered a paper survey to employees during their breaks. An English version of the survey was translated into Chinese by two researchers fluent in both Chinese and English, following the translation-back translation procedure recommended by Brislin (1980). Participation in the survey was voluntary (employees could opt out), and employees received a nominal compensation for their time (team members received 20 yuan, and team leaders received 50 yuan—approximately 3 and 7 USD, respectively). The response rate was 91 percent, and 85 percent of the teams met the 80-percent response rate threshold. Similar to Study 2, we did not exclude teams with lower response rates and instead imputed missing values (see Appendix B). We also conducted our analysis with no imputation and only teams that met the 80-percent threshold; like Study 2, the inferences remained unchanged. Team performance data were collected from three managers who supervised 77 of the 79 teams (97 percent). Two of the managers received 100 yuan and the third received 200 yuan based on the proportion of teams they were asked to report on (approximately 14 and 28 USD, respectively).

Variables. To collect individuals' perceptions of interpersonal task and relationship conflict with each of their teammates, we simplified our existing single-item measures into two items for each type of conflict (out of concern that our existing measure would not translate well due to its length). The two task conflict items (coefficient $\alpha = .78$) were "We have different opinions about the team's work" and "We have conflicting ideas about how to complete our work." The two relationship conflict items (coefficient $\alpha = .73$) were "We have difficulty getting along" and "We experience relationship tension." A 7-point scale (1 = strongly disagree, 7 = strongly agree) was used for each item. We subtracted 4 from the conflict values so that they ranged from −3 to 3. Psychometric intragroup task and relationship conflict were collected using the same measures as in Study 2 (coefficient $\alpha = .71$ and .86, respectively), also using the 7-point scale. We aggregated the individual responses to create the team conflict measures (task conflict ICC(1) = .12, ICC(2) = .61, median $r_{wg} = .59$; relationship conflict ICC(1) = .15, ICC(2) = .37, median $r_{wg} = .72$).

Team performance was rated by external managers using five items (Gonzalez-Mulé et al., 2016; coefficient $\alpha = .89$) on a 7-point scale (1 = strongly disagree, 7 = strongly agree). An example item is "This team meets the requirements set for it." As controls, we included team size, percentage of men, average age, average tenure, whether the team has an appointed lead, and manager (rater) dummy variables.

Data. Similar to Study 2, the data were organized into a network panel and a team panel. The network panel was used to identify the team origins, which were added to the team panel. The network panel included 6,012 rater–teammate conflict ties in 79 teams for two conflict types. The team panel included 79 teams for two conflict types. As in Study 2, we used a linear mixed-effects model to account for rater biases and impute missing data (as outlined in Appendix B).

Origin identification and analytical strategy. We followed the same procedure as Study 2, using the same conflict configurations and the conflict origins algorithm. Like in Study 2, we used weighted observations when missing data imputations suggested more than one origin. For task conflict, 62 percent of teams identified one origin, 29 percent identified a dominant origin, and 9 percent did not identify a dominant origin. For relationship conflict, 67 percent of teams identified one origin, 30 percent identified a dominant origin, and 3 percent did not identify a dominant origin. We also followed Study 2's analytical strategy for examining RQ3 by regressing intragroup task and relationship conflict on the task and relationship conflict origins. To address RQ4, we analyzed the 77 teams with performance ratings. We regressed team performance on psychometric intragroup task and relationship conflict and on the task and relationship conflict origins using OLS with cluster-robust standard errors (clustered by factory line).

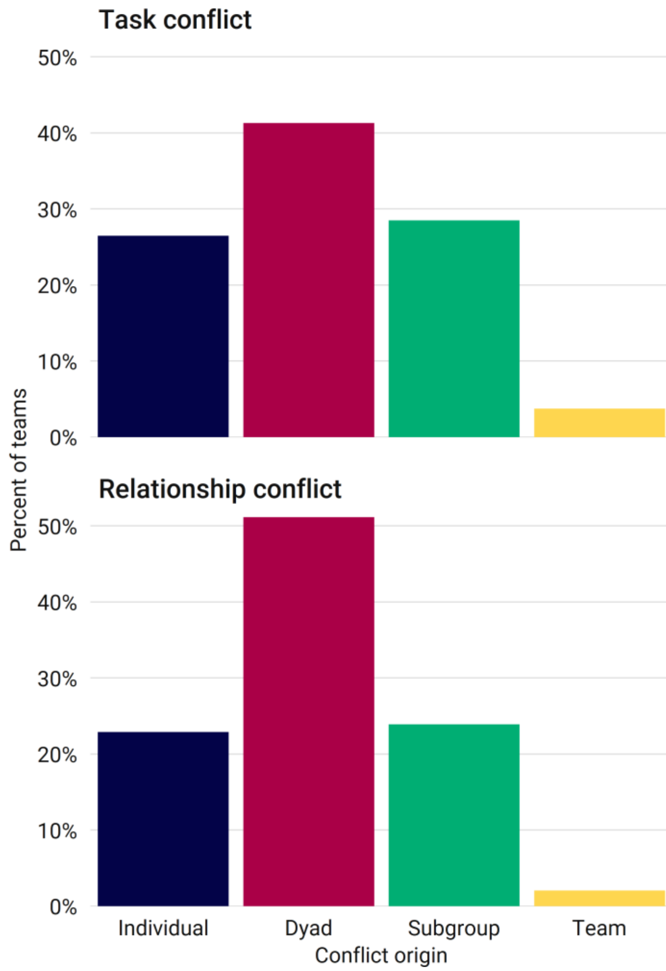
Results

Origins of conflict (RQ1). Of the 79 teams, we identified task conflict in 64 teams and relationship conflict in 49 teams. While the results focus on teams with a conflict origin, teams without conflict were used as the baseline comparison in our regression results.

Figure 8 addresses RQ1. It presents the frequency of each origin for task and relationship conflict. The most prevalent origin for both conflict types was the dyad, accounting for 42 percent of teams with task conflict and 51 percent of teams with relationship conflict. The subgroup and individual were second and third in frequency, accounting for 28 and 27 percent of teams with task conflict, and 24 and 22 percent of teams with relationship conflict, respectively. The team origin accounted for only 3 percent of teams with task conflict and 2 percent of teams with relationship conflict.

Relationship with intragroup assessments of conflict (RQ3). At the team level, we regressed intragroup task and relationship conflict on the origins of the same conflict type, similar to Model 1 of Table 4. As in Study 2, we found that the subgroup and team origins of task conflict predicted the traditional intragroup assessment of task conflict. On average, the psychometric rating of intragroup task conflict was .87 higher (95% C.I. = [.34, 1.39]) for teams with a subgroup origin than for teams with no conflict origin. Similarly, intragroup task conflict was .68 higher (95% C.I. = [.08, 1.27]) for the team origin. Unlike Study 2, however, the individual origin was not a significant predictor, though the estimate was similar to the estimate in Model 1 of Table 4

Figure 8. Study 3 Frequency of Conflict Origins



(est. = .33; 95% C.I. = [−.16, .83]). As in Study 2, the dyad origin effect of task conflict was not significant (est. = .40; 95% C.I. = [−.12, .91]).

As in Study 2, the individual, dyad, and subgroup origins of relationship conflict predicted the traditional intragroup assessment of relationship conflict. On average, the psychometric rating was .51 higher (95% C.I. = [.22, .79]) for teams with an individual relationship conflict origin than for teams with no conflict. Similarly, intragroup relationship conflict was .26 higher (95% C.I. = [.06, .47]) for the dyad origin and .62 higher (95% C.I. = [.27, .96]) for the subgroup origin of relationship conflict. Unlike Study 2, intragroup relationship conflict was also 1.36 higher (95% C.I. = [.87, 1.85]) for the team origin, but again, only 2 percent of teams had a team origin for relationship conflict, so we caution against making inferences from the estimate. Similar to Study 2, the effect of the dyad origin on the traditional intragroup assessment of conflict was significantly lower than the effect of the other three origins (χ^2 = 30.8, d.f. = 6, p < .001) for both task and relationship conflict. (Full regression results are available upon request.)

Table 5. Study 3 OLS Regression of Supervisor-rated Team Performance

	Model 1		Model 2		Model 3		Model 4	
	Est.	**S.E.**	**Est.**	**S.E.**	**Est.**	**S.E.**	**Est.**	**S.E.**
Intragroup task conflict	-0.15	(0.08)					-0.20**	(0.08)
Intragroup rel. conflict	0.03	(0.13)					0.03	(0.12)
Task conflict origins								
Individual			0.47**	(0.16)			0.49**	(0.16)
Dyad			0.40**	(0.14)			0.41**	(0.15)
Subgroup			0.22	(0.17)			0.40	(0.21)
Team			0.14	(0.19)			0.26	(0.26)
Relationship conflict origins								
Individual					-0.05	(0.13)	-0.12	(0.17)
Dyad					0.20	(0.11)	0.15	(0.14)
Subgroup					-0.03	(0.17)	0.00	(0.20)
Team					-0.15	(0.31)	-0.15	(0.23)
Controls								
Team size	0.01	(0.02)	-0.02	(0.02)	0.00	(0.02)	-0.02	(0.02)
Percentage men	-0.31	(0.18)	-0.39*	(0.15)	-0.34*	(0.17)	-0.28	(0.15)
Mean age	-0.01	(0.02)	0.00	(0.02)	0.00	(0.02)	-0.01	(0.02)
Mean tenure	0.02	(0.05)	0.01	(0.04)	0.01	(0.04)	0.02	(0.04)
Has lead	0.12	(0.16)	0.20	(0.12)	0.20	(0.13)	0.14	(0.14)
Manager 2	-0.57*	(0.26)	-0.45	(0.23)	-0.49*	(0.25)	-0.61**	(0.23)
Manager 3	0.31	(0.17)	0.38*	(0.18)	0.39*	(0.18)	0.26	(0.15)
Intercept	5.82***	(0.70)	5.13***	(0.65)	5.13***	(0.71)	5.78***	(0.62)
R-squared	0.408		0.443		0.406		0.497	
Adjusted R-squared	0.401		0.435		0.397		0.486	

* $p < .05$; ** $p < .01$; *** $p < .001$; two-tailed tests.
* Observations = 77 teams. Cluster robust standard errors (clustered by factory line) are in parentheses. Rel. = relationship.

Relationship with team effectiveness (RQ4). Table E2 in Appendix E presents the means, standard deviations, and correlations between the variables. Table 5 presents the regression results. Model 1 regresses team performance on intragroup task and relationship conflict. Model 2 regresses team performance on the task conflict origins, and Model 3 regresses it on relationship conflict origins. Model 4 includes all the variables from the prior models.

In Model 1, consistent with recent meta analyses (e.g., de Witt, Greer, and Jehn, 2012), we found no evidence that the traditional assessments of task and relationship conflict predict team performance. But we found that the task conflict individual and dyad origins do predict team performance in Model 2. On average, team performance was .47 higher (95% C.I. = [.13, .76]) for teams with an individual origin and .40 higher (95% C.I. = [.12, .66]) for teams with a dyad origin than for teams with no task conflict origin. In Model 3, we found no evidence that relationship conflict origins predict team performance.

In Model 4, the estimated effect of the individual and dyad origins of task conflict were very similar to Model 2. Also, when controlling for the task conflict origins, we found that the effect of the traditional intragroup assessment of task conflict was negative: on average, team performance was .20 lower (95% C.I. = [−.35, −.06]) for every one-point increase in task conflict, controlling for the task conflict origins.

Discussion

Study 3 affirmed the findings in the previous studies for RQ1. Again, dyadic conflict was the most frequent origin of conflict in teams, and whole-team conflict was the least frequent origin. Combined, the three studies give strong corroborative evidence for these origins of conflict. Study 3 also provides evidence of generalizability not just to an organizational setting but also across cultures, as data were collected in a collectivistic culture where relational harmony and indirect conflict are normative compared with the individualistic culture represented in the samples for Study 1 and Study 2 that emphasizes task focus and direct confrontation (Brett, Behfar and Sanchez-Burks, 2014).

Interestingly, the frequency of origins in Study 3 mirrored the frequencies found in Study 1, whereas Study 2 found less subgroup conflict than the other two studies. This suggests that the lower frequency in Study 2 is not due to method (since Studies 2 and 3 used the same method) or to retrospective vs. prospective assessments (since Studies 1 and 3 differed in this way). It is more likely due to differences in team size. Team sizes in Study 3 ranged from 4 to 14; team sizes in Study 1 were not specifically stated, but the narratives clearly implied teams of varying sizes. In contrast, Study 2 teams were limited to five members. We examined the Study 3 descriptive data further and found that of the 17 teams with six or fewer members, none had a subgroup origin for task or relationship conflict, but a dyad origin was common. It is plausible that conflict due to subgroups is unlikely to arise when teams are small, perhaps due to a lack of opportunity to draw others into a coalition.

Study 3 also reaffirmed many of the insights from Study 2 regarding RQ3. The dyad origin did not predict traditional assessments of intragroup conflict, but the subgroup origin did. There was also evidence that the individual and team origins predict intragroup conflict assessments, though the support was not always consistent for both conflict types across both studies. Relative to the dyad origin, the subgroup, individual, and team origins were stronger predictors of intragroup conflict ratings.

Study 3 aimed to address RQ4, which considers the implications of conflict origins for team effectiveness. We found no evidence that relationship conflict origins negatively predicted team performance. However, we found that the individual and dyad origins of task conflict were positively related to team performance. This is particularly interesting because the traditional measure of intragroup task conflict was negatively related to team performance—suggesting that the two are capturing different aspects of conflict. The results suggest that a principled dissenter on a team or two individuals debating ideas for how work should be accomplished can improve team outcomes, but when team members perceive broad or divisive task conflict (as captured by the traditional measure), it has an opposite effect of undermining performance. Fully teasing apart the differences in effects is handicapped because the traditional measure can capture many different things, including evidence of a range of origins and multiple team member perceptions. Thus understanding how conflict relates to task performance requires understanding the origins of that conflict.

GENERAL DISCUSSION

Our research clearly demonstrates that intragroup conflict is not uniform, shared, or static and that this is consequential for predicting team performance. Empirical evidence along these lines has been mounting for at least a decade, along with calls to account for the dynamic properties of teams. We responded to this challenge by employing an abductive approach to conjecture conflict origins and evolution patterns from existing theory and our understanding of the phenomenon. We then conducted three studies with a mix of qualitative and quantitative methodologies designed to address four critical research questions that we posed about the nature of team conflict. In all, our studies reveal that intragroup conflict is not what it seems at first blush. These studies not only answer our initial questions but also reorient the study of intragroup conflict and thus bring theoretical clarity and coherence to a phenomenon in need of reconceptualizing.

At the core of our research are the four questions that drove our abductive approach. The first is where conflict within teams originates. Our results from all three studies show that what scholars have historically called intragroup or team conflict most commonly originates from individuals, dyads, or subgroups, with dyadic conflict being most prevalent. Conflict that involves the whole team is quite rare. The relative frequencies of conflict origins are strikingly similar across the studies even though the studies used different methodologies and contexts and were conducted across different cultures. Moreover, the insights we find apply to both task and relationship conflict. The results suggest that assumptions of uniformity—in which team members have similar conflict experiences based on a shared task and social context (Korsgaard, Ployhart, and Ulrich, 2014)—have masked different underlying conflict origins, which imply unique conflict experiences and roles.

Next, we asked how team conflict evolves over time. Results from Studies 1 and 2 suggest that conflict continuity is most common, and conflict contagion and concentration are less common. These findings suggest that intragroup conflict tends to be sticky, which is contrary to the popular notion that conflict is prone to spread in a team over time. Perhaps because emotion tends to spread (e.g., Barsade, 2002), we have incorrectly assumed the same about conflict. The prevalence of conflict continuity reiterates the importance of conflict origins. If conflict contagion were ubiquitous, it would be only a matter of time before conflict enveloped all team members and the conflict's origin became of little concern, but the results cast strong doubt on the ubiquity of contagion. Still, we do find some evidence of conflict contagion and concentration. For example, we find conflict contagion in Study 2 as task conflict spreads from the beginning of the project to the midpoint; conflict then concentrates from the midpoint to the end, perhaps following the arc of the team's project lifecycle. Across Studies 1 and 2 and both types of conflict, concentration most often occurs from a dyad to an individual. This suggests that when dyadic conflict occurs, observers may at times be prone to blame or scapegoat one conflict participant and take the side of the other, such that over time one team member becomes the focus of conflict.

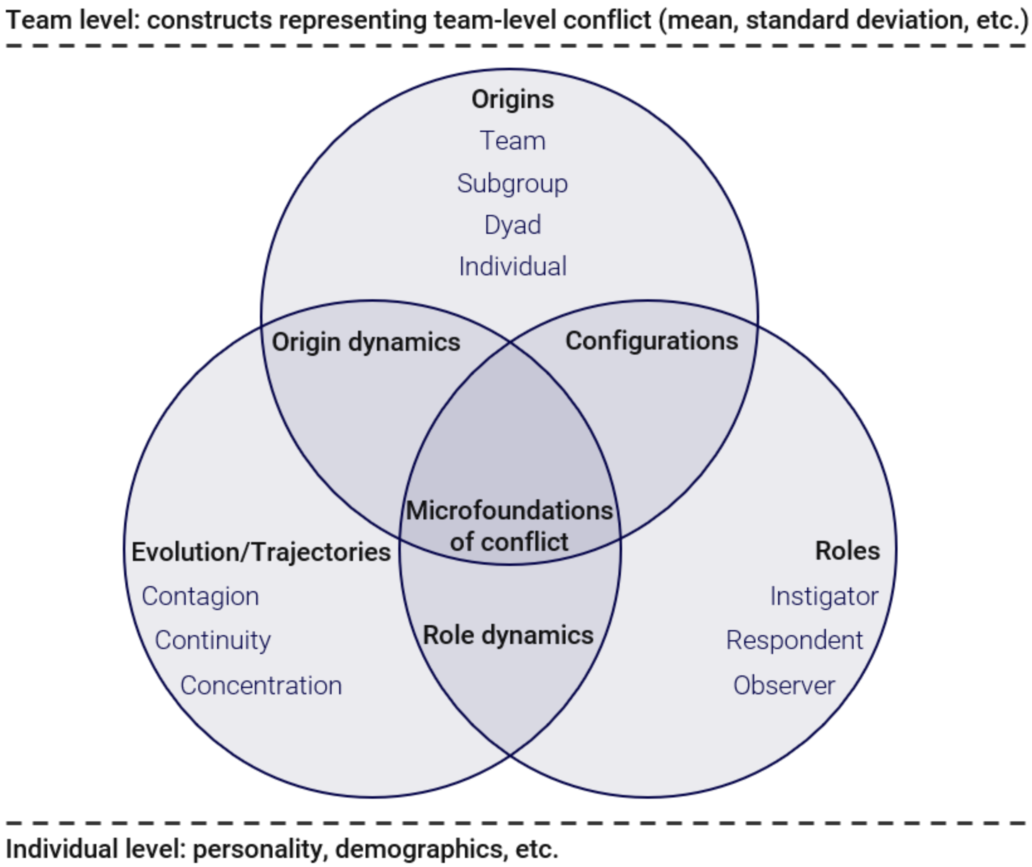
Our third research question was about how conflict origins and evolutionary trajectories relate to traditional intragroup assessments of conflict. Studies 2 and 3 reveal that intragroup assessments of conflict tend to mask unique conflict origins. Specifically, dyadic conflict—despite being foundational to team conflict (Humphrey et al., 2017) and the most common origin in our studies—is a poor predictor of intragroup conflict measured using a traditional assessment. The results of Study 2 also suggest that both conflict continuity and concentration predict intragroup conflict, but conflict contagion is not predictive of intragroup relationship conflict, nor is it a better predictor of intragroup task conflict than the other trajectories. Thus current measures of intragroup conflict are in urgent need of reassessment as they do not differentiate among origins and trajectories, each of which appears to be consequential for predicting substantive outcomes of team conflict. Moreover, the lack of shared perceptions in traditional assessments may represent more than rater noise or individual differences; different perceptions also capture underlying differences in team members' conflict roles. Thus the assumption of sharedness and the ability to aggregate to a single statistic representing intragroup conflict looks untenable.

Finally, our fourth question asked how different conflict origins predict team performance. Study 3 provides evidence that some origins do predict performance, with differing effects of traditional assessments of intragroup task conflict and task conflict origins, further highlighting the importance of examining conflict origins. While the traditional intragroup task conflict assessment did not predict team performance (or was a negative predictor), both individual and dyad task conflict origins positively predicted team performance. Intriguingly, these results suggest that teams experiencing conflict among a minority of their members benefit from conflict, which is consistent with the Sinha et al. (2016) finding that positively skewed conflict benefits team performance. Perhaps the long-held theory suggesting positive benefits from task conflict has been correct all along, but assumptions about uniformity have masked this important effect, leading to meta-analytic findings of inconsistent effects (e.g., de Wit, Greer, and Jehn, 2012). Our findings from Study 3 suggest that these past inconsistencies may be due to using a blunt measure of conflict rather than a fine-grained measure of where in the team conflict is occurring.

The Microfoundations of Intragroup Conflict

Beyond these specific findings from our studies, our research reveals a broader canvas on

Figure 9. Microfoundations of Intragroup Conflict



which a range of recent research fits. We sketch this canvas in Figure 9. It ties together seemingly unconnected research such as work on dyadic conflict (Humphrey et al., 2017), conflict asymmetry (Jehn, Rispens, and Thatcher, 2010), and conflict expression (Weingart et al., 2015). The canvas reveals a suite of ideas best described as the microfoundations of intragroup conflict. Microfoundations sit above the level of theory and research on individual group members, such as effects of personality and demographics, but below the broad notion of intragroup conflict assessed as a team-level property. We show the need to look within teams, without assuming that conflict experiences are uniform, conflict perceptions are shared, or conflict is static over time.

Our research reveals three primary factors when we relax assumptions about intragroup conflict: the origin, the evolution or trajectory, and the different roles individual members play in conflict. The first critical lens for viewing the microfoundations of intragroup conflict is the origin, whether individual (e.g., Felps, Mitchell, and Byington, 2006), dyad (e.g., Humphrey et al., 2017), subgroup (e.g., Carton and Cummings, 2012), or whole team. The results of our studies are provocative as they clearly illustrate that conflict is not uniformly experienced in teams and that certain conflict origins positively predict team performance, despite current intragroup conflict scales failing to show consistent results.

The second critical lens is the evolution or trajectory of conflict: whether it remains static, spreads through contagion, or concentrates to fewer people over time. Again, the results are revealing, showing that contagion is surprisingly rare although prominent in conflict theory. Study 2 shows that conflict is sticky, or persists at its origin, suggesting that conflict stasis where conflict remains unresolved is more common than episodic cycles of conflict and conflict resolution. Even so, conflict is sometimes dynamic, and taking over-time experiences into account is critical in examining its microfoundations.

The third critical lens is the roles played within a group and their effects on perceptions or outcomes of conflict. Beyond classic work on identifying team roles generally (e.g., Belbin, 1981), our findings highlight more specific structural team roles tied to conflict experiences. Our application of social networks methodology to modeling conflict origins led to the discovery that individual team members can be the instigators of conflict, the respondents to the instigator(s), or unaligned observers. Although we did not fully understand the significance of this lens until later in our abductive inquiry, we believe it provides critical insights into the underlying reasons that conflict is not uniform or shared. For example, our supplemental analysis in Study 2 revealed that conflict participants systematically rated intragroup conflict higher than observers, suggesting that conflict asymmetry may be caused in part by differences in lived experience, according to conflict roles.

The three lenses together create the microfoundations of intragroup conflict, and the overlap between lenses generates even more lines of inquiry for conflict researchers. Questions about origin dynamics arise in the overlap between origins and evolution. Our results across all three studies suggest that dyads are the most prominent origin. Study 2 demonstrates that conflict is often initiated at dyadic levels, but dyadic conflict exchanges are foundational (e.g., Humphrey et al., 2017), so one might ask why we see anything else but dyadic conflict over time. Teams provide a defined social context for observing interpersonal exchanges, so we might also ask what group situations prompt different origins of conflict and movement between origins. For example, why does more movement occur between the dyad and individual origins of conflict than between other origins? Incorporating social network principles of balance theory to conflict relationships may provide insight into the structural reasons that certain patterns are more or less evident.

The overlap between roles and origins generates questions related to configurations of conflict within teams. Teams of different sizes may have the same conflict origins but different configurations of conflict roles. For example, small and large teams may have dyadic conflicts, but this conflict origin may or may not indicate widespread behavioral involvement (e.g., one dyad or multiple dyads of team members participating in conflict). This leads to a host of questions, such as: Does it matter whether most team members are unaligned observers or behaviorally involved as instigators or respondents? When people are behaviorally involved in conflict, they are more likely to show more intense conflict expression than when they are observers (Weingart et al., 2015). With this in mind, we could also imagine further exploring conflict asymmetry (Jehn, Rispens, and Thatcher, 2010) within and/or between conflict roles, as opposed to as a team-level property that rests above these microfoundations. We might also ask whether conflict asymmetry is a stable group property as the current measure implies, whether different configurations with the same standard deviation might produce different overall effects, or whether we should consider the perceptions of active participants and bystanders separately as a matter of course.

The question of role dynamics falls between team roles and evolution, and it motivates questions about changing roles and evolution trajectories. What conditions will motivate observers to become involved and contribute to the conflict? For example, will observers bridging two warring factions escalate or deescalate conflict? Presumably the answer depends on the number of people who are instigators, respondents, and observers, or their network properties such as centrality in an advice network (Balkundi, Barsness, and Michael, 2009). It may also depend on how conflict is expressed across time in a team (Weingart et al., 2015).

Finally, in the center of the diagram, the microfoundations of intragroup conflict unite origins, evolution, and roles in one place. Many questions could be asked about intragroup conflict here: How would the actions of otherwise uninvolved observers affect conflict trajectories depending on the origin of the conflict? Do teams have similar patterns of conflict origins across conflict types, and do individual team members play similar roles across conflict types? How might teams resolve conflict based on different conflict origins, roles, and trajectories? Our study illuminates the importance of these lenses to better understand the microfoundations of team conflict and provide a conceptual framework for ongoing study.

Implications for the Measurement of Conflict

Our findings strongly suggest that we must reconsider how we operationalize intragroup conflict. Our studies reveal that identifying team conflict origins predicts team effectiveness over and above traditional measures of team conflict. As such, future intragroup conflict research measures should consider within-team configurations (Park, Mathieu, and Grosser, 2020). The strength of this method also allows researchers to include teams with "no conflict" and show how a lack of conflict could evolve to a specific conflict origin over time, versus relying on measures that indicate different levels of team conflict ranging from low to high. We could better understand experiences and effects of intragroup conflict by aligning theoretical perspectives with corresponding operationalizations. For example, subgroup task-related disagreements could be aligned with social network measures capturing behavioral conflict among subgroups.

That said, although we used social networks methodology to capture fine-grained interpersonal conflict relationships within teams, we imagine that conflict researchers might wish to use other approaches. Qualitative research on origins, trajectories, and conflict roles, such as the conflict narratives in Study 1, or interviews with or observations of team members could provide further insight into conflict microfoundations. Moreover, team conflict survey items could account for origins, trajectories, or roles to make future measures of microfoundations more tractable.

Conflict scholars have long called for alternative methods to examine anomalies and puzzles in conflict research. The original meta-analysis of the link between intragroup conflict and performance concluded with this suggestion: "Our understanding of the conflict–team performance relationship would benefit tremendously from research using alternative methods to assess task and relationship conflict" (De Dreu and Weingart, 2003: 747). Our approach both answers and echoes this call. Although research has begun to consider how conflict configurations relate to conflict types (Srikanth, Harvey, and Peterson, 2016; Humphrey et al., 2017; Maltarich et al., 2017), future research should focus on the actors who are behaviorally, affectively, and cognitively involved across types and levels (Korsgaard, Ployhart, and Ulrich, 2014).

Limitations, Boundaries, and Extensions

We intend for our research to open a conversation about why team conflict is not what it seems and how we might identify new relationships that more precisely describe and explain the microfoundation space between individual- and group-level analyses. As such, we are more focused on developing theory than testing hypotheses. We acknowledge at least three interrelated limitations to our approach. First, we limited our scope to only task and relationship conflict because they are studied most often (Humphrey et al., 2017; Maltarich et al., 2017). Of course, researchers investigate other types of conflict such as status (Bendersky and Hays, 2012) and process conflict (Greer and Jehn, 2007; Behfar et al., 2011), which we have not included. We expect status and relationship conflict to reflect similar properties because they are closely related (Bendersky and Hays, 2012), but process conflict might show a different pattern because it has both logistical and contribution dimensions and is not closely related to either task or relationship conflict (Behfar et al., 2011).

Although our studies illustrate the evolution of task and relationship conflict across origins, we still have much to learn about how configurations of task conflict relate to configurations for relationship conflict. We also have yet to learn whether the evolution pattern of task moving to relationship conflict has the same or similar pattern as relationship moving to task conflict. Indeed, one could ask whether the same members are involved in task and relationship conflicts as one evolves to the other. We also acknowledge that the cross-sectional nature of Study 3 means we cannot determine how different conflict trajectories predict team effectiveness or whether any impact depends on the location in the team's life cycle. Such questions can be addressed in future work and as we develop better methods.

Another limitation is that our use of undergraduate students in Study 2 may fail to generalize. However, using student groups also allows us to identify origins and evolutions of intragroup conflict with common start and end points, team tasks, and evaluation criteria (Peterson and Behfar, 2003). Moreover, we concur with Humphrey et al. (2017) that students and general populations will experience conflict similarly. Indeed, undergraduates and senior executives wrote strikingly similar conflict narratives in our first study, and results from Studies 2 and 3 are quite consistent while using undergraduates and manufacturing employees, respectively.

Last, our research questions extend to other team phenomena related to conflict. For example, research on team trust illustrates patterns of asymmetry and multiple origin points, suggesting important insight is gained by combining sociometric and psychometric approaches (de Jong and Dirks, 2012; Ferguson and Peterson, 2015; Jones and Shah, 2016). We encourage scholars to look at other group phenomena as we have looked at intragroup conflict.

None of these limitations undermines the novelty or contributions of our abductive exploration of the origins and evolution of intragroup conflict. In answering the four questions we established at the outset, we identify many more fundamental future research questions, show weaknesses in how intragroup conflict has been studied in the past, and suggest how it should be studied in the future. We encourage scholars to better theorize and measure intragroup conflict to reflect its true roots, especially its origins, evolution, and roles. In dispensing this recommendation for greater complexity we are cautious of Phaedrus's famous warning from the Plato dialogues: "The only problem with seeing too much is that it makes you insane." Rather, we hope that our methods and approach will help researchers to frame the differentiated and dynamic conflict experiences of individuals in teams.

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REFERENCES

Anicich, E. M., N. J. Fast, N. Halevy, and A. D. Galinsky
2015 "When the bases of social hierarchy collide: Power without status drives interpersonal conflict." Organization Science, 27: 123–140.

Arrow, H., J. E. McGrath, J. L. Berdahl
2000 Small Groups as Complex Systems: Formation, Coordination, Development, and Adaptation. Thousand Oaks, CA: Sage.

Balkundi, P., Z. Barsness, and J. H. Michael
2009 "Unlocking the influence of leadership network structures on team conflict and viability." Small Group Research, 40: 301–322.

Barrick, M. R., G. L. Stewart, M. J. Neubert, and M. K. Mount
1998 "Relating member ability and personality to work-team processes and team effectiveness." Journal of Applied Psychology, 83: 377–391.

Barsade, S. G.
2002 "The ripple effect: Emotional contagion and its influence on group behavior." Administrative Science Quarterly, 47: 644–675.

Bartel, C. A., and R. Garud
2003 "Narrative knowledge in action: Adaptive abduction as a mechanism for knowledge creation and exchange in organizations." In M. Easterby-Smith and M. A. Lyles (eds.), The Blackwell Handbook of Organizational Learning and Knowledge Management: 324–342. Hoboken, NJ: Wiley-Blackwell.

Bartel, C. A., and R. Saavedra
2000 "The collective construction of work group moods." Administrative Science Quarterly, 45: 197–231.

Behfar, K. J., E. A. Mannix, R. S. Peterson, and W. M. Trochim
2011 "Conflict in small groups: The meaning and consequences of process conflict." Small Group Research, 42: 127–176.

Behfar, K., and G. A. Okhuysen
2018 "Perspective—Discovery within validation logic: Deliberately surfacing, complementing, and substituting abductive reasoning in hypothetico-deductive inquiry." Organization Science, 29: 323–340.

Behfar, K. J., R. S. Peterson, E. A. Mannix, and W. M. K. Trochim
2008 "The critical role of conflict resolution in teams: A close look at the links between conflict type, conflict management strategies, and team outcomes." Journal of Applied Psychology, 93: 170–188.

Belbin, R. M.
1981 Management Teams: Why They Succeed or Fail. London: Butterworth-Heinemann.

Bendersky, C., and N. A. Hays
2012 "Status conflict in groups." Organization Science, 23: 323–340.

Bettenhausen, K., and J. K. Murnighan
1985 "The emergence of norms in competitive decision-making groups." Administrative Science Quarterly, 30: 350–372.

Bolinger, A. R., G. A. Okhuysen, and B. L. Bonner
2019 "Investigating individuals' recollections of group experiences." Academy of Management Discoveries. DOI: 10.5465/amd.2017.0066.

Bono, J. E., T. L. Boles, T. A. Judge, and K. J. Lauver
2002 "The role of personality on task and relationship conflict." Journal of Personality, 70: 311–344.

Boulding, E.
1964 "Further reflections on conflict management." In R. L. Kahn and E. Boulding (eds.), Power and Conflict in Organizations: 146–150. New York: Basic Books.

Brett, J., K. Behfar, and J. Sanchez-Burks
2014 "Managing cross-cultural conflicts: A close look at the implication of direct versus indirect confrontation." In N. Ashkanasy, O. Ayoko, and K. A. Jehn (eds.), Handbook of Research in Conflict Management, 136–154. Cheltenham, UK: Edward Edgar.

Brislin, R. W.
1980 "Translation and content analysis of oral and written material." In H. C. Triandis and J.

W. Berry (eds.), Handbook of Cross-Cultural Psychology: 398–444. Boston: Allyn and Bacon.

Carment, D., and D. Rowlands
1998 "Three's company: Evaluating third-party intervention in intrastate conflict." Journal of Conflict Resolution, 42: 572–599.

Carton, A. M., and J. N. Cummings
2012 "A theory of subgroups in work teams." Academy of Management Review, 37: 441–470.

Crawford, E. R., and J. A. Lepine
2013 "A configural theory of team processes: Accounting for the structure of taskwork and teamwork." Academy of Management Review, 38: 32–48.

Cronin, M. A., and K. Bezrukova
2019 "Conflict management through the lens of system dynamics." Academy of Management Annals, 13: 770–806.

Cronin, M. A., L. R. Weingart, and G. Todorova
2011 "Dynamics in groups: Are we there yet?" Academy of Management Annals, 5: 571–612.

Davis, M. S.
1971 "That's interesting! Towards a phenomenology of sociology and a sociology of phenomenology." Philosophy of the Social Sciences, 1: 309–344.
1986 "That's classic! The phenomenology and rhetoric of successful social theories." Philosophy of the Social Sciences, 16: 285–301.

De Dreu, C. K. W., A. Evers, B. Beersma, E. S. Kluwer, and A. Nauta
2001 "A theory-based measure of conflict management strategies in the workplace." Journal of Organizational Behavior, 22: 645–668.

De Dreu, C. K. W., and L. R. Weingart
2003 "Task versus relationship conflict, team performance, and team member satisfaction: A meta-analysis." Journal of Applied Psychology, 88: 741–749.

de Jong, B. A., and K. T. Dirks
2012 "Beyond shared perceptions of trust and monitoring in teams: Implications of asymmetry and dissensus." Journal of Applied Psychology, 97: 391–406.

Delbecq, A. L., A. H. Van de Ven, and D. H. Gustafson
1975 Group Techniques for Program Planning: A Guide to Nominal Group and Delphi Processes. Glenview, IL: Scott, Foresman and Co.

de Wit, F. R. C., L. Greer, and K. A. Jehn
2012 "The paradox of intragroup conflict: A meta-analysis." Journal of Applied Psychology, 97: 360–390.

Elder, T. J., R. M. Sutton, and K. M. Douglas
2005. "Keeping it to ourselves: Effects of audience size and composition on reactions to criticisms of the ingroup." Group Processes & Intergroup Relations, 8: 231–244.

Felps, W., T. R. Mitchell, and E. Byington
2006 "How, when, and why bad apples spoil the barrel: Negative group members and dysfunctional groups." In B. M. Staw (ed.), Research in Organizational Behavior, 27: 175–222. Greenwich, CT: JAI Press.

Ferguson, A. J., and R. S. Peterson
2015 "Sinking slowly: Diversity in propensity to trust predicts downward trust spirals in small groups." Journal of Applied Psychology, 100: 1012–1024.

Fisher, R., W. Ury, and B. Patton
2011 Getting to Yes: Negotiating Agreement Without Giving In. New York: Penguin Books.

Garud, R., R. L. Dunbar, and C. A. Bartel
2011 "Dealing with unusual experiences: A narrative perspective on organizational learning." Organization Science, 22: 587–601.

Gelman A., and J. Hill
2006 Data Analysis Using Regression and Multilevel/Hierarchical Models. New York: Cambridge University Press.

Gemmill, G.
1989 "The dynamics of scapegoating in small groups." Small Group Behavior, 20: 406–418.

Gersick, C. J. G.
1988 "Time and transition in work teams: Toward a new model of group development." Academy of Management Journal, 31: 9–41.

Gonzalez-Mulé, E., S. H. Courtright, D. DeGeest, J. Y. Seong, and D. S. Hong,
2016 "Channeled autonomy: The joint effects of autonomy and feedback on team performance through organizational goal clarity." Journal of Management, 42: 2018–2033.

Greer, L. L., and K. A. Jehn
2007 "The pivotal role of negative affect in understanding the effects of process conflict on group performance." In E. A. Mannix, M. A. Neale, and C. P. Anderson (eds.), Affect and Groups, vol. 10: Research on Managing Groups and Teams: 21–43. Bingley, UK: Emerald Insight.

Hackman, J. R.
1987 "The design of work teams." In J. W. Lorsch (ed.), Handbook of Organizational Behavior: 315–342. Englewood Cliffs, NJ: Prentice-Hall.

Heider, F.
1946 "Attitudes and cognitive organization." Journal of Psychology, 21: 107–112.

Hogg, M. A., D. Abrams, S. Otten, and S. Hinkle
2004 "The social identity perspective: Intergroup relations, self-conception, and small groups." Small Group Research, 35: 246–276.

Hogg, M. A., and D. J. Terry
2000 "Social identity and self-categorization processes in organizational contexts." Academy of Management Review, 25: 121–140.

Humphrey, S. E., F. Aime, L. Cushenbery, A. D. Hill, and J. Fairchild
2017 "Team conflict dynamics: Implications of a dyadic view of conflict for team performance." Organizational Behavior and Human Decision Processes, 142: 58–70.

Janis, I. L.
1972 Victims of Groupthink: A Psychological Study of Foreign-Policy Decisions and Fiascoes. Boston: Houghton Mifflin Harcourt.

Jehn, K. A.
1995 "A multimethod examination of the benefits and detriments of intragroup conflict." Administrative Science Quarterly, 40: 256–282.
1997 "A qualitative analysis of conflict types and dimensions in organizational groups." Administrative Science Quarterly, 42: 530–557.

Jehn, K. A., and C. Bendersky
2003 "Intragroup conflict in organizations: A contingency perspective on the conflict–outcome relationship." In R. M. Kramer and B. M. Staw (eds.), Research in Organizational Behavior, 25: 187–242. Greenwich, CT: JAI Press.

Jehn, K. A, L. Greer, S. Levine, and G. Szulanski
2008 "The effects of conflict types, dimensions, and emergent states on group outcomes." Group Decision and Negotiation, 17: 465–495.

Jehn, K. A., and E. A. Mannix
2001 "The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance." Academy of Management Journal, 44: 238–251.

Jehn, K. A., G. B. Northcraft, and M. A. Neale
1999 "Why differences make a difference: A field study of diversity, conflict, and performance in workgroups." Administrative Science Quarterly, 44: 741–763.

Jehn, K. A., S. Rispens, K. Jonsen, and L. Greer
2013 "Conflict contagion: A temporal perspective on the development of conflict within teams." International Journal of Conflict Management, 24: 352–373.

Jehn, K. A., S. Rispens, and S. M. B. Thatcher
2010 "The effects of conflict asymmetry on work group and individual outcomes." Academy of Management Journal, 53: 596–616.

Jones, S. L., and P. Shah
2016 "Diagnosing the locus of trust: A temporal perspective for trustor, trustee, and dyadic influences on perceived trustworthiness." Journal of Applied Psychology, 101: 392–414.

Keyton, J.
1999 "Analyzing interaction patterns in dysfunctional teams." Small Group Research, 30: 491–518.

Konecni, V. J., and A. N. Doob
1972 "Catharsis through displacement of aggression." Journal of Personality and Social Psychology, 23: 379–387.

Korsgaard, M. A., R. E. Ployhart, and M. D. Ulrich
2014 "The emergence of intragroup conflict: Variations in conflict configurations." In O. B. Ayoko, N. M. Ashkanasy, and K. Jehn (eds.), Handbook of Conflict Management Research: 51–65. Cheltenham, UK: Edward Elgar.

Korsgaard, M. A., S. Soyoung Jeong, D. M. Mahony, and A. H. Pitariu
2008 "A multilevel view of intragroup conflict." Journal of Management, 34: 1222–1252.

Kozlowski, S. W., and K. J. Klein
2000 "A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes." In K. J. Klein and S. W. J. Kozlowski (eds.), Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions: 3–90. San Francisco: Jossey-Bass.

Krackhardt, D.
1999 "The ties that torture: Simmelian tie analysis in organizations." Research in the Sociology of Organizations, 16: 183–210.

Krackhardt, D., and M. S. Handcock
2007 "Heider vs Simmel: Emergent features in dynamic structures." In E. M. Airoldi, D. M. Blei, S. E. Fienberg, A. Goldenberg, E. P. Xing, and A. X. Zheng (eds.), Statistical Network Analysis: Models, Issues, and New Directions: 14–27. Berlin: Springer.

Kramer, R. M., P. P. Shah, and S. L. Woerner
1995 "Why ultimatums fail: Social identity and moralistic aggression in coercive bargaining." In R. M. Kramer and D. M. Messick (eds.), Negotiation as a Social Process: 285–308. Thousand Oaks, CA: Sage.

Krippendorff, K.
1980 Content Analysis: An Introduction to Its Methodology. Beverly Hills, CA: Sage.

Labianca, G., D. J. Brass, and B. Gray
1998 "Social networks and perceptions of intergroup conflict: The role of negative relationships and third parties." Academy of Management Journal, 41: 55–67.

Lau, D. C., and J. K. Murnighan
1998 "Demographic diversity and faultlines: The compositional dynamics of organizational groups." Academy of Management Review, 23: 325–340.
2005 "Interactions within groups and subgroups: The effects of demographic faultlines." Academy of Management Journal, 48: 645–659.

LePine, J. A., J. R. Hollenbeck, D. R. Ilgen, and J. Hedlund
1997 "Effects of individual differences on the performance of hierarchical decision-making teams: Much more than *g*." Journal of Applied Psychology, 82: 803–811.

Lombard, M., J. Snyder-Duch, and C. C. Bracken
2002 "Content analysis in mass communication: Assessment and reporting of intercoder reliability." Human Communication Research, 28: 587–604.

Lovelace, K., D. L. Shapiro, and L. R. Weingart
2001 "Maximizing cross-functional new product teams' innovativeness and constraint adherence: A conflict communications perspective." Academy of Management Journal, 44: 779–793.

Maier, N. R.
1967 "Assets and liabilities in group problem solving: The need for an integrative function." Psychological Review, 74: 239–249.

Maltarich, M. A., M. Kukenberger, G. Reilly, and J. Mathieu
2017 "Conflict in teams: Modeling early and late conflict states and the interactive effects of conflict processes." Group and Organization Management, 43: 6–37.

Mannix, E. A.
1993 "Organizations as resource dilemmas: The effects of power balance on coalition formation in small groups." Organizational Behavior and Human Decision Processes, 55: 1–22.

Marks, M. A., J. E. Mathieu, and S. J. Zaccaro
2001 "A temporally based framework and taxonomy of team processes." Academy of Management Review, 26: 356–376.

McGrath, J. E.
1984 Groups: Interaction and Performance. Englewood Cliffs, NJ: Prentice-Hall.

Murnighan, J. K., and D. J. Brass
1991 "Intraorganizational coalitions." In M. H. Bazerman, R. J. Lewicki, and B. H. Sheppard (eds.), Handbook of Negotiation Research, 3: 283–306. Greenwich, CT: JAI Press.

Nemeth, C., K. Brown, and J. Rogers
2001 "Devil's advocate versus authentic dissent: Stimulating quantity and quality." European Journal of Social Psychology, 31: 707–720.

Neuendorf, K. A.
2017 The Content Analysis Guidebook. Thousand Oaks, CA: Sage.

Neuman, G. A., and J. Wright
1999 "Team effectiveness: Beyond skills and cognitive ability." Journal of Applied Psychology, 84: 376–389.

Park, S., J. Mathieu, and T. J. Grosser
2020 "A network conceptualization of team conflict." Academy of Management Review, 45: 352–375.

Pelled, L. H., K. M. Eisenhardt, and K. R. Xin
1999 "Exploring the black box: An analysis of work group diversity, conflict, and performance." Administrative Science Quarterly, 44: 1–28.

Peterson, R. S., and K. J. Behfar
2003 "The dynamic relationship between performance feedback, trust, and conflict in groups: A longitudinal study." Organizational Behavior and Human Decision Processes, 92: 102–112.

Peterson, R. S., J. Davidson, and L. M. Moynihan
2007 "Does one rotten apple spoil the barrel? Using a configuration approach to assess the conflict-inducing effects of a high-neuroticism team member." In K. Behfar and L. Thompson (eds.), Conflict in Organizational Groups: 93–112. Evanston, IL: Northwestern University Press.

Polzer, J. T., L. P. Milton, and W. B. Swarm
2002 "Capitalizing on diversity: Interpersonal congruence in small work groups." Administrative Science Quarterly, 47: 296–324.

Potter, W. J., and D. Levine-Donnerstein
1999 "Rethinking validity and reliability in content analysis." Journal of Applied Communication Research, 27: 258–284.

Rothschild, Z. K., M. J. Landau, D. Sullivan, and L. A. Keefer
2012 "A dual-motive model of scapegoating: Displacing blame to reduce guilt or increase control." Journal of Personality and Social Psychology, 102: 1148–1163.

Sackett, P. R., and J. R. Larson
1990 "Research strategies and tactics in industrial and organizational psychology." In M. D. Dunnette and L. M. Hough (eds.), Handbook of Industrial and Organizational Psychology, 1: 419–489. Palo Alto, CA: Consulting Psychologists Press.

Schachter, S.
1951 "Deviation, rejection, and communication." Journal of Abnormal and Social Psychology, 46: 190–207.

Shah, P. P., and K. A. Jehn
1993 "Do friends perform better than acquaintances? The interaction of friendship, conflict, and task." Group Decision and Negotiation, 2: 149–165.

Simons, T. L., and R. S. Peterson
2000 "Task conflict and relationship conflict in top management teams: The pivotal role of intragroup trust." Journal of Applied Psychology, 85: 102–111.

Sinha, R., N. S. Janardhanan, L. L. Greer, D. E. Conlon, and J. R. Edwards
2016 "Skewed task conflicts in teams: What happens when a few members see more conflict than the rest?" Journal of Applied Psychology, 101: 1045–1055.

Sparrowe, R. T., R. C. Liden, S. J. Wayne, and M. L Kraimer
2001 "Social networks and the performance of individuals and groups." Academy of Management Journal, 44: 316–325.

Srikanth, K., S. Harvey, and R. Peterson
2016 "A dynamic perspective on diverse teams: Moving from the dual-process model to a dynamic coordination-based model of diverse team performance." Academy of Management Annals, 10: 453–493.

Stemler, S.
2001 "An overview of content analysis." Practical Assessment, Research and Evaluation, *7*: 137–146.

Swann, W. B., J. T. Polzer, D. C. Seyle, and S. J. Ko
2004 "Finding value in diversity: Verification of personal and social self-views in diverse groups." Academy of Management Review, 29: 9–27.

Thomas, K. W.
1992 "Conflict and conflict management: Reflections and update." Journal of Organizational Behavior, 13: 265–274.

Van de Ven, A. H.
2007 Engaged Scholarship: A Guide for Organizational and Social Research. Oxford: Oxford University Press.

Wall, J. A., and R. R. Callister
1995 "Conflict and its management." Journal of Management, 21: 515–558.

Waller, M. J., G. A. Okhuysen, and M. Saghafian
2016 "Conceptualizing emergent states: A strategy to advance the study of group dynamics." Academy of Management Annals, 10: 561–598.

Wanous, J. P., A. E. Reichers, and M. J. Hudy
1997 "Overall job satisfaction: How good are single-item measures?" Journal of Applied Psychology, 82: 247–252.

Weber, R. P.
1990 Basic Content Analysis. Beverly Hills, CA: Sage.

Weick, K. E.
1989 "Theory construction as disciplined imagination." Academy of Management Review, 14: 516–531.

Weingart, L. R., K. J. Behfar, C. Bendersky, G. Todorova, and K. A. Jehn
2015 "The directness and oppositional intensity of conflict expression." Academy of Management Review, 40: 235–262.

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APPENDIX

APPENDIX A: SINGLE-ITEM CONFLICT MEASURE CONSTRUCTION

We revisited the original definitions and core conflict concepts from Shah and Jehn (1993), Jehn (1995), and Jehn and Mannix (2001), and we created relationship and task conflict single-item measures that closely mirrored the articles' multi-item measures. We then collected item responses from a sample of 300 participants using Amazon Mechanical Turk. Using these responses, we conducted confirmatory factor analysis to ensure the single-item measures appropriately reflected their multi-item counterparts. A CFA model, which loaded the single-item relationship and task conflict measures on the relationship and task conflict constructs, respectively, demonstrated good fit (CFI = .974; TLI = .965; RMSEA = .076; see Table A1). The model demonstrated that the single-item measures captured the same constructs as the multi-item measures. Importantly, when we compared the fit of the CFA with an alternative model that allowed the single-item measures to covary with the conflict constructs (instead of being loaded on the constructs), we found no significant improvement in fit ($\chi^2 = 1.74$; d.f. = 3; p = .62).

Table A1. Confirmatory Factor Analysis for Single-Item Conflict Measures*

	Est.	S.E.	*z* value
Task conflict			
We had opposing viewpoints on the task.	1		
We had conflicting ideas about the task.	1.08	0.06	19.55
We had differing opinions about the work being done.	1.04	0.06	18.08
We had task-related disagreements.	1.08	0.05	19.87
[Single item] At times, we had task-related disagreements (i.e., we had different viewpoints on the task, different ideas about the task, or differing opinions about the work being done).	0.93	0.06	15.79
Relationship conflict			
We disagreed about non-work things (social or personal things).	1		
We disagreed about personal matters.	1.01	0.06	17.43
We had difficulty getting along with each other.	0.73	0.06	11.77
Personality clashes were evident between us.	0.91	0.07	14.16
We fought about non-task things when working on our team.	0.86	0.06	15.81
[Single item] At times, we had difficulty getting along (i.e., our personalities clashed), we disagreed about personal matters and non-work things (i.e., social or personal things).	0.99	0.06	16.94

* Sample size = 251 responses. Model fit indices: CFI = .974; TLI = .965, RMSEA = .076; AIC = 8449.7. The alternative model, which allowed the single items to covary with the constructs, had an AIC of 8454.0, indicating the alternative model was inferior.

REFERENCES

Jehn, K. A.
1995 “A multimethod examination of the benefits and detriments of intragroup conflict.” Administrative Science Quarterly, 40: 256–282.

Jehn, K. A., and E. A. Mannix
2001 “The dynamic nature of conflict: A longitudinal study of intragroup conflict and group performance.” Academy of Management Journal, 44: 238–251.

Shah, P. P., and K. A. Jehn
1993 “Do friends perform better than acquaintances? The interaction of friendship, conflict, and task.” Group Decision and Negotiation, 2: 149–165.

APPENDIX B: CONFLICT TIE ESTIMATION AND IMPUTATION

Study 2 conflict tie estimation. We modeled conflict ties in Study 2 using a linear mixed-effects model. The outcome, $CONFLICT_{ijkt}$, denotes rater i's conflict with teammate j for conflict type k (task or relationship) at project period t (start, midpoint, or end). In the model below, observations ij and ji comprise dyad d, and all observations in a team comprise team g. The model was specified as:

$$CONFLICT_{ijkt} = \alpha_{kt} + (b_{ij,k} + b_{j,k} + b_{d,k} + b_{g,k}) + (b_{ij,t} + b_{jk,t} + b_{dk,t} + b_{gk,t}) + u_{i,kt} + \epsilon_{ijkt},$$

where α_{kt} is the mean conflict for type k at project period t; $b_{ij,k}$, $b_{j,k}$, $b_{d,k}$, and $b_{g,k}$ are the time-invariant effects of rater i on teammate j, teammate j, dyad d, and team g, respectively, for conflict type k; $b_{ij,t}$, $b_{jk,t}$, $b_{dk,t}$, and $b_{gk,t}$ are the time-varying effects of rater i on teammate j, teammate j for conflict type k, dyad d for type k, and team g for type k, respectively; $u_{i,kt}$ is the rater bias for conflict type k at project period t; and ϵ_{ijkt} is the residual error. The parameter α_{kt} is the only fixed parameter; all others are random. The random parameters model the multiple sources of nonindependence due to the longitudinal and network nature of the data. We estimated the model using restricted maximum likelihood using the lme4 package in R (Bates et al., 2015). The fixed parameter estimates and random parameter variances are presented in Table B1.

The model above allowed us to estimate rater bias, $\hat{u}_{i,kt}$, which captured idiosyncratic fluctuations in the raters' conflict perception when completing the survey. To more accurately capture behavioral involvement in conflict, we removed $\hat{u}_{ikt}$ from the predicted conflict, $\widehat{CONFLICT}_{ijkt}$. (The hat "^" indicates an estimated value.) This was key to reducing error as rater bias could confound the identification of the conflict origins. Thus, the predicted behavioral involvement in conflict was calculated as:

$$\widehat{CONFLICT}_{ijkt} = \hat{\alpha}_{kt} + (\hat{b}_{ij,k} + \hat{b}_{j,k} + \hat{b}_{d,k} + \hat{b}_{g,k}) + (\hat{b}_{ij,t} + \hat{b}_{jk,t} + \hat{b}_{dk,t} + \hat{b}_{gk,t}).$$

Study 2 missing value imputation. The predicted conflict, $\widehat{CONFLICT}_{ijkt}$, could not be calculated if missing data made it impossible to estimate any b parameter. When an estimate of a b parameter was unavailable, a parameter value was imputed by randomly sampling, with replacement, from the parameter's empirical distribution. Because the b parameters were random, each had its own empirical distribution from which we could draw. For any observation, more or fewer

Table B1. Study 2 Conflict Tie Model Estimates

Group	Parameter	Random effect	Var.	S.D.
Rater-teammate (N = 2,322)	$b_{ij,k}$	Relationship conflict	0.004	0.065
		Task conflict	0.035	0.188
Teammate (*N* = 617)	$b_{j,k}$	Relationship conflict	0.010	0.099
		Task conflict	0.020	0.140
Dyad (*N* = 1,204)	$b_{d,k}$	Relationship conflict	0.006	0.074
		Task conflict	0.016	0.125
Team (*N* = 126)	$b_{g,k}$	Relationship conflict	0.013	0.112
		Task conflict	0.040	0.201
Rater-teammate (*N* = 2,322)	$b_{ij,t}$	Project start	0.028	0.166
		Project midpoint	0.057	0.239
		Project end	0.061	0.246
Ratee-conflict type (*N* = 1,234)	$b_{jk,t}$	Project start	0.001	0.035
		Project midpoint	0.004	0.061
		Project end	0.008	0.088
Dyad-conflict type (*N* = 2,407)	$b_{dk,t}$	Project start	0.002	0.047
		Project midpoint	0.027	0.163
		Project end	0.008	0.091
Team-conflict type (*N* = 252)	$b_{gk,t}$	Project start	0.011	0.104
		Project midpoint	0.020	0.141
		Project end	0.006	0.076
Rater (*N* = 594)	$u_{i,kt}$	Relationship conflict, project start	0.215	0.463
		Relationship conflict, project midpoint	0.900	0.949
		Relationship conflict, project end	0.994	0.997
		Task conflict, project start	0.566	0.752
		Task conflict, project midpoint	0.946	0.973
		Task conflict, project end	1.229	1.109
Residual (*N* = 12,583)	ϵ_{ijkt}		0.111	0.333
Group	**Parameter**	**Fixed effect**	**Est.**	**S.E.**
Sample	α_{kt}	Relationship conflict, project start	-1.71	0.03
		Relationship conflict, project midpoint	-1.28	0.05
		Relationship conflict, project end	-1.38	0.04
		Task conflict, project start	-1.34	0.04
		Task conflict, project midpoint	-0.85	0.05
		Task conflict, project end	-0.92	0.05

parameters were imputed depending on the extent of the missing data in the team. For example, sometimes sufficient dyadic information existed to estimate and use $\hat{b}_{d,k}$; however, at other times the model could not estimate the parameter, so we imputed a value for it, $\tilde{b}_{d,k}$. (The tilde "~" indicates an imputed value.) The estimate $\hat{b}_{j,k}$ was available even if j did not respond to the survey because j's teammates still rated their conflict with j. The same is true for $\hat{b}_{jkt}$, $\hat{b}_{gk}$, $\hat{b}_{gkt}$. Thus, the imputed behavioral involvement in conflict was calculated as:

Table B2. Study 3 Conflict Tie Model Estimates

Group	Parameter	Random effect	Var.	S.D.
Rater-teammate (*N* = 5,205)	$b_{ij,k}$	Relationship conflict	0.075	0.274
		Task conflict	0.146	0.382
Teammate (*N* = 698)	$b_{j,k}$	Relationship conflict	0.009	0.093
		Task conflict	0.004	0.065
Dyad (*N* = 2,932)	$b_{d,k}$	Relationship conflict	0.019	0.136
		Task conflict	0.012	0.108
Team (*N* = 79)	$b_{g,k}$	Relationship conflict	0.088	0.297
		Task conflict	0.085	0.291
Rater (*N* = 618)	$u_{i,km}$	Relationship conflict, item 1	2.623	1.620
		Relationship conflict, item 2	1.672	1.293
		Task conflict, item 1	2.870	1.694
		Task conflict, item 2	2.227	1.492
Residual (*N* = 20,140)	ϵ_{ijkm}		0.186	0.431
Group	**Parameter**	**Fixed effect**	**Est.**	**S.E.**
Sample	α_{km}	Relationship conflict, item 1	-1.61	0.07
		Relationship conflict, item 2	-1.94	0.06
		Task conflict, item 1	-1.01	0.08
		Task conflict, item 2	-1.54	0.07

$$\widehat{CONFLICT}_{ijkt} = \hat{\alpha}_{kt} + \left(\tilde{b}_{ij,k} + \hat{b}_{j,k} + \tilde{b}_{d,k} + \hat{b}_{g,k}\right) + \left(\tilde{b}_{ij,t} + \hat{b}_{jk,t} + \tilde{b}_{dk,t} + \hat{b}_{gk,t}\right),$$

where an imputed parameter would assume its estimated value if it was available or, otherwise, be drawn from the parameter's empirical distribution. In the network panel, 94 of 2,416 rater–teammate conflict ties (3.9 percent) were estimated using one or more imputed parameters.

Study 3 conflict tie estimation. For Study 3, we used a linear mixed-effects model similar to Study 2, but we did not include time-varying effects because the study was cross-sectional. The outcome, $CONFLICT_{ijkm}$, denotes rater i's conflict with teammate j for conflict type k (task or relationship) and survey item m (each conflict type had two survey items). The model was specified as:

$$CONFLICT_{ijkm} = \alpha_{km} + \left(b_{ij,k} + b_{j,k} + b_{d,k} + b_{g,k}\right) + u_{i,km} + \epsilon_{ijkm},$$

where α_{km} is the mean conflict for type k and item m; $b_{ij,k}$, $b_{j,k}$, $b_{d,k}$, and $b_{g,k}$ are the effects of rater i on teammate j, teammate j, dyad d, and team g, respectively, for conflict type k; $u_{i,km}$ is the rater bias for conflict type k and item m; and ϵ_{ijkm} is the residual error. The fixed parameter estimates and random parameter variances are presented in Table B2.

To estimate the behavioral involvement in conflict, we first calculated the average of the two estimated item means for each conflict type: $\bar{\alpha}_k = \frac{1}{2}\sum_{m=1}^{2} \hat{\alpha}_{km}$. The estimated behavioral involvement for rater i, teammate j, and conflict type k was calculated as:

$$\widehat{CONFLICT}_{ijk} = \bar{\alpha}_k + \left(\hat{b}_{ij,k} + \hat{b}_{j,k} + \hat{b}_{d,k} + \hat{b}_{g,k}\right).$$

Study 3 missing value imputation. We imputed missing values following the same procedure as in Study 2 but using the model for Study 3. When we imputed a conflict tie, $\widehat{CONFLICT}_{ijk}$, we used the following estimated and imputed parameters:

$$\widehat{CONFLICT}_{ijk} = \bar{\alpha}_k + \left(\tilde{b}_{ij,k} + \hat{b}_{j,k} + \tilde{b}_{d,k} + \hat{b}_{g,k}\right).$$

In the network panel, 807 of 6,012 conflict ties (13.4 percent) were estimated using one or more imputed parameters.

REFERENCES

Bates, D. M., M. Maechler, B. Bolker, and S. Walker
2015 "Fitting linear mixed-effects models using lme4." Journal of Statistical Software, 67: 1–48.

APPENDIX C: RULES FOR CREATING CANDIDATE CONFLICT CONFIGURATIONS

The following rules guided our selection of conflict configurations:

1. *Individual origin*. A configuration in which one team member has conflict ties with three or more teammates, but teammates do not have ties among themselves. Teams with eight or more members may have multiple individual conflict patterns.
2. *Dyad origin*. A configuration in which two team members have a conflict tie between them but do not have conflict ties with other teammates. Teams may have multiple dyad conflict patterns.
3. *Subgroup origin*. A configuration in which four or more team members are separated into two or more subgroups (with at least two people per subgroup) and each subgroup's members have conflict ties with all teammates in the other subgroup(s), but no conflict ties exist within a subgroup.
4. *Team origin*. A configuration in which at least four team members or the majority of team members—whichever is greater—have conflict ties with all other teammates who have conflict ties.
5. *No conflict*. A configuration in which no team member has conflict ties with other teammates.

Teams must have at least four members to identify an origin. In teams larger than four, not all team members need be behaviorally involved; those who observe conflict will have no conflict ties (i.e., they would be isolates in the network). Individual and dyad patterns can be repeated

Table C1. Number of Configurations for Each Origin by Team Size

Team size	Origin			
	Individual	Dyad	Subgroup	Team
4	1	2	1	1
5	2	2	2	2
6	3	3	5	3
7	4	3	8	4
8	6	4	14	5
9	8	4	21	5
10	11	5	32	6
11	14	5	45	6
12	19	6	65	7
13	24	6	88	7
14	31	7	121	8

within the same team but must form distinct components within the team network. Given these decision rules, Table C1 shows the number of possible configurations for each origin given a team size.

We did not include rules that allowed for blends of configurations because they would not clearly identify one origin. For instance, it is possible for a larger team to possess a conflict dyad and separate conflicting subgroups, but we did not include a configuration for this scenario. Such configurations may be of interest in the future, but our aim in these studies is to do the foundational work of conceptualizing the four origins indicated in our literature review in order to make clear comparisons between them. We believed we could do this most effectively by creating all the possible candidate configurations that clearly specify one of these four origins, but we welcome future variations on our decision rules that allow for further conceptual developments.

APPENDIX D: CONFLICT ORIGINS ALGORITHM

Overview. The conflict origins algorithm accepts two inputs: (1) a team's conflict sociomatrix and (2) a set of candidate conflict configurations. For each configuration in the set, the algorithm finds the combination of team members that, when applied to the configuration, generates the highest score, which indicates the best fit. The algorithm then compares the scores to determine the configuration with the best fit. The algorithm returns the configuration, the combination of team members, and the configuration's origin as outputs.

Input 1: Team conflict **sociomatrix.** Team conflict sociomatrix $\boldsymbol{M}$ is an $n_m \times n_m$ matrix, where n_m is the number of team members. Team members in $\boldsymbol{M}$ are assigned an index $i \in \{1, \dots, n_m\}$. The off-diagonal elements, m_{ij}, are indexed by ij, $j \in \{1, \dots, n_m\}$ and $i \neq j$. Each m_{ij} is a value capturing behavioral involvement in conflict. The diagonal elements of $\boldsymbol{M}$ are set to 0.

Input 2: Set of all possible candidate conflict configurations. Set X holds all candidate configurations for a team of size n_m as described in Appendix C. A configuration is conceptually a $n_m \times n_m$ matrix with +1 and −1 off-diagonal values, which are the expected presence or absence of ties, respectively. But because the rules in Appendix C define patterned matrix structures, the representation of a configuration matrix can be simplified to a nested vector that captures the expected presence of ties. Each configuration $\boldsymbol{x} \in X$ is a vector of one or more *components*. Each component in $\boldsymbol{x}$ represents a cluster of team members who have no ties with clusters of team members in other components. A component is a vector of one or more positive integers that represent *groupings* of team members who do not share conflict ties among themselves but do share conflict ties with team members in other groupings in the component.

Formally, $\boldsymbol{x} = \{\boldsymbol{c}_1, \dots, \boldsymbol{c}_p, \dots, \boldsymbol{c}_P\}$, where $\boldsymbol{c}_p$ is the pth component in $\boldsymbol{x}$ and $1 \leq P \leq n_m$ is the total number of $\boldsymbol{c}_p$ components. In component $\boldsymbol{c}_p = \left\{g_{p,1}, \dots, g_{p,q}, \dots, g_{p,Q_p}\right\}$, $g_{p,q}$ is the qth grouping in $\boldsymbol{c}_p$ and $1 \leq Q_p \leq n_m$ is the length of $\boldsymbol{c}_p$. The length of $\boldsymbol{x}$ is $Q = \sum_{p=1}^{P} Q_p$. The positive integer $g_{p,q}$ defines the size of the grouping of team members (who do not share conflict ties among themselves). The sum of all grouping sizes in $\boldsymbol{x}$ is $n_x = \sum_{p=1}^{P} \sum_{q=1}^{Q_p} g_{p,q}$, and $n_x \leq n_m$. The number of team members who only observe the conflict (i.e., are network isolates) is $n_m - n_x$. The ordering of components in $\boldsymbol{x}$ and the ordering of groupings in $\boldsymbol{c}_p$ are unimportant because components and groupings are not hierarchical.

Consider a few examples. First, consider a configuration $\boldsymbol{x} = \{\boldsymbol{c}_1\} = \left\{\{g_{1,1}, g_{1,2}\}\right\} = \{\{1,4\}\}$ and $n_m = 5$, where an individual is the source of conflict. In this example, $\boldsymbol{c}_1 = \{1,4\}$ means that the one person in $g_{1,1}$ has conflict ties with the four people in $g_{1,2}$, but the four in $g_{1,2}$ do not have conflict ties among themselves. Also, $P = 1$, $Q = Q_1 = 2$, and $n_c = 1 + 4 = 5$, which means there are no conflict observers since $n_m = n_x$. This configuration identifies an individual origin, and the source of the conflict is the member in $g_{1,1}$. Second, consider a configuration $\boldsymbol{x} = \{\boldsymbol{c}_1, \boldsymbol{c}_2\} = \left\{\{g_{1,1}, g_{1,2}\}, \{g_{2,1}, g_{2,2}\}\right\} = \{\{1,1\}, \{1,1\}\}$ and $n_m = 5$. In this second example, the one team member in $g_{1,1}$ has a conflict tie with the one member in $g_{1,2}$, and the one member in $g_{2,1}$ has a conflict tie with the member in $g_{2,2}$. $P = 2$ and $Q = Q_1 + Q_2 = 4$, and $n_x = 1 + 1 + 1 + 1 = 4$. Since $n_m - n_x = 1$, there is one observer who has no conflict ties. This configuration has two dyadic conflict ties and identifies a dyad origin. Third, consider a configuration $\boldsymbol{x} = \{\boldsymbol{c}_1\} = \left\{\{g_{1,1}, g_{1,2}, g_{1,3}\}\right\} = \{\{2,3,3\}\}$ and $n_m = 8$. Here the two team members in $g_{1,1}$ have conflict ties with all three members in $g_{1,2}$ and with all three members in $g_{1,3}$. Further, the three members in $g_{1,2}$ have conflict ties with the three in $g_{1,3}$. $P = 1$, $Q = 3$, and $n_x = 8$, which indicates no conflict observers. This configuration has three subgroups and identifies a subgroup origin. Finally, consider a configuration $\boldsymbol{x} = \{\boldsymbol{c}_1\} = \left\{g_{1,1}, g_{1,2}, g_{1,3}, g_{1,4}\right\} = \{1,1,1,1\}$ and $n_m = 4$. Here each team member is in a separate grouping within the same component $\boldsymbol{c}_1$, which means that each team member has a conflict tie with every teammate. In this final example, $P = 1$, $Q = 4$, and $n_x = 4$. This configuration identifies a team origin.

Processing: Configuration combinations. Configuration $\boldsymbol{x}$ defines the pattern of ties expected in $\boldsymbol{M}$. The algorithm assigns team members from $\boldsymbol{M}$ to groupings in $\boldsymbol{x}$, and there may be many possible ways to do so. A specific set of assigned team members is a combination, $\boldsymbol{b}_k$, $k \in \{1, \dots, n_b\}$, where n_b is the total number of possible combinations given n_m and $\boldsymbol{x}$. For example, consider the ways in which one symmetric dyad can be placed in a four-person network. If $n_m = 4$ and $\boldsymbol{x} = \left\{\{g_{1,1}, g_{1,2}\}\right\} = \{\{1,1\}\}$, then there are $n_b = 6$ combinations in which two of the four team members can be assigned to $g_{1,1}$ and $g_{1,2}$. Using team member index $i \in \{1, \dots, 4\}$ and $j \in \{1, \dots, 4\}$, $i \neq j$, the six combinations of $\boldsymbol{b}_k = (i, j)$ are: $\boldsymbol{b}_1 = (1,2)$, $\boldsymbol{b}_2 = (1,3)$, $\boldsymbol{b}_3 = (1,4)$, $\boldsymbol{b}_4 = (2,3)$, $\boldsymbol{b}_5 = (2,4)$, $\boldsymbol{b}_6 = (3,4)$. Since configurations define symmetric ties, (1,2) is the same as (2,1).

To explain the calculation of n_b, we first define additional variables. Let $\boldsymbol{x}^*$ be the distinct set of components in $\boldsymbol{x}$ such that $\boldsymbol{x}^* = \{\boldsymbol{c}_1, \dots, \boldsymbol{c}_h, \dots, \boldsymbol{c}_H\}$, with $1 \leq H \leq P$. Let $\boldsymbol{w}$ be an associated vector of counts, $\boldsymbol{w} = \{w_1, \dots, w_h, \dots, w_H\}$, where w_h is the number of $\boldsymbol{c}_h$ components in $\boldsymbol{x}$. For example, if each $\boldsymbol{c}_p$ in $\boldsymbol{x}$ is distinct, then $\boldsymbol{x} = \boldsymbol{x}^*$, $H = P$, and $\boldsymbol{w}$ is a vector of 1s of length P. On the other hand, if all $\boldsymbol{c}_p$ in $\boldsymbol{x}$ are equal to one another, then $\boldsymbol{x}^* = \boldsymbol{c}_p$, $H = 1$, and $\boldsymbol{w} = P$. Similarly, let $\boldsymbol{c}_p^*$ be the distinct set of groupings in $\boldsymbol{c}_p$ such that $\boldsymbol{c}_p^* = \left\{g_{p,1}, \dots, g_{p,f}, \dots, g_{p,F_p}\right\}$ with $1 \leq F_p \leq Q_p$. Let $\boldsymbol{w}_p$ be an associated vector of counts, $\boldsymbol{w}_p = \left\{w_{p,1}, \dots, w_{p,f}, \dots, w_{p,F_p}\right\}$, where $w_{p,f}$ is the number of $g_{p,f}$ groupings in $\boldsymbol{c}_p$. The number of combinations, n_b, is calculated as:

$$n_b = {n_m!}\Big/\left(\prod_{p=1}^{P}\prod_{q=1}^{Q_p} g_{p,q}!\right)\cdot\left(\prod_{p=1}^{P}\prod_{f=1}^{F_p} w_{p,f}!\right)\cdot\left(\prod_{h=1}^{H} w_h!\right)\cdot(n_m - n_x)!\,.$$

For example, if $n_m = 6$ and $\boldsymbol{x} = \{\{1,1\},\{1,1\},\{1,1\}\}$, then $P = 3$, $Q_p = 2$ for all p, and $g_{p,q} = 1$ for all p and q; $F_p = 1$ for all p, $w_{p,f} = 2$ for all p and f; $H = 1$ and $w_h = 3$; and $n_x = 6$. In this example, $n_b = {6!}\big/(1!\,1!\,1!\,1!\,1!\,1!)(2!\,2!\,2!)(3!)(0!) = 15$. As another example, if $n_m = 12$ and $\boldsymbol{x} = \{\{3,3,4\}\}$, then $n_b = {12!}\big/(3!\,3!\,4!)(2!\,1!)(1!)(2!) = 138{,}600$.

The algorithm creates a combination matrix, $\boldsymbol{B} = \left(\boldsymbol{b}_1, \dots, \boldsymbol{b}_k, \dots, \boldsymbol{b}_{n_b}\right)^{\mathsf{T}}$, that is $n_b \times n_x$ for a given n_m and $\boldsymbol{x}$.

Processing: Scoring. The algorithm selects ij and ji values from $\boldsymbol{M}$ that are expected to have conflict ties as defined by $\boldsymbol{x}$ and $\boldsymbol{b}_k$. The selected values are assigned to a vector $\boldsymbol{s}_k = \{s_{k,1}, \dots, s_{k,r}, \dots, s_{k,2n_r}\}$, of length $2n_r$, where n_r is the number of symmetric ties defined by $\boldsymbol{x}$.

The fit score for combination k is calculated as:

$$\tau_k = 2 \cdot \sum_{r=1}^{2n_r} s_{k,r} - \sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij},$$

where $\sum_{r=1}^{2n_r} s_{k,r}$ sums the elements of $\boldsymbol{s}_k$ and $\sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij}$ sums all elements of $\boldsymbol{M}$.

This formula is slightly different than the logic described in Study 2, but it is equivalent. Study 2 describes a square matrix, $\boldsymbol{D}_k$, with the same dimensions as $\boldsymbol{M}$, and $d_{k,ij}$, which is the ijth element of $\boldsymbol{D}_k$, has a value of +1 or −1 depending on whether configuration $\boldsymbol{x}$ expects, respectively, the presence or absence of a tie. In the Study 2 description, $\tau_k = \sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij} \cdot d_{k,ij}$. We can show the equivalence thus: let $d_{k,ij}^* = d_{k,ij}$ when $d_{k,ij} = 1$, and $d_{k,ij}^* = 0$ otherwise. Note that $m_{ij} \cdot d_{k,ij} = m_{ij} \cdot d_{k,ij}^* - m_{ij}\left(1 - d_{k,ij}^*\right) = 2m_{ij} \cdot d_{k,ij}^* - m_{ij}$, and $\sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij} \cdot d_{k,ij} = 2\sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij} \cdot d_{k,ij}^* - \sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij}$. Since $\sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij} \cdot d_{k,ij}^*$ is defined as the sum of the elements of $\boldsymbol{M}$ that are expected to be positive, it has the same definition as $\sum_{r=1}^{2n_r} s_{k,r}$. Therefore, $\tau_k = 2 \cdot \sum_{r=1}^{2n_r} s_{k,r} - \sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij} = \sum_{i=1}^{n_m}\sum_{j=1}^{n_m} m_{ij} \cdot d_{k,ij}$.

Instead of looping through each k to calculate τ_k, the algorithm uses matrix algebra. It stacks the $\boldsymbol{s}_k$ vectors to create an $n_b \times 2n_r$ matrix, $\boldsymbol{S} = \left(\boldsymbol{s}_1, \boldsymbol{s}_2, \dots, \boldsymbol{s}_{n_b}\right)^{\mathsf{T}}$. Additionally, $\boldsymbol{E}$ is defined as a $n_b \times n_m$ matrix of 1s, and $\boldsymbol{e}_s$ and $\boldsymbol{e}_m$ are defined as column vectors of 1s with length $2n_r$ and n_m, respectively. The vector of fit scores, $\boldsymbol{\tau}$, is calculated as:

$$\boldsymbol{\tau} = 2\boldsymbol{S}\boldsymbol{e}_s - \boldsymbol{E}\boldsymbol{M}\boldsymbol{e}_m.$$

The fit score for configuration $\boldsymbol{x}$ is $\tau^{\max}$, which is the maximum value in $\boldsymbol{\tau}$. The combination, $\boldsymbol{b}^{\max}$, is the $\boldsymbol{b}_k$ combination associated with $\tau^{\max}$.

Outputs. After every configuration $\boldsymbol{x}$ in X is scored, the algorithm returns (1) the configuration with the highest $\tau^{\max}$, (2) $\boldsymbol{b}^{\max}$ and $\tau^{\max}$ for the returned configuration, and (3) the configuration's origin.

A case example. To further clarify the algorithm, we use a case example of a four-person team, $n_m = 4$. In this example, sociomatrix $\boldsymbol{M}$ has the following values:

$$\boldsymbol{M} = \begin{bmatrix} 0 & -3 & 3 & -1 \\ -3 & 0 & -2 & 1 \\ 3 & -2 & 0 & -1 \\ -1 & 1 & -1 & 0 \end{bmatrix}.$$

Positive values indicate the presence of conflict ties between team members; negative values indicate the absence of conflict ties. The team members in $\boldsymbol{M}$ are indexed by $i \in \{1, \dots, 4\}$. $\boldsymbol{M}$ reveals that team members 1 and 3 have a symmetric conflict tie; so do members 2 and 4. It is not necessary to have symmetric ties in $\boldsymbol{M}$, but we present a symmetric matrix for simplicity.

There are six possible configurations with a four-person team: $\{\{1,3\}\}$, which identifies an individual origin; $\{\{1,1\}\}$ and $\{\{1,1\},\{1,1\}\}$, which identify dyad origins; $\{\{2,2\}\}$, which identifies a subgroup origin; $\{\{1,1,1,1\}\}$, which identifies a team origin; and $\{\{4\}\}$, which identifies no conflict.

We consider the configuration $\boldsymbol{x} = \{\{1,3\}\}$ first. There are four combinations of interest, $n_b = \frac{4!}{(1!3!)(1!1!)(1!)(0!)} = 4$, which are captured in $\boldsymbol{B}$:

$$\boldsymbol{B} = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 3 & 4 \\ 3 & 1 & 2 & 4 \\ 4 & 1 & 2 & 3 \end{bmatrix}.$$

Table D1. Example Results from the Conflict Origins Algorithm for Each Configuration

x	**Origin**	$\tau^{\max}$	$b^{\max}$
(1 1) (1 1)	Dyad	22	(1,3,2,4)
(1 1)	Dyad	18	(1,3)
(2 2)	Subgroup	10	(1,2,3,4)
(1 3)	Individual	6	(3,1,2,4)
(4)	None	6	(1,2,3,4)
(1 1 1 1)	Team	−6	(1,2,3,4)

Each row in $\boldsymbol{B}$ defines a distinct combination, $\boldsymbol{b}_k$, and each element holds a team member index i. The first column in $\boldsymbol{B}$ assigns one team member to $g_{1,1}$, which is the first grouping in $\boldsymbol{x}$. Columns 2 through 4 assign team members to the second grouping, $g_{1,2}$. Configuration $\{\{1,3\}\}$ specifies ties between team members in the first and second groupings; $n_r = 3$, and $\boldsymbol{S}$ is a 4×6 matrix:

$$\boldsymbol{S} = \begin{bmatrix} m_{12} & m_{13} & m_{14} & m_{21} & m_{31} & m_{41} \\ m_{21} & m_{23} & m_{24} & m_{12} & m_{32} & m_{42} \\ m_{31} & m_{32} & m_{34} & m_{13} & m_{23} & m_{43} \\ m_{41} & m_{42} & m_{43} & m_{14} & m_{24} & m_{34} \end{bmatrix} = \begin{bmatrix} -3 & 3 & -1 & -3 & 3 & -1 \\ -3 & -2 & 1 & -3 & -2 & 1 \\ 3 & -2 & -1 & 3 & -2 & -1 \\ -1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}$$

$$\boldsymbol{\tau} = 2 \cdot \begin{bmatrix} -2 \\ -8 \\ 0 \\ -2 \end{bmatrix} - \begin{bmatrix} -6 \\ -6 \\ -6 \\ -6 \end{bmatrix} = \begin{bmatrix} 2 \\ -10 \\ 6 \\ 2 \end{bmatrix}$$

Thus, for $\boldsymbol{x} = \{\{1,3\}\}$, the algorithm returns $\tau^{\max} = \tau_3 = 6$ and $\boldsymbol{b}^{\max} = \boldsymbol{b}_3 = (3,1,2,4)$.

The origin, $\tau^{\max}$, and $\boldsymbol{b}^{\max}$ for each configuration in this example are shown in Table D1. The highest fit score among the configurations is $\tau^{\max} = 22$ when $\boldsymbol{x} = \{\{1,1\},\{1,1\}\}$. This identifies a dyad origin with two dyadic ties, one between team members 1 and 3 and one between 2 and 4.

Comments. The sociomatrix $\boldsymbol{M}$ can have valued or binary elements. It is important, however, that the absence of a tie be represented by negative values. Thus, if ties are binary, the values must be shifted downward by 0.5 so that the absence of a tie is −0.5 and the presence of a ties is 0.5, or the absence of a tie must be recoded as −1. $\boldsymbol{M}$ can also have symmetric or asymmetric ties. If ties are asymmetric, the algorithm effectively averages values across the diagonal of the matrix.

The scores are based on the values of a team's conflict network, so scores are only comparable across configurations applied to the same network. Scores are not comparable across different team networks. Further, because the number of combinations to score grows exponentially as teams become larger, the algorithm is only technically feasible with small networks. We were able to use it with teams up to 14 members on a high-performance computer. The smallest team size that the algorithm accepts is 4 because it is not possible to discriminate between the four origins for teams with two or three members.

APPENDIX E: TABLES

Table E1. Study 2 Descriptive Statistics of Team Data*

	Mean	**S.D.**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Intragroup conflict												
(1) Task	2.02	0.41										
(2) Relationship	1.37	0.42	0.46••									
Task origin and evolution												
(3) None	0.23	0.42	-0.37••	-0.26••								
(4) Individual	0.09	0.29	0.16	0.11	-0.17							
(5) Dyad	0.39	0.49	-0.07	0.14	-0.44••	-0.25••						
(6) Subgroup	0.12	0.33	0.30••	0.08	-0.20•	-0.11	-0.29••					
(7) Team	0.09	0.29	0.12	-0.01	-0.17	-0.10	-0.25••	-0.12				
(8) Contagion	0.05	0.23	0.14	-0.10	-0.13	0.47••	-0.10	0.04	-0.08			
(9) Continuity	0.41	0.49	0.22•	0.16	-0.45••	0.07	0.30••	0.08	0.22•	-0.20•		
(10) Concentration	0.14	0.35	0.24••	0.29••	-0.22•	-0.13	0.14	0.20•	0.10	-0.10	-0.34••	
Relationship origin and evolution												
(11) None	0.38	0.49	-0.32••	-0.34••	0.57••	-0.18•	-0.25••	-0.09	-0.25••	-0.11	-0.47••	-0.21•
(12) Individual	0.10	0.30	0.29••	0.22•	-0.11	0.26••	-0.15	0.13	0.11	0.04	0.21•	-0.02
(13) Dyad	0.33	0.47	0.00	0.20•	-0.38••	-0.08	0.40••	-0.09	0.26••	-0.12	0.32••	0.30••
(14) Subgroup	0.03	0.18	0.16	0.22•	-0.10	-0.04	0.05	0.20•	-0.06	0.17	0.13	-0.08
(15) Team	0.01	0.09	-0.12	0.05	-0.05	0.29••	-0.07	-0.03	-0.03	-0.02	-0.07	-0.04
(16) Contagion	0.05	0.22	0.17	-0.01	-0.13	0.03	-0.19•	0.25••	0.26••	0.12	0.13	0.01
(17) Continuity	0.20	0.40	0.26••	0.35••	-0.27••	0.09	0.30••	-0.05	-0.01	0.00	0.29••	0.16
(18) Concentration	0.06	0.23	0.20•	0.42••	-0.13	0.13	0.03	0.02	0.05	0.00	0.12	0.11
Controls												
(19) Team size	4.90	0.31	0.04	0.02	0.00	0.11	-0.10	0.04	0.11	0.08	-0.09	0.14
(20) Percent men	0.58	0.19	0.01	-0.04	0.07	-0.03	-0.07	0.05	-0.01	-0.07	-0.01	-0.10
(21) Average GPA	3.88	0.13	0.01	-0.08	0.07	0.10	-0.01	-0.06	0.09	0.10	0.04	0.01
(22) Honors section	0.06	0.23	0.18•	-0.02	-0.13	0.05	0.09	-0.09	0.16	0.25••	0.08	0.00
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	
Relationship origin and evolution												
(12) Individual	-0.25••											
(13) Dyad	-0.55••	-0.23••										
(14) Subgroup	-0.15	-0.06	-0.13									
(15) Team	-0.07	-0.03	-0.06	-0.02								
(16) Contagion	-0.18•	0.62••	-0.11	-0.02	-0.02							
(17) Continuity	-0.39••	0.20•	0.44••	0.00	-0.04	-0.12						
(18) Concentration	-0.19•	-0.08	0.19•	0.36••	-0.02	-0.06	-0.12					
Controls												
(19) Team size	-0.01	0.11	-0.09	0.06	0.03	0.08	-0.03	0.08				
(20) Percent men	0.12	0.00	-0.10	-0.03	0.01	0.02	-0.10	-0.02	-0.37••			
(21) Average GPA	-0.01	0.17	0.08	-0.10	0.00	0.11	0.07	0.00	0.06	-0.05		
(22) Honors section	-0.05	0.20•	-0.05	-0.05	-0.02	0.26••	0.05	-0.06	0.08	-0.05	0.40••	

• *p* < .05; •• *p* < .01
* Sample size = 126 teams.

Table E2. Study 3 Descriptive Statistics*

	Mean	**S.D.**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
(1) Team performance	5.09	0.60								
Intragroup conflict										
(2) Task	3.81	0.81	-0.18							
(3) Relationship	2.25	0.55	-0.17	0.67••						
Task conflict origin										
(4) None	0.19	0.39	-0.24•	-0.32••	-0.33••					
(5) Individual	0.22	0.41	0.06	0.00	0.03	-0.25•				
(6) Dyad	0.34	0.47	0.21	-0.07	-0.20	-0.34••	-0.38••			
(7) Subgroup	0.24	0.43	-0.05	0.33••	0.44••	-0.27•	-0.30••	-0.40••		
(8) Team	0.02	0.14	-0.06	0.14	0.16	-0.07	-0.07	-0.10	-0.08	
Relationship conflict origin										
(9) None	0.39	0.49	-0.09	-0.39••	-0.43••	0.52••	-0.14	0.11	-0.42••	-0.11
(10) Individual	0.14	0.35	-0.05	0.13	0.32••	-0.20	0.17	-0.25•	0.31••	-0.03
(11) Dyad	0.32	0.47	0.15	0.14	-0.01	-0.24•	0.15	0.29••	-0.24•	-0.02
(12) Subgroup	0.15	0.36	-0.01	0.22•	0.28•	-0.20	-0.16	-0.28•	0.58••	0.21
(13) Team	0.00	0.05	-0.05	0.03	0.07	-0.02	-0.03	-0.04	0.09	-0.01
Controls										
(14) Team size	8.79	2.64	0.01	0.23•	0.24•	-0.45••	0.34••	-0.07	0.17	-0.04
(15) Percent men	0.68	0.30	-0.33••	0.20	0.16	0.03	0.14	-0.20	0.02	0.12
(16) Mean age	30.69	3.61	-0.23•	0.08	0.29•	-0.04	0.07	-0.19	0.12	0.20
(17) Mean tenure	2.71	1.44	-0.04	0.14	0.00	-0.05	0.09	-0.10	0.08	-0.02
(18) Has lead	0.49	0.50	-0.07	0.12	0.27•	-0.10	0.14	-0.27•	0.21	0.12

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Relationship conflict origin									
(10) Individual	-0.33••								
(11) Dyad	-0.54••	-0.28•							
(12) Subgroup	-0.33••	-0.17	-0.29•						
(13) Team	-0.04	-0.02	-0.03	-0.02					
Controls									
(14) Team size	-0.24•	0.22	0.03	0.07	0.00				
(15) Percent men	-0.01	0.10	-0.10	0.04	0.05	-0.03			
(16) Mean age	-0.02	0.13	-0.10	0.02	0.05	0.18	0.10		
(17) Mean tenure	-0.09	0.11	0.00	0.01	-0.01	0.11	0.16	0.23•	
(18) Has lead	-0.13	0.28•	-0.15	0.09	0.05	0.25•	0.37••	0.24•	0.16

• *p* < .05; •• *p* < .01.
* Sample size = 79 teams.