When team members (dis)agree about social rules and norms: a shared relational models approach to explaining team viability

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Abstract

When people work together in teams, they ideally have a common understanding, a shared mental model regarding various aspects of teamwork. This common understanding refers not only to task-related aspects of teamwork but also to the elemental social rules and norms that underlie social interactions among team members. Relational models theory proposes that social rules and norms can be seen as the implementation and combination of four elemental relational models that people use to coordinate their social interactions. Since each of these relational models encompasses a distinct moral motive, which determines expectations of fairness and appropriate behaviors in social interactions, we propose that the degree of sharedness of individuals' perceptions regarding the applicable relational models in teams (i.e., shared relational models) is positively related to various aspects of team viability, mediated by perceived justice and relationship conflict. In two field studies collecting data from $N=40$ and $N=46$ work teams in organizations, we found reproducible support for most of our hypotheses. Our studies' findings emphasize the importance of shared relational models among team members for justice perceptions, conflict and team viability in organizational settings.

Keywords Relational models theory · Relational models · Shared relational models · Shared mental models · Team mental models · Shared cognition · Justice perception · Team conflict · Team viability

In a time of rapidly changing and complex work environments, organizations are increasingly relying on team-based work structures, and the effectiveness of work teams is crucial for organizational success (DeChurch & Mesmer-Magnus, 2010a). In organizational science, a large body of research has been conducted to identify antecedents of team effectiveness (DeChurch & Mesmer-Magnus, 2010a; Kozlowski, 2018). Team effectiveness refers not only to a team's performance outcomes but also to *team viability*, or a team's ability to keep up team members' satisfaction and willingness to remain in the team (Hackman, 1987; Kozlowski & Ilgen, 2006). Identifying and understanding

variables that enhance team effectiveness is crucial for both practitioners and academics (Kozlowski, 2018).

In recent decades, scholars have identified and examined (the extent of) team members' shared understanding of various aspects of teamwork, so-called *shared mental models,* as an antecedent of team effectiveness (for an overview, see Mohammed et al., 2010; Turner et al., 2014). For example, teams may (or precisely may not) have a shared (i.e. common) understanding of task-related aspects like task procedures, task strategies or contingencies as well as of team related aspects like roles, responsibilities, communication channels, teammates knowledge or skills (Mathieu et al., 2000). The more teams share an understanding of task and team related aspects the more effective they can collaborate (Marks et al., 2001).

With regard to the criterion domain, research on shared mental models has a strong focus on performance outcomes, while team viability, as the person-related aspect of team effectiveness, has been underresearched (Mohammed et al., 2010). With regard to the content domain, a large body of research has focused on shared mental models of task-specific aspects of team work in specific working

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environments, often using highly task-specific measurement tools. Much less attention has been devoted to shared mental models of the social rules and norms that underlie social interactions among team members. This area warrants greater attention because social rules and norms play a role in all types of teams and organizations.

Social rules and norms are often unspoken but can nevertheless have a strong impact on interaction partners' expectations about fairness and appropriate behavior (Fiske, 1992; Rai & Fiske, 2011). They influence how, under which conditions and with which expectations interaction partners cooperate, how they distribute resources, or make decisions. According to relational models theory (RMT, Fiske, 1992), social rules and norms stem from four distinct and elemental mental representations of relationships, so-called *relational models,* that people use to regulate their social interactions. Because each relational model encompasses a distinct moral motive defining distinct expectations about what behavior is appropriate and fair, interaction partners should ideally have a shared understanding of which relational model to apply in various types of social interactions (Fiske, 1992). Accordingly, the group of individuals making up a team should ideally have a shared understanding of the relational models to be applied in the various types of social interactions relevant for team functioning (i.e., shared relational models). But what are the consequences for team functioning and team effectiveness when team members have a low (rather than high) degree of sharedness of relational models in their team?

The present studies aim to shed light on this question. Building upon the theoretical framework of RMT, we propose that the degree of sharedness of relational models in teams is related to perceived justice and relationship conflict among team members, which are in turn related to various aspects of team viability. By focusing on RMT, fairness perceptions, interpersonal conflict, and team viability, we seek to contribute to three fundamental lines of research. First, we seek to contribute to research on RMT by empirically testing one of its core propositions, namely that the application of *different* relational models by the people involved in a social interaction is negatively related to justice perceptions and positively related to relationship conflict. Second, we seek to contribute to research on shared mental models by examining shared understanding of fundamental aspects of social interaction in relation to team viability as an affective and motivational outcome of shared relational models. Third, we seek to contribute to research on team effectiveness more generally by identifying antecedents of team viability, which is known to be an important factor for team performance (Mathieu et al., 2008).

Relational models theory

Relational models theory (RMT) posits that people use four universal and distinct cognitive schemas, so-called *relational models*, to structure their social interactions. People use these relational models "to plan and to generate their own action, to understand, remember, and anticipate others, to coordinate the joint production of collective action and institutions, and to evaluate their own and other's action" (Fiske, 2004, p. 3). Relational models can be seen as the grammar or building blocks of social interactions. They guide people in social interactions by providing specific representations of oneself and the other in a social interaction as well as specific information about what behavior is (not) appropriate and (not) acceptable in a given situation. Moreover, each relational model includes a specific, distinct moral motive (Rai & Fiske, 2011), making them the major source of fairness perceptions, moral judgements, and cooperative behavior. Relational models and moral motives, in combination, determine whether a particular behavior is perceived as fair or morally appropriate in a specific social interactive situation – or as unfair and inappropriate in another. For example, it depends on the relational model and the corresponding moral motive whether someone expects a decision to be made by consensus or by a leader. Or it also depends on the relational model and the corresponding moral motive whether someone perceives a bonus distributed among team members to be fair when it is paid depending on each member's contribution or in equal shares.

The four relational models are as follows: communal sharing (CS), authority ranking (AR), equality matching (EM) and market pricing (MP).

When people apply a *communal sharing* model, they perceive themselves and their interaction partner(s) as sharing a common identity. CS relationships are guided by the moral motive of unity and characterized by feelings of belonging, altruism and solidarity. In a CS relationship, resources are distributed based on the principle of need. Keeping track of in- and outputs of individuals within the group is not only not common, it is considered extremely inappropriate and morally wrong. Decisions are taken together and consensus among group members is sought.

When people apply an *authority ranking* model, they perceive each other to be in a hierarchical order with respect to a certain dimension, such as formal rank, experience or seniority. AR relationships are guided by the moral motive of authority and characterized by feelings of superiority/inferiority, power, loyalty and respect. When resources are distributed in an AR relationship, it is socially accepted that individuals with higher status receive a larger amount than individuals with lower status.

In a similar vein, it is socially accepted that people with higher status make decisions for the whole group. However, while higher ranking people have these privileges, they are also expected to lead and to protect lower-ranking people.

When people apply an *equality matching* model, they perceive each other as equivalent (but distinct) individuals and seek balance in their interactions. EM relationships are guided by the moral motive of equality and characterized by attributes such as reciprocity, equalization and turn-taking. When resources are distributed in EM relationships, it is important that everyone receives exactly the same share. When decisions are made, each member's vote has exactly the same value. In EM relationships, people keep track of imbalances of favors and support and strive to balance them out by reciprocating in an equivalent way.

When people apply a *market pricing* model, their interactions are driven by considerations of what they have invested in and to what degree they profit from a relationship. MP relationships are guided by the moral motive of proportionality and characterized by attributes such as ratios, cost–benefit calculations and individual pay-offs. When resources are distributed in MP relationships, each individual's share depends on his/her individual contribution. Decisions are made by considering proportionality with respect to each individual's input as well as regarding the consequences of the decision. Unlike in CS relationships, it is considered appropriate and even expected for group members to keep track of individuals' inputs and outputs, and individuals' effort and participation in MP interactions depends to a large extent on the pay-off he/she can expect from the relationship.

Because RMT was developed to provide a theoretical framework for analyzing and predicting human motivation and behavior in all social interactive situations, professional and private, face-to-face, remote or computer mediated, it can be seen as a broad and generic theory about human relationship regulation in social situations. It has gained empirical support from studies in various disciplines (for an overview see Fiske, 2012; Haslam, 2004) and across a multitude of domains, such as emotion research (Fiske et al., 2017; Seibt et al., 2017a, b), neuroscience (Dien et al., 2018), moral psychology (McGraw & Tetlock, 2005), clinical psychology (Haslam et al., 2002), and behavioral economics (Brodbeck et al., 2013). In recent years, scholars have also started to use RMT to explain and examine various forms of organizational behavior, such as interpersonal conflict (Frone, 2000; Vodosek, 2000), leadership (Fehr et al., 2015; Giessner & van Quaquebeke, 2010; Keck et al., 2018; Wellman, 2017), mentoring (Rutti et al., 2013), cooperative behavior (Bridoux & Stoelhorst, 2016; Mossholder et al., 2011), knowledge sharing (Boer et al., 2011), and proactive behavior (Batistič et al., 2016). A large share of organizational research on relational models is of a theoretical

nature (e.g., Bridoux & Stoelhorst, 2016; Fehr et al., 2015; Giessner & van Quaquebeke, 2010; Mossholder et al., 2011; Rutti et al., 2013; Vodosek, 2000; Wellman, 2017). Only a few empirical studies empirically examining organizational behavior from the theoretical perspective of RMT have been published (e.g., Boer et al., 2011; Keck et al., 2018; Vodosek, 2009), and several core propositions of RMT have not yet been empirically tested.

From the perspective of RMT, social rules and norms can be seen as the combination and manifestation of the four relational models described above in various domains of social interaction within a group. Relational models are the implicit 'building blocks' of social rules and norms since they define how team members see themselves in relation to each other in social interactions and, based on that, what kind of behavior one can and cannot expect from one's interaction partner. Thus, when we perceive someone's behavior in a social interactive situation within a team as inappropriate and breaking the team's social rules, this means that his/her behavior is incompatible with and thus a violation of the relational model we are applying to the respective social interaction. Since people strongly believe that interaction partners should adhere to the relational models perceived as valid in a given situation (Fiske, 1992), the application of *different* relational models among interaction partners, that comes with a high probability of violating rules that are perceived as valid, is likely to have a negative impact on their relationship.

Shared relational models in teams

In the ideal case, all members of a team have a similar understanding of the relational models, which should be applied in particular social interactive situations within their team. Accordingly, they have a similar understanding of what behaviors are appropriate and fair and what behavior can be expected in interactions between team members. For example, in a particular team, team members may have a similar understanding that decisions should be made by consensus and not by majority or that recognition for work is given to the one who contributed the most and not to the one highest in the hierarchical order. In this case, the team members have *a shared mental model* regarding the social rules and norms to be applied in interactive situations within their team.

Shared mental models or *team mental models*[1] have been defined as "team members' shared, organized understanding and mental representation of knowledge about key elements of the team's relevant environment" (Mohammed

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[1] Following Mohammed et al. (2010), we treat these two terms interchangeably.

et al., 2010, p. 879). Shared mental models are conceptualized as emergent states, which are "cognitive, motivational, and affective states of teams [that are]... dynamic in nature and vary as function of team context, inputs, processes, and outcomes" (Marks et al., 2001, p.357). Emergent states – including shared mental models – extend classical input-process-output models of teamwork by a component crucial for teams' success (Mathieu et al., 2000, 2017). Through shared mental models, teams are able to implicitly coordinate their work without the need for direct communication, complementing explicit coordination, which requires intentional communication about processes, plans, schedules etc. (Espinosa et al., 2004; Rico et al., 2008). In other words, when team members share a common implicit understanding of, for example, how decisions are made, there is no need to explicitly agree on a mode each time a decision needs to be made.

In recent decades, interest in the concept of shared mental models has grown, and a growing number of empirical studies have provided evidence for the role of shared mental models as an antecedent of various aspects of team functioning (DeChurch & Mesmer-Magnus, 2010b; Mohammed et al., 2010; Turner et al., 2014). Most empirical studies in this field examine *task*-focused mental models in specific team types, such as military teams or student teams, performing simulation games (Mohammed et al., 2010), while neglecting the relational aspects of social interaction in teams. Studies examining *team-focused* mental models (e.g., Johnson et al., 2007; Lim & Klein, 2006) have only investigated selected aspects of social interaction, such as open communication or mutual trust. Measurement instruments that capture only certain aspects of social interaction fail to consider the broad variety of aspects of social interactions and in particular, how people see each other in relation to each other. Hence, shared mental models regarding *fundamental aspects of social interactions* have yet to be explored. This research gap is remarkable, since the question of how team members see themselves in relation to each other plays a central role in every team, regardless of team type, team task or environmental conditions. Due to the importance of fundamental aspects of social interaction for all types of teams and work contexts, it is an important step for SMM research to close this gap.

Teams vary in the degree to which team members share a common understanding of how social interaction in general should be regulated within their team, how team members should relate to each other and how *fundamental social interactions* between team members should take place. From the perspective of RMT, teams vary in the degree to which team members have a shared understanding of which relational models are to be applied in specific social interactions among team members, for instance when team members help each other or when they make joint decisions. In

this paper, we term this degree of sharedness[2] of relational models within teams *shared relational models.*

Shared relational models in teams, justice perceptions and conflict

Each of the four relational models identified by RMT encompasses a distinct moral motive; therefore, judgments about right and wrong, about what is fair and unfair depend on the relational model a person applies in a specific social interaction (Simpson & Laham, 2015). This means that the same behavior can be perceived as appropriate and just in one social interaction and completely inappropriate and unjust in another; depending on which relational model is salient in the particular situation. The principles of fairness and justice inherent to the different relational models are usually incommensurable with each other because the "adherence to one model usually violates the standards of any other" (Fiske, 1992, p. 712). This becomes evident, for example, when team members apply different relational models to the exchange of resources: a team member who keeps track of his/her and other team members' giving and taking and employs cost–benefit analyses to guide his/her behavior (e.g., refrains from helping others when his/her giving to the other person exceeds the other person's giving to him/her) will be viewed as acting appropriately and reasonably from the perspective of the MP model. However, a team member who witnesses the behaviors just described while applying a CS model will most likely judge them as highly inappropriate and morally reprehensible, since they violate the fundamental fairness principles embodied in the CS model. A team member who seeks help from someone without directly offering something in return or without expecting that the helper will profit will be perceived as behaving appropriately when applying a CS model, but inappropriately when applying an MP model. Regardless of whether it is about allocating resources within a group, making decisions together, asking each other for advice or support, or about how one behaves towards outgroup members—the question of which behavior is perceived as appropriate, fair, and morally right and which not depends strongly on the relational model that is perceived as "valid" in the respective situation.

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[2] In the present study, the term sharedness refers to the (varying) degree of sharedness of mental models among team members. However, in the pertinent literature, scholars have also used a wide range of other terms for this concept, such as consensus, agreement, similarity or convergence (see Mohammed et al., 2010). A large share of the literature uses the term shared mental model to imply a varying degree of sharedness. Hence, we follow the predominant trend in the literature by referring to the sharedness of relational models within teams using the term shared relational model.

The lower the degree of shardeness of relational models in a team, the more likely it is that team members apply *different* relational models with conflicting moral motives in a given social interactive situation. Such application of different relational models in a social interaction has been labeled *between-model conflict* (Poulson, 2005) and is likely to result in perceptions of injustice, as the individuals involved have a different understanding and different expectations of what behavior is 'fair' and 'just' (Rai & Fiske, 2011; Simpson et al., 2016). Correspondingly, the more often team members experience or observe social interactive situations in which their expectations about what is fair and about how relationships "should" be regulated are not fulfilled, the less justice they are likely to perceive in their team. Vice versa, the higher the degree of shardeness of relational models in a team, the more likely it should be that team members apply *the same* relational model and thus hold the same moral motive with the same understanding regarding justice and fairness in a given social interactive situation. The more often team members observe social interactive situations in which their expectations about what is fair and appropriate are fulfilled, the more justice they are likely to perceive in their team.

Thus, we predict the following:

Hypothesis 1: The shardeness of relational models in teams is positively related to justice perceptions within teams.

The degree of shardeness of relational models in a team should also be related to the probability of relationship conflicts among team members. Relationship conflict is caused by interpersonal, non-task-related issues, such as differences in norms and values, and often involves feelings of annoyance, frustration and irritation (de Wit et al., 2012; Jehn, 1995; Jehn & Mannix, 2001). Relationship conflict has been repeatedly linked to justice perceptions (e.g., Bouckenooghe et al., 2014; Zhang & Jia, 2013), with further research suggesting that these two constructs reciprocally influence each other (Shapiro & Sherf, 2015).

The moral motives underlying the four relational models and the justice principles inherent in them are usually incommensurable with each other, making them a major source of interpersonal conflict (Fiske, 1992). Team members who apply different relational models in a social interactive situation are likely to violate the principles inherent in each other's relational models (Poulson, 2005). People often attack and try to punish other people who are perceived as having profoundly violated the relational model they perceive as valid (Fiske, 1991; Rai & Fiske, 2011). Thus, the application of different relational models due to a low degree of shared relational models in teams is likely to lead to aggression and tension and hence to relationship

conflict among team members (Vodosek, 2000). Against this background, we predict the following:

Hypothesis 2: The shardeness of relational models in teams is negatively related to perceptions of relationship conflict among team members.

Justice, relationship conflict and team viability

Justice perceptions and relationship conflict have repeatedly been identified as antecedents of various aspects of team effectiveness (de Wit et al., 2012; Mathieu et al., 2017). Team effectiveness is usually conceptualized with respect to team performance, satisfaction of team members' needs, and team members' willingness to remain in the team (Hackman, 1987; Kozlowski & Ilgen, 2006). In the present study, we will focus on the latter two and thus on the person-oriented side of team effectiveness, which is usually termed *team viability* (Balkundi & Harrison, 2006). Team viability is defined as "a team's potential to retain its members through their attachment to the team, and their willingness to stay together as a team" (Balkundi & Harrison, 2006, p. 52) and includes team outcomes such as team commitment, member satisfaction, team climate and group cohesion (Balkundi & Harrison, 2006). In the present study, we focus on three aspects of team viability which have been intensively studied in organizational research: team cohesion and a participative safety climate on the team level of analysis and team members' affective commitment to the team on the individual level of analysis.

Team cohesion has been defined as "the resultant of all the forces acting on the members to remain in the group " (Festinger, 1950, p. 274). In organizational research, team cohesion is one of the most examined affective aspects of team effectiveness (Kozlowski & Chao, 2012) and has been repeatedly linked to various aspects of team performance (e.g., Beal et al., 2003; Chiocchio & Essiembre, 2009).

Participative safety refers to a team atmosphere perceived as a non-threatening interpersonal social climate characterized by trust and support (Burningham & West, 1995). In a climate of participative safety, team members feel that they will not be rejected, embarrassed or punished by other team members for speaking up and sharing their ideas (Peltokorpi & Hasu, 2014). Participative safety has been repeatedly linked to group performance, particularly to group innovation (e.g., Bain et al., 2001; Brodbeck & Maier, 2001; Hülsheger et al., 2009; Peltokorpi & Hasu, 2014).

Affective commitment to the team (hereafter: *team commitment*) refers to team members' "emotional attachment to, identification with and involvement in" (Wombacher & Felfe, 2017b, p.1557) their team. Team commitment

has been repeatedly shown to be positively related to various aspects of team performance and performance-related behaviors such as OCB-I (e.g., Ohana, 2016; Wombacher & Felfe, 2017a).

There is ample evidence that justice perceptions among team members are an antecedent of team viability (Mathieu et al., 2008). For instance, justice perceptions on the individual and team level have been found to be positively related to team commitment (Ganesh & Gupta, 2015), team identification (De Backer et al., 2011), job satisfaction (Aryee et al., 2002), team cohesion (De Backer et al., 2011), and participative safety (Ganesh & Gupta, 2015). When people do not feel treated fairly, this is likely to cause anger, hostility and moral outrage (Judge et al., 2006), which are also likely to negatively affect team viability and member satisfaction. Thus, we predict the following:

> Hypothesis 3a: Justice perceptions among team members are positively related to perceptions of team cohesion, participative safety and affective commitment to the team.

There is also robust empirical evidence showing that relationship conflict has large negative effects on various aspects of team effectiveness, including team viability (de Wit et al., 2012). Relationship conflict is associated with negative affect (e.g., Kessler et al., 2013) and often involves hostility among team members (de Wit et al., 2013). In this way, relationship conflict is likely to decrease team members' satisfaction and team commitment and thus their willingness to remain in the team (Jehn et al., 2008; Wombacher & Felfe, 2017b). When team members repeatedly experience that social interactions lead to tension and hostility among team members, this is also likely to negatively affect the participative safety climate, since team members are likely to try to avoid conflict by refraining from actively getting involved in interactions with other team members. Indeed, previous research has linked relationship conflict with team members' anxiety and discomfort (Poitras, 2012). Moreover, besides its negative direct effect on group effectiveness, relationship conflict has also been shown to exacerbate the effects of other types of conflicts, such as task conflict, which can have positive effects on team effectiveness in absence of relationship conflict but negative effects when relationship conflict is present (de Wit et al., 2012, 2013). Hence, relationship conflict is likely to negatively affect team viability. Thus, we predict the following:

> Hypothesis 3b: Perceived relationship conflict among team members is negatively related to perceptions of team cohesion, participative safety and affective commitment to the team.

As formulated in Hypotheses 3a and 3b, we expect justice perceptions and relationship conflict among team members

to be predictors of team viability. Since the degree of sharedness of relational models in teams functions as an antecedent of justice perceptions and relationship conflict (see Hypothesis 1 and Hypothesis 2), the following mediation effect is also proposed:

> Hypothesis 3c: The sharedness of relational models in teams is positively and indirectly related to team members' perceptions of cohesion, participative safety and affective commitment to the team via relationship conflict and justice perceptions.

Study overview

We conducted two separate studies to test our hypotheses. The sample of Study 1 included work teams from various organizations and industries as well as student teams at universities. In order to strengthen our findings and ensure the generalizability of our results to natural work groups, we conducted Study 2 as a robust replication study only including natural work teams in organizations.

Study 1

Method

Sample and procedures We conducted a field study using an online questionnaire. Data was collected from work teams in various organizations and industries in Germany as well as from student project teams at German universities. We used anonymous identification codes to match the members of each team.

A total of 157 participants completed the questionnaire. Ten teams who not reach the minimum rate of three respondents per team had to be excluded, which resulted in the exclusion of 16 participants.

Thus, $N = 40$ teams with a total of $N = 141$ participants made up our final sample. Fifty seven percent of participants were female; the average age was 30.1 years ($SD = 9.41$). Seventy-two percent of participants hold a university degree.

The average team size was 3.1 ($SD = 1.3$) and ranged from three to eight members per team. Seven teams (22 participants) were student project teams, while 33 teams were work teams (119 participants). Forty eight percent of the participants had been working in their current team for less than one year, 17% between one and two years, 11% between two and five years, and 24% for more than five years.

Measures If possible, a validated German version of each scale was used. If only English versions were available, the respective scales were translated and back-translated by several individuals fluent in both languages. Only a few differences occurred, which were resolved through discussion between the translators and the authors of the present study, and the respective items were revised accordingly.

All items were answered on a 5-point frequency scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*).

Relational models in teams Team members' perceptions of relational models in their team were assessed using the relational models scale developed by Vodosek ([2009](#)). The measure includes four subscales assessing the four relational models. A sample item for the communal sharing subscale is "If one of the group members needs something, other group members give it without expecting anything in return." A sample item for the authority ranking subscale is "One of the group members tends to lead". A sample item for the equality matching subscale is "Group members typically divide things up into shares that are the same size". A sample item for the market pricing subscale is "Group members calculate what their payoffs are in this group and act accordingly". All subscales were reliable ($\alpha = .78$ for CS, $\alpha = .88$ for AR, $\alpha = .84$ for EM, and $\alpha = .83$ for MP).

To assess the degree of sharedness of relational models in teams, we first calculated four r_{wg} values (i.e., one r_{wg} value for each relational model) for each team, indicating to what extent the individuals of each team agreed regarding the use of each relational model within their team. The r_{wg} is a measure assessing inter-rater agreement and specifies "agreement among judges [i.e., team members] by comparing the observed variance to the variance expected when judges [i.e., team members] respond randomly" (LeBreton & Senter, [2008](#), p. 818—819; see also Klein & Kozlowski, [2000](#); Lindell et al., [1999](#)). In research on shared mental models, the r_{wg} has been repeatedly used to assess agreement within teams (DeChurch & Mesmer-Magnus, [2010b](#)). Using the r_{wg} allows to indirectly assess the degree of sharedness of relational models, instead of asking participants directly about their subjective perception of the degree of sharedness, which would result in several problems such as response biases and common method variance.

Since we were predominantly interested in the *overall* degree of sharedness regarding relationship regulation (and not in the degree of sharedness regarding each single relational model), we secondly, summed up the four r_{wg} values in order to obtain one overall index for the degree of sharedness across all four relational models for each team. The approach of combining multiple r_{wg}-values into an overarching index of shared mental models in teams has been used in research before (see e.g., Levesque et al., [2001](#)).

Justice perception Team members' overall justice perception was measured with four items adapted from Ambrose and Schminke ([2009](#)). A sample item is "I consider the collaboration in my team as fair". Cronbach's alpha was $\alpha = .86$.

Relationship conflict Team relationship conflict was measured with three items from the German version of Jehn's Intragroup Conflict Scale (Jehn, [1995](#)), taken from Lehmann-Willenbrock et al. ([2011](#)). The wording was slightly adapted to our question format. A sample item is "There is much tension among members in my team". Cronbach's alpha was $\alpha = .86$.

Participative safety climate Participative safety climate was measured with three items from the German version of the team climate inventory (Brodbeck et al., [2000](#)). A sample item is "People feel understood and accepted by each other." Cronbach's Alpha was $\alpha = .79$.

Team cohesion Team cohesion was measured with eight items taken from Kauffeld ([2001](#)). A sample item is "We feel like a team." Cronbach's Alpha was $\alpha = .88$.

Affective commitment to the team Team members' affective commitment to the team was measured with three items taken from Xue et al. ([2011](#)). A sample item is "If I had a chance to do the same work again in a team, I would rather stay in the same team." Cronbach's Alpha was $\alpha = .85$.

Research model Given the hierarchical nature of our data, our research model is a multi-level model including a team level ($N = 40$ teams) and an individual level ($N = 141$ individuals). Our proposed mediation model is depicted in Fig. 1.

The team-level measurement of the sharedness of relational models is a direct function of team members' within-group agreement across all four relational models. The other variables in our research model were assigned to different levels of measurement based on theoretical considerations and the perceptional reference object of the corresponding scales (i.e., Do the items reference the team as a whole from the perspective of the team member as an observer, or do the items reference the team member and his/her perceptions as an individual?). Since we were interested in team members' perception of overall justice *in the team as a whole* and the *general* level of relationship conflict among *all members of the team*, these variables were conceptualized and assessed as team-level constructs. Following Beal et al. ([2003](#)), we also conceptualized and measured team cohesion as a team-level construct. Participative safety, as an aspect of team climate, was conceptualized and measured on the team level as well. Therefore, all these variables were aggregated onto the
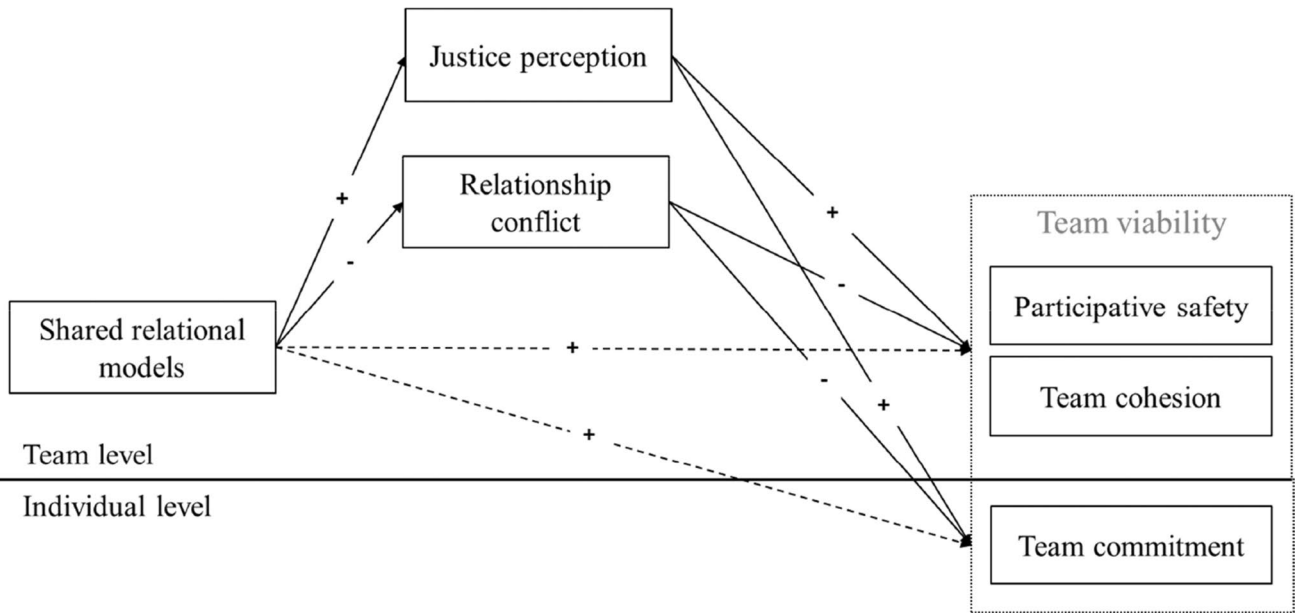
Fig. 1 Proposed mediation model

Table 1 Means, standard deviations, and correlations of Study 1 variables

	Variable	ICC(1)	ICC(2)	r_{WG} (mean)	M	SD	1	2	3	4	5	6
1	Shared relational models	-	-	-	3.12	.43	(-)	.22**	-.26**	.23**	.22**	.15
2	Justice perception	.34	.65	.90	4.12	.52	.33*	(.86)	-.60***	.63***	.72***	.63***
3	Relationship conflict	.43	.72	.84	1.75	.68	-.37*	-.71***	(.86)	-.42***	-.64***	-.45***
4	Participative safety	.28	.58	.84	4.18	.55	.37*	.75***	-.55***	(.79)	.67***	.67***
5	Team cohesion	.48	.77	.87	4.08	.61	.32*	.84***	-.72***	.80***	(.88)	.69***
6	Team commitment	.34	.64	.82	4.14	.63	.23	.80***	-.52***	.77***	.85***	(.85)

Means and standard deviations are at Level 2 ($N=40$). Level 1 correlations ($N=141$) are above the diagonal. Level 2 correlations ($N=40$) are below the diagonal. For Level 1 correlations, Variable 1 was disaggregated by assigning each member of each group the same value. Reliabilities (Cronbach's alpha) are indicated on the diagonal in parentheses. Please note that some of our hypotheses concern cross-level effects, which are not shown in this table. * $p<.05$; ** $p<.01$; *** $p<.001$

team level. In contrast, team members' individual affective commitment to their team was conceptualized and assessed on the individual level of analysis because it refers to their individual satisfaction with and feelings of belonging to the team.

Results

Correlations (both levels), means, standard deviations (team level) and reliabilities (individual level) for all variables are shown in Table 1. Tables 2 and 3 show the results of the mediation analyses on Level 2 as well as cross-level.

Data aggregation and analysis To support the aggregation of our team-level constructs, ICC(1) and r_{wg} values were

calculated for the respective scales. The r_{wg} values ranged from 0.84 to 0.90 and all ICC(1) values were statistically significant, indicating that group membership had a substantial effect on individual ratings (LeBreton & Senter, 2008). Hence, these scales were aggregated to the team level by calculating the mean for each team.

The mediation hypotheses were tested using the following methodologies: Mediations on Level 2 were assessed using bootstrapping methodology with 20,000 replications (Hayes, 2013). Cross-level mediations were assessed using hierarchical linear modeling (HLM 7, Raudenbush et al., 2011) and the Monte Carlo method with 20,000 repetitions (cf. Selig & Preacher, 2008). When testing cross-level mediations, we followed the suggestions of Zhang et al. (2009) and included the mediator variables on both levels (i.e., group mean-centered on the individual level and aggregated on the team level) to differentiate the within-group and between-group

Table 2 Results of multilevel mediation analyses for Study 1 and Study 2 (Mediator: Justice perception)

	Mediator: Justice perception (Level 2)	Dependent Variable: Participative safety (Level 2)			Dependent Variable: Team cohesion (Level 2)			Dependent Variable: Team commitment (Level 1)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Study 1 IV: Shared relational models (Level 2)	.33 (.15)*	.37 (.19)*		.15 (.11)	.32 (.22)*		.05 (.10)	.17 (.11)		-.02 (.08)
Mediator: Justice perception (aggregated; Level 2)			.75 (.11)***	.73 (.11)***		.84 (.09)***	.87 (.10)***		.60 (.08)***	.61 (.08)***
Control Variable: Justice perception (group mean centered; Level 1)										.47 (.09)***
Study 2 IV: Shared relational models (Level 2)	.36 (.14)*	.10 (.15)		-.19 (.10)	.34 (.14)*		.06 (.09)	.12 (.10)		-.15 (.20)
Mediator: Justice perception (aggregated; Level 2)			.76 (.10)***	.83 (.10)***		.82 (.09)***	.80 (.09)***		.49 (.07)***	.51 (.07)***
Control Variable: Justice perception (group mean centered; Level 1)										.47 (.06)***

Standardized coefficients are shown; standard errors are included in parentheses. Models 1- 7 (i.e., single level relationships on Level 2) were calculated as linear regressions ($N_{Study\,1} = 40$ / $N_{Study\,2} = 48$ on Level 2). Models 8—10 (i.e., multilevel relationships) were calculated as multilevel linear models with random intercepts ($N_{Study\,1} = 40$ / $N_{Study\,2} = 46$ on Level 2 and $N_{Study\,1} = 141$ / $N_{Study\,2} = 189$ on Level 1). * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3 Results of multilevel mediation analyses for Study 1 and Study 2 (Mediator: Relationship conflict)

	Mediator: Relationship conflict (Level 2)	Dependent Variable: Participative safety (Level 2)			Dependent Variable: Team cohesion (Level 2)			Dependent Variable: Team commitment (Level 1)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Study 1 IV: Shared relational models (Level 2)	-.37 (.15)*	.38 (.15)*		.20 (.14)	.32 (.15)*		.06 (.12)	.17 (.11)		.03 (.11)
Mediator: Relationship conflict (aggregated; Level 2)			-.55 (.14)***	-.47 (.14)**		-.72 (.11)***	-.70 (.12)***		-.40 (.10)***	-.39 (.10)**
Control Variable: Relationship conflict (group mean centered; Level 1)										-.40 (.10)***
Study 2 IV: Shared relational models (Level 2)	-.36 (.14)*	.10 (.15)		-.17 (.11)	.34 (.14)*		.05 (.08)	.12 (.10)		-.02 (.09)
Mediator: Relationship conflict (aggregated; Level 2)			-.70 (.10)***	-.76 (.11)***		-.84 (.08)***	-.82 (.09)***		-.40 (.08)***	-.40 (.09)***
Control Variable: Relationship conflict (group mean centered; Level 1)										-.43 (.07)***

Standardized coefficients are shown; standard errors are included in parentheses. Models 1- 7 (i.e., single level relationships on Level 2) were calculated as linear regressions ($N_{Study\,1} = 40$ / $N_{Study\,2} = 46$ on Level 2). Models 8—10 (i.e., multilevel relationships) were calculated as multilevel linear models with random intercepts ($N_{Study\,1} = 40$ / $N_{Study\,2} = 46$ on Level 2 and $N_{Study\,1} = 141$ / $N_{Study\,2} = 189$ on Level 1). * $p < .05$; ** $p < .01$; *** $p < .001$

variance. Since we were interested in the latter, we only analyzed the mediator variables on the team level.

Hypothesis tests In confirmation of Hypothesis 1 and Hypothesis 2, we found the degree of sharedness of relational models to be positively related to justice perceptions on the team level ($\beta = 0.33$, $p = .04$) and negatively related to relationship conflict on the team level ($\beta = -0.37$, $p = .02$). In other words, the higher the degree of sharedness of relational models within teams, the higher the perceptions of justice and the less perceived relationship conflict.

In Hypothesis 3a we proposed that team members' justice perceptions are positively related to team cohesion, participative safety and team commitment. Supporting Hypothesis 3a, we found justice perceptions on the team level to be positively related to team cohesion on the team level ($\beta = 0.84$. $p < .001$), participative safety climate on the team level ($\beta = 0.75$, $p < .001$), and team commitment on the individual level ($\beta = 0.60$, $p < .001$). The more justice among team members was perceived, the more cohesion and participative safety were perceived and the more team commitment was experienced by team members.

In Hypothesis 3b we proposed that perceived relationship conflict among team members is negatively related to team cohesion and participative safety on the team level and team commitment on the individual level. Supporting Hypothesis 3b, we found perceived relationship conflict to be negatively related to team cohesion on the team level ($\beta = -0.72$. $p < .001$), participative safety climate on the team level ($\beta = -0.55$, $p < .001$) and team commitment on the individual level ($\beta = -0.38$; $p < .001$). In other words, the more relationship conflict within a team was perceived among team members, the less team cohesion and team-level participative safety were perceived by team members, and the less team commitment was experienced by each individual team member.

In Hypothesis 3c we proposed that the degree of sharedness of relational models in teams is positively and indirectly related to team cohesion, participative safety climate and team commitment via justice perceptions and perceived relationship conflict. However, different than expected, mediation analyses revealed no statistically significant indirect relationship between the degree of sharedness of relational models and the dependent variables team cohesion (95% bias-corrected bootstrap CI [-0.04, 0.57]), and participative safety (95% bias-corrected bootstrap CI [-0.04, 0.49]) via perceived justice. The indirect relationship between the degree of sharedness of relational models and team commitment on the individual level via perceived justice was statistically significant (95% bias-corrected bootstrap CI [0.03, 0.76]). Supporting our hypotheses, we found perceived relationship conflict to be a mediator of the expected indirect relationships between the degree of sharedness of relational

models and team cohesion (95% bias-corrected bootstrap CI [0.05, 0.48]), participative safety (95% bias-corrected bootstrap CI [0.01, 0.39]) and team commitment (95% bias-corrected bootstrap CI [0.05, 0.58]). Thus, Hypothesis 3c was partly supported by our data.

Brief discussion of Study 1

Study 1 confirmed most of our hypotheses. An exception are the hypothesized indirect relationships between the degree of sharedness of relational models and our dependent variables on the team level (i.e., participative safety and team cohesion) via the mediator perceived justice, which turned out to not be statistically significant. However, including data from only 40 teams, our sample is rather small which could make it difficult to detect smaller effects on the team level.

Study 2

We conducted Study 2 as a robust replication of Study 1 to strengthen our findings and to ensure the generalizability of our results to natural work groups in organizations. Thus, our theoretical rationale and hypotheses were the same as in Study 1.

Method

Sample and procedures We included the measures described in Study 1 in another field study conducted by the authors examining a related research question regarding relational models in teams (Arendt et al., 2023). Data was collected via online questionnaire from work teams in various organizations and industries in Germany, Austria and Switzerland.

Teams were recruited using the following strategies: First, we contacted individuals from our personal and professional networks. Second, we contacted the HR departments of various organizations in different industries; third, we advertised the study in social networks (mainly XING). Unlike in Study 1, we limited recruitment to natural work teams in organizations and did not include any student project teams.

A total of 272 participants from 61 teams participated in Study 2. Forty-nine participants had to be excluded because they stopped participating at one of the two first pages of the questionnaire. Fifteen teams (30 individuals) were excluded because they did not reach the minimum response rate of three participants per team. Hence, 193 individuals nested in 46 teams remained in the final sample. Four of these 193 individuals did not completely answer the questionnaire. However, they stopped at a very late stage of the

Table 4 Means, standard deviations, and correlations of Study 2 variables

	Variable	ICC(1)	ICC(2)	r$_{WG}$ (mean)	M	SD	1	2	3	4	5	6
1	Shared relational models	-	-	-	3.14	.32	(-)	.22**	-.22**	.06	.26***	.13
2	Justice perception	.19	.49	.85	4.19	.48	.36*	(.87)	-.58***	.62***	.72***	.62***
3	Relationship conflict	.30	.64	.81	1.78	.59	-.35*	-.72***	(.83)	-.52***	-.71***	-.50***
4	Participative safety	.22	.54	.81	4.22	.49	.10	.76***	-.70***	(.75)	.73***	.66***
5	Team cohesion	.39	.73	.91	4.10	.56	.34**	.82***	-.84***	.79***	(.88)	.68***
6	Team commitment	.34	.68	.82	4.28	.60	.18	.71***	-.57***	.73***	.71***	(.82)

Means and standard deviations are at Level 2 ($N = 46$). Level 1 correlations ($N = 189$) are above the diagonal. Level 2 correlations ($N = 46$) are below the diagonal. For Level 1 correlations, Variable 1 was disaggregated by assigning each member of each group the same value. Reliabilities (Cronbach's alpha) are indicated on the diagonal in parentheses. Please note that some of our hypotheses concern cross-level effects, which are not shown in this table. * $p < .05$; ** $p < .01$; *** $p < .001$

questionnaire, and since we deemed their view of the social rules and norms in their team viable, we used their data to calculate the shared perception of relational models on the team level only.

Thus, the final sample used to test our hypotheses consisted of $N = 189$ individuals nested in $N = 46$ teams. The number of participants per team ranged from three to eight ($M = 4.48$, $SD = 1.39$). Seventy percent of the participants were female and the average age was 36.52 years ($SD = 11.15$), ranging from 23 to 70 years. Our sample consisted of individuals from Germany (82%), Austria (9%), Switzerland (6%) and other nationalities (3%). Eighty-two percent of our participants hold a university degree.

The actual team size reported by the participants (including team members who did not answer the questionnaire) ranged from three to 31 ($M = 7.80$, $SD = 4.39$). Eighteen percent of the participants had been working in their current team for less than one year, 20% between one and two years, 32% between two and five years, 13% between five and ten years, and 17% for more than ten years.

Measures The measures used in Study 2 were identical to those used in Study 1. Again, all items were answered on a 5-point frequency scale (ranging from 1 = *strongly disagree* to 5 = *strongly agree*). For scale reliabilities and descriptive statistics, see Table 4.

Results

Data aggregation and analyses Correlations (both levels), means, standard deviations (team level) and reliabilities (individual level) for all variables are shown in Table 4. Table 2 and Table 3 show the results of the mediation analyses on the team level as well as cross-level.

To support the aggregation of our team-level constructs, ICC(1) and r$_{wg}$ values were calculated for the respective scales. The r$_{wg}$ values ranged from 0.81 to 0.91 and all ICC(1) values were statistically significant, indicating that

group membership had a substantial effect on individual ratings (LeBreton & Senter, 2008). Hence, the respective scales were aggregated to the team level by calculating the mean for each team.

Our research model and statistical procedures for testing our hypotheses were the same as in Study 1.

Hypothesis tests All hypotheses were supported in Study 2.

Supporting Hypothesis 1 and Hypothesis 2, we found the degree of sharedness of relational models to be positively related to justice perceptions on the team level ($\beta = 0.36$, $p = .02$) as well as to perceived relationship conflict on the team level ($\beta = -0.35$, $p = .016$).

Supporting Hypothesis 3a, we found justice perceptions on the team level to be positively related to team cohesion on the team level ($\beta = 0.82$, $p < .001$) as well as to participative safety climate on the team level ($\beta = 0.76$, $p < .001$) and team commitment on the individual level ($\beta = 0.49$, $p < .001$).

Supporting Hypothesis 3b, we found perceived relationship conflict to be negatively related to team cohesion on the team level ($\beta = -0.84$, $p < .001$), as well as to participative safety climate on the team level ($\beta = -0.70$, $p < .001$) and team commitment on the individual level ($\beta = -0.40$, $p < .001$).

Supporting Hypothesis 3c, we found justice perceptions to be a mediator of the expected indirect relationships between the degree of sharedness of relational models and team cohesion (95% bias-corrected bootstrap CI [0.07, 0.53]), participative safety (95% bias-corrected bootstrap CI [0.07, 0.55]) and team commitment (95% bias-corrected bootstrap CI [0.10, 0.92]). Similarly, we found perceived relationship conflict to be a mediator of the expected indirect relationships between the degree of sharedness of relational models and team cohesion (95% bias-corrected bootstrap CI [0.08, 0.57]), participative safety (95% bias-corrected bootstrap CI [0.09, 0.52]) and team commitment (95% bias-corrected bootstrap CI [0.02, 0.93]).

In order to fully benefit from the added value of a replication study, we calculated overall effect sizes across both studies for all relationships proposed in our hypotheses. In a first step, we merged the data from both studies and analyzed whether the variables' means differed between the two samples (i.e., Study 1 and Study 2). An analysis of variance using the two different samples as the independent variable and the variables in our research model as dependent variables indicated no differences between the two studies.[3] In a second step, we again tested our hypotheses using an hierarchical linear modelling approach (HLM 7, Raudenbush et al., 2011) that took into account the two different samples. Thus, our statistical model had three levels: an individual level (Level 1), a team level (Level 2) and a study level (Level 3).

The degree of sharedness of relational models was positively related to justice perceptions on the team level (H1; $\beta = 0.34$, $p = .001$) as well as perceived relationship conflict on the team level (H2; $\beta = -0.36$, $p < .001$). Justice perceptions on the team level were positively related to team cohesion on the team level (H3a; $\beta = 0.83$, $p < .001$) as well as participative safety climate on the team level (H3a; $\beta = 0.76$, $p < .001$) and team commitment on the individual level (H3a; $\beta = 0.56$, $p < .001$). Relationship conflict was negatively related to team cohesion on the team level (H3b; $\beta = -0.78$, $p < .001$) as well as to participative safety climate on the team level (H3b; $\beta = -0.62$, $p < .001$) and team commitment on the individual level (H3b; $\beta = -0.40$, $p < .001$). Justice perception was a mediator (H3c) of the expected indirect relationships between the degree of sharedness of relational models and team cohesion (95% bias-corrected bootstrap CI [0.18; 0.70]), participative safety (95% bias-corrected bootstrap CI [0.14; 0.58]) and team commitment (95% bias-corrected bootstrap CI [0.17; 0.69]). Similarly, perceived relationship conflict was a mediator (H3c) of the expected indirect relationships between the degree of sharedness of relational models and team cohesion (95% bias-corrected bootstrap CI [0.19; 0.69]), participative safety (95% bias-corrected bootstrap CI [0.13; 0.51]) and team commitment (95% bias-corrected bootstrap CI [0.13; 54]).

According to Cohen (1992) these findings correspond to medium (H1, H2) to large (H3a, H3b) effect sizes for the direct relationships between the variables in our hypotheses.

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[3] Results of the ANOVA comparing the two study samples:

DV shared relational models: $F (1, 328) = .31$; $p = .580$
DV justice: $F (1, 328) = .56$; $p = .456$
DV relationship conflict: $F (1, 328) = .29$; $p = .591$
DV team cohesion: $F (1, 328) = .02$; $p = .889$
DV participative safety: $F (1, 328) = .04$; $p = .838$
DV team commitment: $F (1, 328) = 2.41$; $p = .122$

General discussion

The question that drove our research was what can be expected if team members have different perceptions of the fundamental social rules and norms they perceive as "valid" for regulating interpersonal relationships in their team. Building upon RMT (Fiske, 1992), we operationalized (the extent of) a shared understanding of fundamental social rules and norms in terms of the degree of sharedness of four elemental relational models people use to regulate their social interactions. We proposed that this sharedness is related to perceptions of justice and relationship conflict among team members. We further proposed perceived justice and relationship conflict to be related to various aspects of team viability (i.e., team cohesion, participative safety and team commitment). Results from two analogous field studies supported most of the hypotheses proposed. The higher the degree of sharedness of relational models within teams, the higher the perceived justice, the less perceived relationship conflict and the higher perceived team viability within teams. It should be noted that the indirect relationship between the degree of sharedness of relational models and our dependent variables on the team level (i.e., participative safety and team cohesion) via perceived justice was not statistically significant in Study 1. However, these mediation effects could be observed in Study 2 as well as in the overall analysis using the merged data from both study samples. This suggests that the non-significant finding in Study 1 may be due to the low power of the respective sample that only comprised data from 40 teams.

Theoretical implications

The present research contributes to various strands of research on social relationships in teams.

Implications for relational models research The present studies contribute to research on RMT by providing empirical support for one of its key assumptions, that conflicting relational models are related to perceptions of (in)justice and relationship conflict (Fiske, 1992; Rai & Fiske, 2011), and extending it to work teams. By rating the relational models they perceive to be valid in their work team, participants in our two studies rated their individual perceptions of which relationship regulation behaviors are appropriate in different domains of social interaction within their work team. Accordingly, the degree of sharedness of relational models reflects team members' degree of shared perceptions concerning which relationship regulation behaviors are appropriate in their team. Combined with our further proposition, derived from the literature on shared mental models (in teams), that the degree of sharedness of relational models varies across work teams, we were able to predict justice

perceptions and levels of conflicts within work teams by the degree of sharedness of relational models. In teams with strongly shared relational models, team members are highly likely to apply the same relational models in social interaction situations. Conversely, in teams with weakly shared relational models, team members are highly likely to apply different and therefore *conflicting* relational models in social interaction situations. RMT proposes that when interaction partners apply different relational models to the same aspect of social interaction (e.g., the exchange of resources or decision-making), this is likely to lead to conflict (Fiske, 1992) and reduced levels of perceived justice among interaction partners (Rai & Fiske, 2011). Our finding that the degree of sharedness of relational models in teams is related to team members' perceptions of justice and relationship conflict supports this core proposition of RMT.

The findings of our studies also dovetail with a theoretical paper by Vodosek (2000) applying RMT to the work team context. Building upon the same propositions of RMT that we did in our theoretical rationale, Vodosek proposed (but did not test) a relationship between the similarity of relational models applied by team members and relationship conflict in teams. Our finding that the degree of sharedness of relational models in teams is related to perceived relationship conflict among team members provides empirical support for this proposition.

The present studies' findings also contribute to the small but growing body of research on relational models in organizations. This line of research is still dominated by theoretical works (e.g., Bridoux & Stoelhorst, 2016; Fehr et al., 2015; Giessner & van Quaquebeke, 2010; Mossholder et al., 2011; Rutti et al., 2013; Vodosek, 2000; Wellman, 2017). In contrast, only a small number of empirical studies actually test the propositions derived from RMT in organizational settings (e.g., Boer et al., 2011; Keck et al., 2018; Vodosek, 2009). The present studies contribute to this line of research by revealing the explanatory value of RMT with respect to organizational relevant constructs (i.e., justice, relationship conflict and team viability).

Implications for shared mental models research The present studies also contribute to and expand the shared mental models literature with regard to both the content domain (by examining shared mental models regarding fundamental aspects of social interaction) and the criterion domain (by examining the effects of shared relational models on affective and motivational outcomes).

Regarding the content domain, research on shared mental models is still dominated by studies focusing on task-related mental models. Many studies on shared mental models are conducted in specific contexts and scenarios, often involving simulations (e.g., Santos et al., 2016) or video games (e.g., Resick et al., 2010), and highly task-specific measurement

tools based on detailed task analyses. While these studies have delivered valuable insights on group processes when dealing with specific tasks, they excluded major parts of interactions within teams and their findings can only be transferred to other areas of activity to a limited extent. The small number of studies that included shared team-related knowledge focus on very specific team characteristics, such as information sharing or mutual trust (e.g., Johnson et al., 2007; Lim & Klein, 2006). Team members' shared mental models regarding *fundamental aspects* of relationship regulation had been largely neglected in research on shared cognition in teams. A few studies included certain aspects of relationship regulation: for example, Lim and Klein (2006) asked participants about certain types of decision-making in their teams (distinguishing between decisions made by the leader and decisions made by the team). However, the questionnaires used in such studies usually neglected other domains of social interaction, such as the allocation of resources or motives for resource exchange, and thus did not cover all possible variants of how people can relate to each other (i.e., the four relational models proposed by RMT).

The present studies expand the content domain of shared mental model research by examining the sharedness of the four universal and (according to RMT) comprehensively exhaustive models of social interaction in teams. According to RMT (Fiske, 1992), people use the four relational models to regulate *all* types of social interaction. Relational models are neither task-specific nor team-specific and the sharedness of relational models in teams should be relevant in all situations in which team members socially interact. The question of how people see themselves in relation to each other, of how people interpret the relationship between themselves and their interaction partners in different situations at work – not in terms of task accomplishment but in terms of elemental social interaction – is relevant in all types of organizations and settings. The present studies' findings and the fact that the studies used data from different types of teams in various organizations, industries and countries, support this claim.

The present studies also contribute to research on shared mental models with regard to the criterion domain: Empirical studies on shared mental models have largely focused on team processes and team performance as outcomes of shared mental models. Reviewing the empirical research on team mental models, Mohammed et al. (2010) called on scholars "to expand the criterion base by exploring other indicators of team effectiveness (e.g., team creativity, adaptability), affective outcomes (e.g., team commitment, team satisfaction, conflict), and emergent states (e.g., cohesion, psychological safety)" (p.896). The present studies answer this call by focusing on different aspects of team viability (i.e., team cohesion, participative safety climate and team commitment) as outcomes of shared relational models.

Implications for justice research The present studies also establish a link between RMT and research on justice in the workplace by introducing shared relational models as an antecedent of justice perceptions in teams. Since we assessed team members' justice perceptions on a very abstract level, our findings are particularly relevant for the small but growing body of research on the concept of *overall justice* (Ambrose & Schminke, 2009; Ambrose et al., 2015). The majority of studies on justice in organizations conducted in recent decades focus on facet-specific justice perceptions (procedural, distributive, informational, interactional), most often building upon Colquitt's (2001) conceptualization of organizational justice. However, in recent years, some studies have provided evidence that these facets of justice do not fully capture the justice phenomenon and can rather be seen as antecedents of a single, more global perception of justice (i.e. overall justice, Ambrose & Schminke, 2009), which mediates their effects on various affective and motivational outcomes (e.g., job satisfaction, commitment or turnover intention). Several scholars (Ambrose et al., 2015; Rupp et al., 2017) have pointed out that there may be other antecedents of overall justice perceptions which are not captured by and go beyond the facets of justice usually examined in organizational psychology (i.e., procedural, distributive, informational, interactional justice). Our results indicate that conflicting relational models could be one such additional antecedent of overall justice perceptions.

Implications for conflict research The present studies' findings also contribute to research on relationship conflict in teams, which is still dominated by a strong focus on conflict as an antecedent of other variables, such as team performance or performance-related behavior (for a meta-analytic overview, see De Dreu & Weingart, 2003; de Wit et al., 2012). The factors which *cause* relationship conflict in teams have received less attention. Relational models theory offers a promising framework for examining and explaining potential antecedents of relationship conflict. As described in the pertinent literature, relationship conflict is caused by interpersonal, non-task-related issues, such as differences in norms and values, and is often accompanied by feelings of irritation, frustration and annoyance (de Wit et al., 2012; Jehn, 1995; Jehn & Mannix, 2001). RMT contains propositions for both the nature of differences in norms and values (i.e., the application of different relational models among interaction partners) and the origin of feelings of irritation and annoyance (i.e., moral outrage resulting from the violation of a relational model and the moral motive inherent to it). The relationship between the degree of sharedness of relational models in teams and perceived relationship conflict among team members found in both of the present studies provides support for these propositions.

Implications for research on team effectiveness Finally, the present study also contributes to general research on team effectiveness. Scholars have argued that team effectiveness refers not only to a team's performance outcomes but also to its potential to maintain team members' satisfaction and willingness to remain in the team (Kozlowski & Bell, 2013). By linking the sharedness of relational models in teams to various aspects of team viability (i.e., team cohesion, participative safety climate and team commitment), the current studies reveal the importance of shared relational models for team effectiveness. Even though we did not assess any team performance outcomes, shared relational models are also likely to affect team performance, since both our mediator variables (i.e., justice perceptions and relationship conflict) and our outcome variables (i.e., team cohesion, participative safety, and team commitment) have been repeatedly linked to team performance.

Limitations

We also need to note several limitations of the study that warrant attention.

Due to its cross-sectional design, our study does not allow causal conclusions. Although we think that it is more plausible that different perceptions of relational models in teams affect perceptions of justice and relationship conflict than vice versa, future research would benefit from using longitudinal designs to establish causality. Such research should particularly focus on testing the situational effects (i.e., effects of conflicting relational models in specific social interactive situations) underlying the theoretical rationale used to develop our research model.

Another limitation of the present studies is the use of self-report measures, which hold the risk of common method bias (Podsakoff et al., 2003). However, the nature of our variables (i.e., shared relational models, justice perceptions, relationship conflict, and team viability) necessitated the use of self-report data. Moreover, we collected data from multiple team members, and the degree of sharedness of relational models among team members (our independent variable) was measured on the team level of analysis by calculating and summing up the r_{wg} values based on the team members' individual responses. Moreover, all variables in our research model except team commitment were aggregated onto the team level, which also reduces common source bias.

A third limitation refers to the sample of Study 1. Seven of the 40 teams were student project teams. The inclusion of student teams, who typically do not spend the same amount of time together as work teams, may have biased our results. Indeed, there is meta-analytical evidence in conflict research that the results of studies in university settings tend to underestimate many effects of team conflict (Poitras, 2012). Furthermore, the majority (73%) of work team members in

Study 1 had been working in their teams for less than one year and the average team size was quite small. This relatively short tenure and small team size may have influenced the sharedness of relational models itself as well as the way and extent to which shared relational models affected team members. However, Study 2 replicated the findings of Study 1 with comparable effect sizes in a different sample restricted to work teams with larger team sizes and a longer average team tenure. This replication strengthens our findings and their generalizability.

A fourth limitation relates to the sample characteristics of both studies. Because we examined convenience samples in both studies, there is a possibility that certain types of teams with certain task characteristics (e.g., task-oriented, face-to-face) are overrepresented, which limits the generalizability of our findings. With this in mind and also taking into account the small sample sizes, future studies would benefit from using larger and more representative samples.

Future research

The findings of the present studies suggest several potential avenues for future research.

First, our newly introduced construct *(i.e., shared relational models)* must prove its added value to existing concepts both theoretically and empirically. Hence, future research examining shared relational models not independently but in combination with existing measures of task-related and team-related mental models in teams is needed to assess which theoretical approach most adequately explains relevant phenomena and effects in different types of team contexts.

Second, future research could examine more distal outcomes of shared relational models in teams, such as team performance or performance-related behaviors. In the present studies, we were interested in very proximal outcomes of shared relational models, and thus focused on perceived justice and relationship conflict as well as on different aspects of team viability (i.e., team cohesion, participative safety climate and team commitment). Future studies could extend our findings by examining relationships between shared relational models and team performance and/or performance-related behaviors in teams. RMT allows linkages between shared relational models and both cooperative behaviors, such as helping behavior or sharing knowledge, and *un*cooperative behaviors, such as knowledge hiding (Connelly et al., 2012). Accordingly, RMT has already been used as a theoretical framework for explaining various aspects of cooperation, including helping behavior (Mossholder et al., 2011) and knowledge sharing (Boer et al., 2011). Moreover, there is ample evidence that perceptions of justice and relationship conflict are related to both cooperative behaviors and counterproductive work behaviors (e.g., Colquitt et al., 2013; Kessler et al., 2013; Naumann & Bennett, 2002; O'Neill et al., 2013). Hence, future research might build on our findings and examine the effects of shared relational models on (un)cooperative behaviors in teams.

Third, future research might build upon our findings when studying team development in organizations. Scholars have repeatedly emphasized the role of team cognition in general and implicit coordination in particular on different stages of team development (Shuffler et al., 2011, 2018). Future studies could pay special attention to the question in which phases of team development and in which way shared relational models optimally develop in teams and how this can be facilitated and strengthened.

In terms of more general directions for future research, it might be also worthwhile to examine the role of leaders for shared relational models within their teams. After RMT has already been applied as a theoretical framework for examining other leadership phenomena, such as leadership emergence (Wellman, 2017) or ethical leadership (Giessner & van Quaquebeke, 2010; Keck et al., 2018), future studies could explore how and to what degree leaders may affect their teams' success by shaping shared relational models among team members.

Practical implications

Our study, which provides evidence that the degree of sharedness of relational models relates to justice perceptions, relationship conflict and team viability, offers some practical implications. We will highlight three major issues which we deem most relevant for practitioners: a) team members' degree of shared understanding of relational models itself, b) the finding that the sharedness of relational models in teams is related to perceived justice and relationship conflict, and c) potential avenues to enhance the sharedness of relational models in teams.

In the present studies, participants rated their perception of what behavior is generally (not only by themselves individually) considered appropriate in social interactions in their team. The first practical implication of our study is that team members do not always have the same perception of the relational models in their team. We think that teams could benefit from becoming aware of potential variability in individual team members' perceptions of relational models and thus social rules and norms in their team and the fact that this variability may have negative consequences. If team members become aware that their individual perception of the relational models in their team does not necessarily coincide with that of their teammates and consequently there are different perceptions of the social rules 'valid' in the team, they may better understand each other's perspectives and may be able to prevent conflicts before they arise.

Team members have individual perceptions and expectations of how social interaction in particular situations should work within their team. If these individual expectations for interpersonal interaction do not match, relational model violations and thus injustice may be perceived and relationship conflict is likely to occur. People are typically very sensitive to perceived violations of the relational models they experience as valid in a social interaction and are highly motivated to punish them. However, as Fiske points out, "the targets of such sanctions often do not acknowledge that their acts were transgressions, so they perceive the intended sanctions as illegitimate aggression" (Fiske, 2004, p.21). Against this background, it is reasonable that a low degree of sharedness of relational models in a team can easily give rise to larger spirals of conflict, which can have serious consequences for teamwork. An awareness and understanding of such dynamics and their cognitive underpinnings, may enable team members to better understand the nature of their (or others') justice perceptions and the origins of relationship conflicts among team members.

It can be further inferred from our studies that improving the sharedness of relational models among team members can reduce the occurrence of unmet expectations about social interactions at work, thereby reducing perceived injustice and interpersonal conflict and improving team viability. In other words, based on our research, it can be reasoned that teams may become more effective and harmonious by aligning their ideas about how they relate to each other and how social interaction works (or should work) in their team. The sharedness of relational models could be increased through trainings on interpersonal communication and interaction that foster a common understanding of the social rules and norms (e.g., in terms of the four types of RMs) in particular social interactive situations (e.g., resource allocation, decision-making rules etc.). Because teams do not necessarily reflect on their behavior spontaneously and without a concrete reason to do so, they could try team coaching (Hackman & Wageman, 2005) that includes guided reflexivity (Tesler et al., 2018) to reflect on their interactions and identify and solve disagreements. In concrete terms, a team development intervention could proceed in such a way that—as a first step—the relational models underlying social interactions in the team are elucidated and divergent perceptions, discussed. Existing disagreements could then be reflected against this background, considered from the different perspectives and, optimally, resolved.

Our findings suggest that if team members manage to get on the same page regarding the application of relational models to particular situations in their team, there should be positive effects on both individual satisfaction and the functioning of the team as a whole.

Data availability The data that support the findings of this study are openly available at the Open Science Framework: https://osf.io/jv94n/.

Declarations

The authors certify that the research presented in this manuscript was conducted in compliance with the ethical standards of the DGPs (German Psychological Society) regarding research with human participants and scientific integrity. Participants were free to not participate and to terminate participation at any time without any consequence or any loss of they were otherwise entitled to receive. All subjects gave written informed consent in accordance with the Declaration of Helsinki. The study was approved by the local ethics committee.

Conflict of interest The authors declare that there are no conflicts of interest.

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