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Trust in teams: A taxonomy of perceived trustworthiness factors and risk-taking behaviors in face-to-face and virtual teams

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Abstract

Do we really need personal meetings to develop trust within teams? Which factors impact trust emergence within face-to-face and virtual teams? How do high-trust teams interact compared with teams with low team trust? Trust is seen as an important predictor of behavior in teams. However, the psychological mechanisms linking team trust to both its antecedents and its behavioral consequences are not well understood. The present study introduces a new taxonomy of team trust mechanisms by integrating results from a qualitative interview study with prior theoretical and empirical research on team trust. We conducted exploratory interviews based on the critical incident technique with 55 professionals who had substantial teamwork experience. Altogether, 776 behavioral items were collected stemming from 127 team events that were perceived as critical

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for the emergence of trust in teams. A content analysis revealed five main categories of perceived trustworthiness factors in teams as antecedents of team trust and three main categories of risk-taking behaviors as behavioral consequences in teams. The findings contribute to a better understanding of team trust emergence and related behaviors in teams. Future research should validate the derived taxonomy of team trust with quantitative data.

Keywords
antecedents, consequences, critical incident, trust, virtual team

In today's organizations, trust is often seen as a key success factor to ensure effective collaboration. Indeed, trust has been shown to be predictive for organizational outcomes (Colquitt et al., 2007; Dirks and Ferrin, 2001, 2002). Moreover, recent meta-analyses have shown that team trust is positively related with team-related attitudes, information processing in teams, and team performance (Breuer et al., 2016; De Jong et al., 2016). In addition, these meta-analyses have demonstrated that team trust matters more in virtual as compared with face-to-face teams, reflecting additional uncertainties and risks under conditions of electronic communication (Breuer et al., 2016).

Antecedents of trust have been widely investigated for dyadic relationships (Colquitt et al., 2007; Mayer et al., 1995). However, an overarching taxonomy is lacking that can integrate the various antecedents as well as behavioral consequences of trust in teams. On the one hand, most of the empirically identified trust antecedents in teams are not integrated into theoretical models (e.g. Henttonen and Blomqvist, 2005; Jarvenpaa and Leidner, 1999; Stewart and Gosain, 2006). On the other hand, studies on trust antecedents in specific teams (e.g. virtual teams) often apply theoretical models that were originally developed for other team contexts (e.g. face-to-face teams) or dyadic relationships only (e.g. Mayer et al., 1995; Meyerson et al., 1996). Thus, a taxonomy of antecedents and behavioral consequences of team trust that also integrates potential moderating context conditions (e.g. digitalized collaboration) would contribute to a better understanding of trust emergence in teams. For instance, a taxonomy of trust emergence in teams as compared with dyads could help to understand situations in which individual members in the team experience the behavior and interaction of multiple fellow members. In a team situation, people can observe and experience behavior that is more socially complex and multifaceted than behavior in an one-on-one discussion and that is not possible in dyadic situations such as information sharing with multiple colleagues, dealing with intrateam conflicts, or even the formation of subgroups or social exclusion. Thus, individuals' assessment of trustworthiness in teams probably considers socially more complex information than the assessment of trustworthiness in dyadic relationships. Accordingly, a taxonomy of trust emergence in teams could help to understand team situations and related team behavior.

The current study seeks to extend existing research in three ways. First, we provide a taxonomy of perceived trustworthiness factors, team trust, and resulting risk-taking

behaviors in working teams and groups,[1] thereby integrating and extending existing models on trust in dyadic relationships (e.g. Mayer et al., 1995). Moreover, we specify the integrative model of organizational trust (Mayer et al., 1995) for the team context. In doing so, we focus on the perceptions of individual members within teams. This approach may contribute to a better understanding of trust emergence in teams. Second, we consider team virtuality as a moderating condition in the relationship between team trust and its antecedents and behavioral consequences. By systematically comparing perceived trustworthiness factors and risk-taking behaviors in virtual and in face-to-face teams, we contribute to the debate as to whether virtual and face-to-face teams need different interventions to build trust (e.g. Jarvenpaa et al., 1998; Rumpf and Akin, 2013). Finally, although team trust emergence may be specific for professionals, most research on trust in teams has been conducted with student participants (Mitchell and Zigurs, 2009). In the current study, we exclusively interviewed professionals with experience in both virtual and face-to-face teamwork to obtain findings that may be more generalizable to occupational teams.

Theoretical framework

Conceptualization of team trust

One of the most cited definitions of trust in organizational research defines trust as 'the willingness of a party to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party' (Mayer et al., 1995: 712). Most other existing definitions include one or both of these two key defining elements: the positive expectation of favorable treatment by another party and the willingness to be vulnerable (e.g. Colquitt et al., 2007; Fulmer and Gelfand, 2012; Lewicki et al., 2006; McEvily and Tortoriello, 2011; Rousseau et al., 1998).

These definitions conceptualize trust as a dyadic construct between a trusting party (trustor) and a party to be trusted (trustee). When considering trust at the team level, the dyadic concept has to be extended to multiple team members, for the trustors as well as the trustees (Jarvenpaa et al., 1998; Polzer et al., 2006). We therefore consider team trust as trust shared among all team members (see Breuer et al., 2016; Fulmer and Gelfand, 2012). In addition, we conceptualize team trust as an emergent state of teams, which develops from the team members' shared perceptions and experiences (De Jong and Elfring, 2010; Kozlowski and Klein, 2000; Langfred, 2004). In line with these notions, we build on the definition suggested by Mayer and colleagues (1995) and refer to the team trust definition by Breuer and colleagues (2016: 1152) as follows:

> Team trust is defined as the shared willingness of the team members to be vulnerable to the actions of the other team members based on the shared expectation that the other team members will perform particular actions that are important to the team, irrespective of the ability to monitor or control the other team members.

In their integrative model of organizational trust, Mayer and colleagues (1995) clearly differentiate between: (i) trust (as defined above), (ii) the antecedents of trust, and (iii)

consequences of trust. As antecedents of trust, the authors differentiate between the trustor's propensity to trust and the trustee's trustworthiness. Propensity to trust implies a stable disposition of the trustor (a personality trait), which affects the likelihood that the party will trust another party (Mayer et al., 1995). In addition, the perception of three characteristics of the trustee is assumed to determine his/her trustworthiness. *Ability* refers to competencies and skills of the trustee in a given domain. *Benevolence* refers to the extent the trustor believes the trustee has a positive orientation towards the trustor beyond an egoistic profit motive. *Integrity* implies that the trustee acts in accordance with values and principles the trustor finds acceptable. Concerning the consequences of trust, Mayer and colleagues (1995) propose that trust enables risk-taking behaviors in a relationship. They further state that the concrete risk-taking behaviors depend on the specific situation and relationship.

In a more recent review, Schoorman et al. (2007) state that the three factors can contribute to trust in a group although their model refers to the individual level of analysis. Nevertheless, they articulate the need for specifying contextual variables for the model that are unique to studying trust within a particular context (e.g. teams). Thus, we expect that trust emergence in the context of teams is more complex than trust emergence in dyads because the individual members in the team experience the behaviors and interaction of multiple fellow members. For instance, they observe their fellow team members sharing information or gossiping with each other, discussing intrateam conflicts, or undergoing the formation of subgroups, possibly leading to coalition building or even social exclusion—all these processes cannot emerge in dyads. Accordingly, for the assessment of trustworthiness in teams, an individual member might use more complex information than for assessing the trustworthiness of a single trustee in dyadic relationships. Moreover, in the current study, we investigate whether the existing model of team trust needs to be extended in order to consider specific contexts, such as virtual teamwork. In the following, we briefly review existing theoretical and empirical work on: (a) perceived trustworthiness factors in teams, (b) risk-taking behaviors in teams, and (c) the differences between these two types of constructs in face-to-face and in virtual teams.

Factors of perceived trustworthiness in teams

Existing theories of team trust often build on the Integrative Model of Organizational Trust by Mayer et al. (1995) but without a modification for the team context (e.g. Aubert and Kelsey, 2003; Clark et al., 2010). Other studies, particularly of virtual teams (e.g. Iacono and Weisband, 1997; Robert et al., 2009), have built on the theory of swift trust by Meyerson and colleagues (1996). However, this theory is conceptualized for ad-hoc groups of strangers who only work together for one specific task without the expectation of future interaction (Meyerson et al., 1996). The typical characteristics of these groups, such as a very attractive reward system, team members being assigned to the group without any choice about joining, and the very short-term duration of the relationship (Meyerson et al., 1996) do not fit most working teams that work together face-to-face or virtually for more than one day (Mayer et al., 1995; Schoorman et al., 2015). Thus, swift trust seems to refer only to limited collaboration periods in rather coercive situations supported by a very attractive reward system (Schoorman et al., 2015).

To the best of our knowledge, the only published model specifically addressing *team* trust has been developed by Costa (2003) and Costa and Anderson (2011). In their model, the authors conceptualize trust as a multi-dimensional construct consisting of propensity to trust, perceived trustworthiness, and trust behavior. In contrast to Mayer et al. (1995), Costa and colleagues do not assume a sequential model of antecedents of trust, trust itself, and trust behavior (or trust consequences). However, we argue that clearly differentiating perceived trustworthiness factors and risk-taking behavior as separate variables from trust itself is necessary for clear definitions as well as measurement of trust in teams. Moreover, the interpretation of research findings and associated interventions to increase trust in working teams might benefit from such a taxonomy (Colquitt et al., 2007; Schoorman et al., 2015).

In contrast to the sparse theoretical work on the emergence of team trust, many empirical studies have investigated the antecedents of team trust in face-to-face as well as in virtual teams but without integrating their valuable findings into an extended theoretical framework. In their meta-analysis on co-workers and supervisors as referents of trust, Colquitt and colleagues (2007) documented the unique relationships between the three trustworthiness factors (i.e. ability, benevolence, and integrity) and trust as well as between trust and risk-taking behaviors. Moreover, studies on trust in virtual teams have empirically confirmed that ability, benevolence, and integrity influence perceptions of trustworthiness in this specific context (Aubert and Kelsey, 2003; Jarvenpaa et al., 1998). In contrast, empirical validation of these three trust antecedents in face-to-face teams is still lacking.

In addition, several empirical studies have suggested additional antecedents of team trust besides ability, benevolence, and integrity. For instance, Webber (2008) found in a longitudinal study that organizational citizenship behavior had a positive impact on team trust, whereas monitoring behavior, such as tracking the work progress of others, decreased team trust. Moreover, perceived justice has been demonstrated to enhance trust in teams (Dayan and Di Benedetto, 2010). In addition, information sharing (Jarvenpaa et al., 1998), frequent interactions as well as predictable and timely communication have been shown to predict team trust (e.g. Germain, 2011; Henttonen and Blomqvist, 2005; Iacono and Weisband, 1997). Finally, several studies have demonstrated that the emergence of team trust is influenced by single predictors, such as, for instance, feedback (e.g. Geister et al., 2006; Henttonen and Blomqvist, 2005), a positive reputation (e.g. Henttonen and Blomqvist, 2005; McNab et al., 2012), shared values (e.g. Stewart and Gosain, 2006), proactive behavior (e.g. Iacono and Weisband, 1997; Jarvenpaa and Leidner, 1999), or keeping commitments and following rules (e.g. Stewart and Gosain, 2006; Walther and Bunz, 2005). In summary, although there is a substantial body of separate empirical findings on the antecedents of team trust, a framework integrating prior theoretical and empirical work on the antecedents of trust in teams is still lacking. Thus, our taxonomy of team trust should answer the following research question by integrating our new findings from an explorative interview study with experts and prior theoretical and empirical knowledge:

Research Question 1: Which perceived trustworthiness factors predict team trust?

Risk-taking behaviors in teams

Similar to the question of perceived trustworthiness factors in teams, theoretical approaches are rare that specify risk-taking behaviors in teams. Mayer and colleagues (1995) conceptualize risk-taking behavior as the proximal behavioral outcome of trust in a specific context. Moreover, Edmondson (2002) specifies risk-taking behaviors as interpersonal behaviors for which outcomes are uncertain. Based on the work of Mayer and colleagues (1995) as well as Breuer and colleagues (2016), we define risk-taking behaviors in teams as team members' actions reflecting the shared willingness of the team members to be vulnerable to the actions of the other team members. We specifically take the perspective of an individual member within the team showing certain risk-taking behaviors.

In a theoretical review, Edmondson (2002) explicates general risk-taking behaviors in the workplace such as asking questions, admitting mistakes, seeking help, or sharing and seeking feedback. Moreover, Zand (1972) theoretically considers three behaviors as relevant proximal consequences of trust: disclosure of information, acceptance of influence from others, and reduced control of others. In another theoretical analysis, McKnight and Chervany (2001) conceptualize cooperation, information sharing, informal agreements, decreasing controls, accepting influence, granting autonomy, and transacting business as behavioral consequences of trust. Nevertheless, these considerations are not specified for the context of teams. In their theoretical model, Breuer and colleagues (2016) consider risk-taking behaviors as team processes mediating the positive effect of team trust on team effectiveness. They theoretically postulate the following behaviors as risk-taking behavior in teams: sharing confidential information, asking for help, sharing feedback, discussion of conflicts and mistakes, unilateral investment of effort, and forbearance from defensive control. An empirical investigation of these factors is still lacking (Breuer et al., 2016).

In empirical studies, four categories of risk-taking behavior have been repeatedly investigated: openness of communication, acceptance of influence, forbearance from opportunism, and control reduction (e.g. Costa and Anderson, 2011; Costa et al., 2001; Smith and Barclay, 1997). For instance, Costa and Anderson (2011) have shown that trust positively affects open communication in teams, increases acceptance of each other, and personal involvement with the team. In addition, trust increases unilateral effort (e.g. Williams and Karau, 1991) and decreases monitoring behavior (e.g. Costa and Anderson, 2011; Langfred, 2004). Nevertheless, to date it is not clear whether these investigated categories of risk-taking behaviors in teams are exhaustive. This leads to the following research question:

Research Question 2: Which risk-taking behaviors result from team trust?

Team trust in virtual as compared with face-to-face teams

Virtual teams are defined as teams that predominantly rely on electronic communication technologies when pursuing common goals (e.g. Bell and Kozlowski, 2002; Hertel

et al., 2005). Although there is a vivid discussion about relevant dimensions of team virtuality such as spatial distribution, richness of used communication, media synchronicity, or cultural diversity (e.g. Hoch and Kozlowski, 2014; Kirkman and Mathieu, 2005, Maynard et al., 2017), all definitions include the key defining element of the reliance on electronic communication media. Thus, we use this criterion as the defining aspect of team virtuality in the current study. Much more than for face-to-face teams, the importance of trust has been mentioned in the literature on virtual teamwork (e.g. Duarte and Snyder, 2006; Li, 2007; Majchrzak et al., 2004; Society for Human Resource Management, 2012). However, it is unclear whether trust emergence in virtual teams is influenced by the same factors of perceived trustworthiness as trust emergence in face-to-face teams. Whereas practitioners state that trust needs personal meetings to develop (e.g. Rumpf and Akin, 2013), empirical studies show that although trust initially is on a lower level in computer-mediated teams, the level of trust increases over time to levels comparable to those in face-to-face teams even without any face-to-face interaction (e.g. Wilson et al., 2006).

Thus, to date a specific articulation of perceived trustworthiness factors and risk-taking behaviors that might also be applicable for virtual teams is lacking. Empirical studies that investigate the moderating effect of virtuality on the antecedents of team trust are based on theories originally developed for the face-to-face context. They, thus, run the risk of ignoring variables that are particularly relevant for the virtual team context, such as media literacy or availability via electronic media.

Having a look on empirical findings, Bierly et al. (2009) found that virtuality can moderate the relationship between antecedents of trust and team trust. For virtual as compared with face-to-face teams, relationship conflict had a more negative effect on trust while goal clarity was less important for trust emergence. However, concerning risk-taking behaviors, research is lacking that investigates whether risk-taking behaviors in teams differ when teams work virtually as compared with face-to-face. Together, although initial empirical evidence suggests that antecedents of team trust differ as a function of virtuality, more research is needed to systematize and integrate those findings. Furthermore, neither theoretical nor empirical studies have compared risk-taking behavior in face-to-face and virtual teams yet. Thus, the current status of research on perceived trustworthiness factors and risk-taking behaviors leads to the following research questions:

Research Question 3: Is team trust in virtual teams predicted by different perceived trustworthiness factors than team trust in face-to-face teams?

Research Question 4: Does team trust in virtual teams result in different risk-taking behaviors as compared with team trust in face-to-face teams?

Method

Sample

We used a convenience sample that we recruited from personal contacts. Participation in the study was voluntary. We interviewed 55 German professionals (educated and trained

employees) who had experience in virtual and/or face-to-face teamwork. All participants had completed their school education and had a University degree or a completed pertinent vocational training. We coded the reported team situations as virtual when collaboration predominantly relied on electronic communication technologies (e.g. Bell and Kozlowski, 2002; Hertel et al., 2005). Therefore, we asked the interviewees on a scale from 1 (= not at all) to 5 (= very often) how often they communicated face-to-face and how often they communicated via electronic communication technologies in each team situation. Team situations in which the interviewees communicated face-to-face "sometimes," "often," and "very often" were coded as face-to-face situations (k = 67). Team situations in which the interviewees collaborated face-to-face "rarely" or "not at all" were coded as virtual (k = 60). According to this operationalization, 16 interviewees reported only face-to-face team situations, 13 interviewees reported only virtual team situations, and 26 interviewees reported face-to-face as well as virtual team situations.

Thirty-five (64%) interviewees were female and 20 (36%) were male. Their mean age was 33.49 years, with a standard deviation of 12.39 years and a range of 20 to 67 years. Mean team tenure was 4.51 years (*SD* = 4.70 years) and mean company tenure was 9.26 years (*SD* = 10.55 years). According to the RIASEC-typology of jobs by Holland (1996), most of the participants worked in enterprising jobs (44%), in conventional-administrative jobs (27%), and in social jobs (24%). The remaining 5% worked in realistic-manual jobs, investigative-scientific jobs as well as artistic jobs. Twenty-three (41.8%) of the 55 interviewees were direct supervisors for an average of 13.38 subordinates (*SD* = 15.78).

Critical Incident Technique

We conducted in-depth interviews using the Critical Incident Technique (CIT) introduced by Flanagan (1954). This method enables an inductive approach to theory building, largely independent of a priori assumptions of the researchers and of prior theoretical work (FitzGerald et al., 2008). The general objective of the CIT is to collect behaviors that are critical in positive or negative job events (Flanagan, 1954). "The critical incident technique consists of a set of procedures for collecting direct observations of human behavior in such a way as to facilitate their potential usefulness in solving practical problems and developing broad psychological principles" (Flanagan, 1954: 327). Initially, the CIT was developed for job analysis and to identify behaviors critical for successful job performance. However, later the CIT was also successfully applied to other organizational outcome variables (e.g. Dekker et al., 2008).

In the current study, we collected incidents that participants perceived as critical for emerging high and low trust within working teams. In the interviews, we conceptualized distrust and trust as two ends of one dimension (low and high trust; see Guo et al., 2017; McKnight and Chervany, 2001; Schoorman et al., 2007, 2015, for reviews discussing the dimensionality of trust and distrust). The CIT facilitates the detection of antecedents and consequences of team trust, which have not yet been discussed in the literature, such as constructs that might be specific for high or low levels of virtuality in teams. Thus, we used the CIT to assure that our taxonomy of team trust is not only built on a priori assumptions based on prior research but is complemented by bottom-up data from specific team contexts such as virtual collaboration.

Procedure and measures

The interviews were semi-structured. Two female interviewers followed a prescribed manual and asked the same open-ended questions. Interview materials were pretested in three interviews and modified by adding further questions for more detailed descriptions of the critical situation and behavior in order to ensure that the interviewees reported the incidents as if the interviewer herself observed the situation (Flanagan, 1954). The first author of this study conducted 30 interviews and the third author conducted the remaining 25 interviews. The interviews took 25 to 60 minutes. After explaining the general aim of the study, the interviewees were informed that the interviews were strictly confidential and that their names would not be published. Additionally, the participants were asked for their permission to audio-record the interviews. All interview partners gave their consent. All 55 interviews were conducted in Germany in a face-to-face setting.

After the introduction, the interviewee was asked:

> Please think of a situation in which you trusted or distrusted your team members. Teamwork can either be performed face-to-face or virtually. Teamwork implies that all team members pursue a common goal. Please, try to remember the precise behavior of one or more team members, which directly influenced your trust or distrust in the team and describe the situation.

To obtain more concrete information about the respective situation, we consecutively asked the following questions: (1) "Which team members interacted in this incident?," (2) "What were the general circumstances leading up to this incident?," (3) "Please tell me exactly what the team member(s) did that was critical for you to trust or distrust the team!" Finally, we asked the interviewee about the consequences of the fellow team member's/members' behaviors for his/her own behavior. We asked the interview partners for as many incidents as they could come up with.

After the report of all critical incidents, the participants completed a brief questionnaire about their subjective ratings of *trust* and in each situation and whether they worked *virtually or face-to-face*. We measured the degree of trust in each situation in order to assess whether interviewees really perceived high trust in the "trust"-situations and low trust in the "distrust"-situations. Trust was enquired with five items from an adapted scale by Mayer and Davis (1999; Cronbachs Alpha $\alpha = .893$). The degree of virtuality was measured with 10 items (Bell and Kozlowski, 2002; Gibson and Gibbs, 2006; Kirkman and Mathieu, 2005). All items were answered on a 5-point scale ranging from 1 *(does not apply at all)* to 5 *(does apply completely)*. We finished the interview by asking demographic questions.

Categorization process

The categorization of the critical incidents is an inductive process that should be conducted with a standardized classification system in order to gain maximum objectivity (Flanagan, 1954). We applied the grounded theory approach by Glaser

and Strauss (1967), which provides a systematic procedure to theory building based on qualitative data (e.g. Wilhelmy et al., 2016). First, the digital records were transcribed into a list of critical incidents. The critical incidents were then transformed into behavioral items because all but three of 127 incidents contained multiple critical behaviors (Dekker and Rutte, 2007; please see a map of codes in the Appendix). Behavioral items are sentences that explicitly describe a discriminable behavior in the respective situation. In a second step, two of the authors, working independently of each other, identified subcategories ("concepts," Glaser and Strauss, 1967) from the items that represented antecedents (perceived trustworthiness factors) and consequences of trust (risk-taking behaviors). Subcategories are the basic units of analysis, breaking data down into conceptual components by comparing incidents and naming the same phenomena with the same term (Glaser and Strauss, 1967). The resulting subcategories from the independent ratings were conceptually identical for both raters. In a next step, the coders discussed each subcategory and grouped it to a higher level of abstraction by the analytic process of comparing similarities and differences between the lower level subcategories they represent (Pandit, 1996). Finally, following Glaser and Strauss (1967), the emerging taxonomy was compared with existing theoretical models.

After this categorization process, the raters designed a standardized coding scheme that provided precise information about each subcategory. Using this coding scheme, two graduate assistants working also independently of each other assigned every behavioral item to one of these subcategories. The average interrater reliability was satisfactory (Cohen's Kappa = .89). All discrepancies were discussed until a consensus was reached.

Data analysis

We computed frequencies for the identified subcategories. To compare distributions of perceived trustworthiness factors and risk-taking behaviors in face-to-face and virtual teams, we conducted chi-square tests and computed the effect size Phi.

Results

The interviewees reported between one and four critical incidents ($M = 2.31$; $SD = .63$). Overall, 127 critical incidents were reported, 66 incidents critical for raising the trust level in a team and 61 incidents critical for lowering the trust level in the team. Sixty-seven incidents were reported from face-to-face team situations, and 60 incidents from virtual team situations. A chi-Square test shows that the incidents were distributed uniformly across the high and low trust levels, as well as the face-to-face and virtual situations (X^2 (1) = .177, $p = .674$; see Table 1). A paired sample *t*-test revealed that participants' trust ratings were significantly higher in the reported "high-trust situations" ($M = 4.20$, $SD = .795$) as compared with the reported "low-trust situations" ($M = 2.10$, $SD = .957$; $t(126) = -10.804$, $p < .001$), confirming the effectivity of the interview instructions.

Table 1. Distribution of the reported critical incidents.

Type of incident	Type of teamwork situation		
	Face-to-face	Virtual	Total
High trust level	36	30	66
Low trust level	31	30	61
Total	67	60	127

Perceived trustworthiness in teams

From the 127 critical incidents, 776 behavioral items were derived, which describe perceived trustworthiness factors influencing team trust (see the Appendix for a detailed coding map). The inductive categorization process revealed 22 subcategories of trustworthiness factors. In addition to ability, benevolence, and integrity, *predictability* and *transparency* were identified as further main categories of perceived trustworthiness of the team. Predictability reflects consistency and regularity of behavior (Dietz and Den Hartog, 2006) and transparency reflects the need for clear and open information exchange in teams. Moreover, the inductive categorization process of the critical incidents revealed that most main categories of perceived trustworthiness (i.e. ability, benevolence, and transparency) include both task-related and team-related facets: task-related ability, team-related ability, task-related benevolence, team-related benevolence, task-related transparency, and team-related transparency (see Table 2).

Table 2 shows all identified subcategories and the number of critical incidents containing behaviors that fit into these subcategories. The following 22 subcategories are included in the five main categories of perceived team trustworthiness (ability, benevolence, integrity, predictability, and transparency) with most of them being differentiated into two facets (task-related and team-related aspects).

Task-related ability. This main category encompasses team member characteristics that are perceived as beneficial to perform the team task successfully. It comprises the four subcategories "competence," "reputation," "conscientiousness," and "media literacy."

Competence. Interview partners who trusted their team members perceived them as having expert knowledge and a lot of experience in their field. Moreover, the trusted team members showed the ability to perform a task successfully. For instance, one of the interviewees reported the following: "They have tremendous expert knowledge." [Code FHVP12]

Reputation. Interviewed team members reported that they trusted team members who were respected and admired by clients, colleagues, and/or supervisors. Those team members were described as being acknowledged and highly respected based on their past behavior. One example for a reported positive reputation was the following: "Other colleagues told me about his high competence." [Code FHVP01]

Table 2. Reported main categories and subcategories of perceived trustworthiness in teams.

Factor of perceived trustworthiness	Number of critical incidents reporting the critical behavior overall (%)	Number of critical incidents reporting the critical behavior in face-to-face team situations	Number of critical incidents reporting the critical behavior in virtual team situations	X^2	d.f.	*Phi*	*P (two-tailed)*
Task-related ability							
Competence	42 (33.1)	23	19	.101	1	−.028	.851
Reputation	16 (12.6)	10	6	.697	1	−.074	.436
Conscientiousness	19 (15)	10	9	.000	1	.001	1.000
Media literacy	13 (10.2)	3	10	5.118		.201	.037
Team-related ability							
Proactivity	40 (31.5)	19	21	.647	1	.071	.449
Positive humor	10	4	6	.709	1	.075	.515
Friendliness	34	21	13	1.512	1	−.109	.236
Feedback culture	50 (39.4)	25	25	.251	1	.044	.716
Participation	21 (16.5)	13	8	.845	1	−.082	.474
Task-related benevolence							
Task support	45 (35.4)	27	18	1.467	1	−.107	.267
Autonomy	12 (9.4)	9	3	2.631	1	−.144	.134
Team-related benevolence							
Emotional care	15 (11.8)	10	5	1.321	1	−.102	.284
Loyalty	26 (20.5)	19	7	5.417	1	−.207	.027
Task-related predictability							
Keeping commitments	44 (34.6)	18	26	3.791	1	.173	.063

(Continued)

Table 2. (Continued)

Factor of perceived trustworthiness	Number of critical incidents reporting the critical behavior overall (%)	Number of critical incidents reporting the critical behavior in face-to-face team situations	Number of critical incidents reporting the critical behavior in virtual team situations	X^2	d.f.	*Phi*	*P (two-tailed)*
Availability	25 (19.7)	2	23	25.016	1	.444	*
Consistency	7 (5.5)	4	3	.057	1	−.021	1.000
Team-related integrity							
Confidentiality	9 (7.1)	6	3	.752	1	−.077	.498
Ethical values	34 (26.8)	19	15	.182	1	−.038	.693
Task-related transparency							
Information transparency	27 (21.3)	12	15	.950	1	.087	.388
Responsibility assignment	5 (3.9)	2	3	.340	1	.052	.666
Team-related transparency							
Sharing private information	21 (16.54)	14	7	1.953	1	−.124	.232
Openness	5 (3.94)	3	2	.110	1	−.029	1.000

Note: Characters in parentheses indicate the percentage of critical incidents in which this category was reported from all reported critical incidents. * $p < .00227$ (p level adjusted to account for alpha inflation: p/number of tests = .05/22 = .00227).

Conscientiousness. Interviewed team members reported that they trusted fellow-team members who are conscientious and show the required effort to do a task well. They continuously worked very thoroughly and accurately. For instance, one interviewee described trusted team members as follows: "My team members worked very thoroughly and accurately." [Code CHVP08]

Media literacy. Interviewees reported that they trusted those team members who were perceived to have the ability to write emails appropriately and to use media technologies effectively to access, store, retrieve, and share content in order to meet individual and team needs. Moreover, trusted team members were perceived to have the capability to choose the communication technology that is appropriate for the particular content of a message. For example, one interview partner reported: "They have sent me pictures from a meeting in which I could not participate in person." [Code FHVP22]

Team-related ability. This main category encompasses characteristics of fellow team partners that are perceived to contribute to a positive team climate and high team cohesion, including the subcategories "proactivity," "positive humor," "friendliness," "feedback culture," and "participation."

Proactivity. Interviewees reported that they trusted team members who were independent workers and took responsibility for the team tasks and processes. Those team partners were perceived to constantly demonstrate extra-role behaviors (i.e. behaviors, which are not part of their formal job requirements; Bateman and Organ, 1983), and were highly involved in team tasks and processes. For instance, one interviewee described proactive co-workers: "My colleagues showed much more initiative than was expected from them." [Code CHVP07]

Positive humor. Interviewed team members reported that they trusted team members who show positive humor and made a lot of fun. Trust emerged in teams when members laughed a lot together. For instance, one interviewee described trusting fellow team partners: "They had a lot of humor and with their jokes they made working on difficult topics a lot easier." [Code CHVP07]

Friendliness. Interviewed team members reported that they trusted fellow team members who are communicative and show a generally positive and open attitude towards the team and the team tasks. They described that trust emerged in teams whose members created a positive atmosphere and were friendly and polite to everybody in the team. For instance, one interviewee reported the following: "In the beginning of each email we said thank you for the work the other team members have done." [Code FHVP01]

Feedback culture. Interviewed team members reported that trust emerged in teams in which members perceived a positive feedback culture. Members of those trusted teams were described as having the ability to offer positive and negative feedback in a friendly manner and having the ability to refer their feedback to work aspects and not to the personality of their fellow members. One example for constructive criticism was: "In case

of a mistake nobody in the team was blaming anybody, but they were all seeking for a solution." [Code CHVP07]

Participation. Trust in fellow team members was reported as a result of participation, referring to a team culture in which every team member could express his/her opinions and could participate in decision-making processes. Teams that had a high degree of participation jointly and equally decided on how to proceed. For instance, high participation in a team was described as follows: "We jointly and equally decided on how to proceed." [Code FHVP02]

Task-related benevolence. This main category includes characteristics which reflect goodwill towards fellow team members in terms of helping them with completing the work task successfully. This main category comprises the two subcategories "task support" and "autonomy."

Task support. Trust was perceived to emerge in teams that showed the general tendency to help fellow team members with job-related problems. For example, one interviewee described this as: "When I had questions they supported me in doing my job." [Code CHVP07]

Autonomy. Trust was perceived to develop in teams in which team members had high control about their working conditions and in which they had decision-making authority over the work processes. For instance, one interviewee reported: "They did not control me." [Code FHVP24]

Team-related benevolence. This main category includes team behaviors that reflect personal goodwill towards fellow team members, including the two subcategories "emotional care" and "loyalty."

Emotional care. Interviewees reported that they perceived high trust in teams with a culture of listening to the concerns and problems of their members. Team members showed the tendency to give comfort to each other and to find solutions to handle personal issues. One example for team behaviors showing emotional care was the following: "We supported each other emotionally by giving comfort to each other." [Code FHVP21]

Loyalty. Interviewed team members reported that they trusted those fellow members whom they perceived to be constantly faithful to other members' decisions and obligations. A loyal team member was described in the following example: "In this situation, it was important that we discussed the topic within the team and that, in the end, we defended the final team decision towards other departments even if they criticized it." [Code CHVP04]

Task-related predictability. This main category includes team characteristics that reflect consistency and regularity of behavior as well as strong principles and standards concerning the fulfillment of work tasks (Dietz and Den Hartog, 2006). This main category

comprises the three subcategories "keeping commitments," "availability," and "consistency."

Keeping commitments. Interviewed team members reported that they trusted fellow team members who showed the tendency to keep the promises they made and who constantly fulfilled their assignments within agreed deadlines. For instance, one interviewee reported an example of low trust: "The team did not meet an agreed deadline." [Code CHVP10].

Availability. Interviewed team members reported that they trusted fellow members who showed a culture of being available and of responding promptly to requests via email or phone. Those fellow team members were perceived to be socially present in both virtual and face-to-face teams by sending reliable personal cues. For instance, as an example of behavior leading to low trust, one interviewee reported: "The team members did not reply to my emails." [Code CHVP09]

Consistency. Interviewed team members reported that they trusted fellow members who acted often in similar ways and, thus, were perceived as being predictable. One example for such consistent behavior was described as: "I exactly know how my colleagues will react." [Code CHVP15]

Team-related integrity. This main category includes team characteristics that reflect strong moral principles and standards referring to team values and team interactions. This main category comprises the two subcategories "confidentiality" and "ethical values."

Confidentiality. Trust emerged in those teams that were perceived to treat private or secret information from the team or individual team members confidentially. One example was described as: "They do not tell anybody about problems I am sharing with them." [Code CHVP08]

Ethical values. Interviewed team members reported that they trusted those fellow members who show adherence to ethical principles and team values. One example for unethical behavior leading to low trust was described as: "My team members have searched her computer and have read all her emails." [Code CHVP08]

Task-related transparency. This main category includes team characteristics that contribute to a transparent and open knowledge management within the team. This main category comprises the two subcategories "information transparency" and "responsibility assignment."

Information transparency. Trust emerged in those teams that had the general tendency to share all relevant information within the team openly. Members from such teams reported, for instance, the following: "My colleague provided me with all necessary information." [Code CHVP20]

Responsibility assignment. Interviewed team members reported that they trusted those teams in which information about work and team roles, task assignments, and deadlines was clear. One example for such clear responsibility assignments was the following: "Every team member knew exactly which field of responsibility he or she accounted for." [Code FHVP21]

Team-related transparency. This main category includes team characteristics that lead to openness concerning private topics. This main category comprises the two subcategories "sharing private information" and "openness."

Sharing private information. Trust emerged in teams that had a culture of sharing private concerns. In those teams, members were described to talk also about private issues that are not directly related to the work context. One example of such behavior is shown in the following quote: "We also talk about private issues." [Code CHVP09]

Openness. Interviewed team members reported that they trusted those fellow members who talked openly about emotions and intimate, private feelings. For instance, one of the interviewees reported the following: "He told me openly that he suffers from the bad atmosphere in the team." [Code CHVP26]

Risk-taking behaviors

From the 127 critical incidents, 179 behavioral items were identified that describe risk-taking behaviors as proximal consequences of team trust. The behavioral items were categorized in three main categories and six subcategories describing risk-taking behaviors. Table 3 shows the categories we identified and the number of critical incidents containing behaviors that are categorized into these categories. We identified the following three main categories and six subcategories for risk-taking behaviors in teams:

Disclosure. This main category includes risk-taking behaviors that reflect behaviors of making oneself vulnerable by communicating confidential information or talking about own mistakes and weaknesses. This main category comprises the two subcategories "sharing confidential information" and "discussing mistakes and conflicts openly."

Sharing confidential information. This category includes team behaviors such as discussing confidential and private information with fellow team members. For instance, team members who shared confidential information as a consequence of trust reported the following: "After that incident I am now more open towards her. I tell her about my concerns and about what bothers me." [Code CHVP22]

Discussing mistakes and conflicts openly. This category includes a culture of open and constructive criticism. Teams who showed this kind of trusting behavior provided negative feedback in a constructive manner and discussed mistakes and conflicts openly. One example was the following: "When they did not answer my emails, I instantly called

Table 3. Reported categories of risk-taking behaviors in teams.

Category of risk-taking behavior	Number of critical incidents reporting the trust behavior (%)	Number of critical incidents reporting the trust behavior in face-to-face team situations	Number of critical incidents reporting the trust behavior in virtual team situations	X^2	d.f.	*Phi*	*P (two-tailed)*
Disclosure							
Sharing confidential information	32 (25.20)	20	12	1.630	1	−.113	.225
Discussing mistakes & conflicts openly	24 (18.90)	8	16	4.479	1	.188	.042
Reliance							
Asking for help	22 (17.32)	12	10	.034	1	−.016	1.000
Forbearance from control	26 (20.47)	12	14	.572	1	.067	.512
Contact-seeking							
Affirmation of future teamwork	25 (19.69)	10	15	2.032	1	.126	.183
Spending leisure time together	11 (8.66)	6	5	.015	1	−.011	1.000

Note: Characters in parentheses indicate the percentage of critical incidents in which this category was reported from all reported critical incidents. * $p < .00833$ (p level adjusted to account for alpha inflation: p/number of tests = .05/6 = .00833).

them and asked for the reason of this delay. Thus, we avoided many misunderstandings." [Code CHVP07]

Reliance. This main category includes risk-taking behaviors, such as making oneself vulnerable by giving fellow members autonomy, influence and responsibility for tasks that are important to the trustor. This main category comprises the two subcategories "asking for help" and "forbearance from control."

Asking for help. This category of trust behavior includes actions of team members that make themselves vulnerable by admitting mistakes and asking for support and help. For example, one team member reported: "I trust her … and as a consequence I call her whenever I have a question. I am sure she is not bugged by my questions." [Code CHVP06]

Forbearance from control. This category of trust behavior implies that team members who trusted each other did neither monitor the work progress of their fellow members nor documented their own work in case of a conflict. One example of forbearance from control showed the following quote: "Now, I don't ask my colleagues about their work progress anymore. I do not control them anymore." [Code CHVP17]

Contact-seeking. This main category includes risk-taking behaviors such as showing interest in spending time with others and building a good relationship. By doing so, individuals open up and, in principle, make themselves vulnerable. This main category comprises the two subcategories "affirmation of future teamwork" and "spending leisure time together."

Affirmation of future teamwork. This category includes team members' decision to continue work in the current team, or, in case of low trust, to try to leave the team. One example of affirmation of future teamwork was the following: "Although I had another job offer which included a much higher salary I decided to stay in the team because of my colleagues." [Code CHVP11]

Spending leisure time together. This category comprises team behaviors reflecting that team members have (voluntarily) met also in their leisure time. For example, one team member reported: "Since I trust them I also spend my leisure time with my colleagues." [Code CHVP08]

Team trust in virtual as compared with face-to-face teams

To answer *Research Question 3* (i.e. is team trust predicted by different perceived trustworthiness factors when team virtuality is high rather than low?), we compared how often a perceived trustworthiness factor was reported in virtual versus face-to-face team situations. We conducted a chi-square test to determine whether there is a significant difference between the reported frequencies in virtual versus face-to-face team situations for each perceived trustworthiness factor. We accounted for alpha-error inflation by adjusting the critical alpha level with Bonferroni correction (Cabin and Mitchell, 2000).

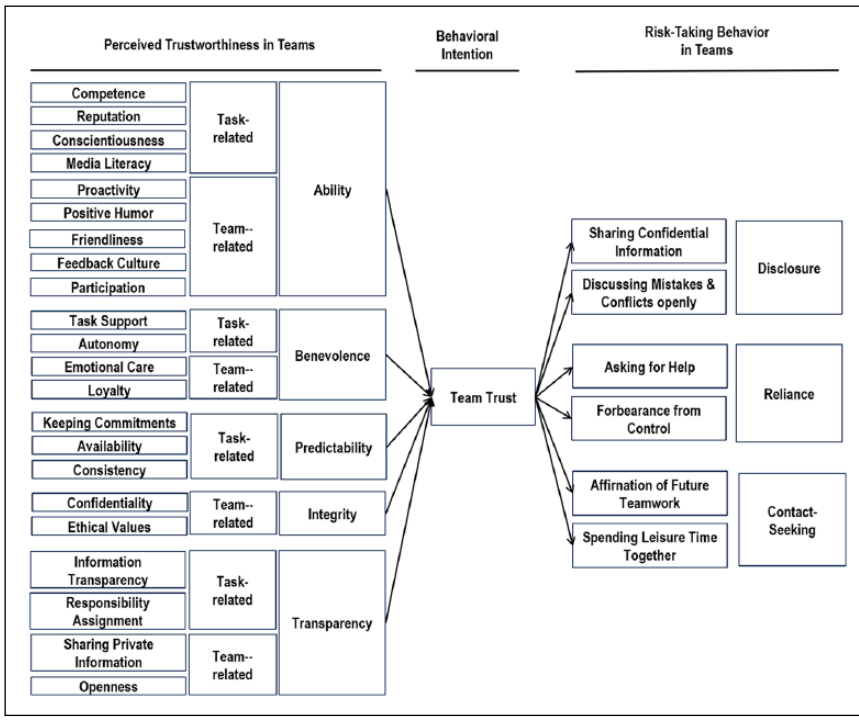

Figure 1. Illustration of the taxonomy of team trust including factors of perceived trustworthiness in the team and risk-taking behaviors.

We used phi (Φ) as a measure of effect size. All 22 subcategories of perceived trustworthiness were mentioned in virtual and in face-to-face teams (see Table 2). Using uncorrected p values, the analyses revealed that media literacy (X^2 (1) = .5.118, Φ = .201, p = .037; see Table 2) and availability (X^2 (1) = 25.016, Φ = .444, $p < .001$) were reported significantly more often as critical for team trust in virtual team situations than in face-to-face team situations, whereas loyalty was reported more often as relevant for trust in face-to-face teams (X^2 (1) = 5.417, Φ = -.207, p = .027). Using the alpha-adjusted p values, only availability was reported significantly more often as critical for team trust in virtual team situations compared with face-to-face team situations.

To answer *Research Question 4* (i.e. does team trust result in different risk-taking behaviors when team virtuality is high rather than low?) we also compared the frequencies of the reported risk-taking behaviors in face-to-face and virtual teams and conducted chi-square tests. All six categories of risk-taking behaviors were mentioned in virtual as well as in face-to-face teams (see Table 3). When uncorrected p values were used, the trust consequence of discussing mistakes and conflicts openly was reported significantly more often in virtual as compared with face-to-face teams (X^2 (1) = 4.479, Φ = .188, p = .042). When corrected p values were used, frequencies of reported behavioral consequences in virtual and face to-face team situations did not differ significantly. Figure 1

shows the resulting conceptual taxonomy of team trust including the eight main categories of perceived trustworthiness factors in teams and their 22 subcategories as well as the three main categories of risk-taking behaviors including the six subcategories. Since all subcategories were reported in virtual as well as in face-to-face situations, we propose one taxonomy of team trust, which seems to be not only applicable for face-to-face teams but also for virtual teams.

Discussion

The relevance of trust for successful collaboration has become more and more apparent in the field of organizational behavior research (e.g. Breuer et al., 2016; Colquitt et al., 2007; De Jong et al., 2016) as well as for practitioners (Rumpf and Akin, 2013). Particularly, the question of how trust can be developed and maintained in face-to-face and virtual teams has increasingly been focused in recent years (e.g. Duarte and Snyder, 2006; Majchrzak et al., 2004). The current study provides a qualitative examination and resulting taxonomy of trust emergence and risk-taking behaviors in working teams. The taxonomy extends the integrative model of organizational trust by Mayer and colleagues (1995) to the team context by considering not only specific factors that are relevant for the team context but also by identifying concrete risk-taking behaviors as proximal consequences of team trust in both face-to-face and virtual teams. With respect to *Research Question 1*, examining perceived trustworthiness factors in teams, the results are well in line with the integrative model of organizational trust by Mayer and colleagues (1995). However, we extended this model in two major aspects that consider the dynamic interactions of multiple team members as referents of trust: First, *transparency* and *predictability* were added to the model in addition to ability, benevolence, and integrity. Second, the inductive categorization process of the critical incidents revealed that most main factors of perceived trustworthiness include both task-related and team-related facets (see Figure 1).

This derived taxonomy provides an overarching framework that can also integrate prior empirical work on team trust antecedents in face-to-face and virtual teams. For instance, a positive reputation (e.g. Henttonen and Blomqvist, 2005; McNab et al., 2012) matches our definition of task-related ability whereas organizational citizenship behavior (Webber, 2008), proactive behavior (Iacono and Weisband, 1997; Jarvenpaa and Leidner, 1999) as well as giving feedback (Geister et al., 2006; Henttonen and Blomqvist, 2005) fit into our category of team-related ability. Moreover, the empirically demonstrated antecedents of predictable and timely communication (Henttonen and Blomqvist, 2005; Iacono and Weisband, 1997), keeping commitments, and following rules (e.g. Stewart and Gosain, 2006; Walther and Bunz, 2005) can be classified as task-related predictability, while perceived justice (Dayan and Di Benedetto, 2010) and shared values (Stewart and Gosain, 2006) match the team-related integrity in our team trust taxonomy. In addition, information sharing (Jarvenpaa et al., 1998) fits into the category of task-related transparency. Finally, our conceptualization of task-related predictability as being different from team-related integrity corresponds to Simon's (2002) concept of behavioral integrity that does not include adherence to ethical and moral principles but refers to clear alignment between word and deed.

Research Question 2 asked which risk-taking behaviors result from team trust. Our taxonomy provides a first theoretical approach specifying empirically observed proximal behavioral consequences in the domain of teamwork. The qualitative interviews revealed three main categories and six subcategories of risk-taking behaviors: disclosure with the subcategories of sharing confidential information and discussing mistakes and conflicts openly, reliance with the subcategories of asking for help and forbearance from control, as well as contact-seeking with the subcategories of affirmation of future teamwork and spending leisure time together. All six subcategories include prior theoretical considerations on risk-taking behaviors. For instance, theoretically derived risk-taking behaviors such as asking questions and seeking help (Edmondson, 2002) correspond to asking for help in our proposed taxonomy. Moreover, admitting mistakes as well as sharing and seeking feedback (Edmondson, 2002) fit into the category of discussing mistakes and conflicts openly in our taxonomy of team trust. Disclosure of information (Zand, 1972) and information sharing (McKnight and Chervany, 2001) fit into the category of sharing confidential information. In addition, informal agreements, decreasing controls (McKnight and Chervany, 2001), and decreasing control of others (Zand, 1972) correspond to forbearance from control in our taxonomy. Finally, the categories of risk-taking behaviors found in this study indicate a first empirical validation of the theoretically postulated risk-taking behaviors by Breuer and colleagues (2016).

Research Questions 3 and *4* asked whether team trust is evoked by different perceived trustworthiness factors and results in different risk-taking behaviors when team virtuality is high rather than low. In the current study, we found that all categories of perceived trustworthiness and risk-taking behaviors were mentioned in virtual as well as in face-to-face teams. This result is a first indicator that our taxonomy is also applicable for virtual teamwork. Moreover, in virtual team situations, availability was mentioned as critical for trust emergence significantly more often than in face-to-face team situations. Concerning risk-taking behavior, the number of reported behaviors did not differ significantly in virtual and face-to-face team situations. Future quantitative research is needed that systematically investigates the moderating effect of virtuality on the relationship between team trust and the perceived trustworthiness factors and risk-taking behaviors. It will be valuable to examine in a quantitative design the weighting and sizes of the effects of the different perceived trustworthiness factors and risk-taking behaviors in face-to-face compared with virtual teams in order to conclude whether these two groups have the same team trust antecedents and consequences.

Limitations and future research

The results of this study have to be considered in light of various limitations. First, we used an exploratory bottom-up approach by conducting interviews with the critical incident technique by Flanagan (1954). This interview format allowed us to collect a broad sample of team behaviors largely independent from theoretical pre-assumptions that might limit the focus of data collection. Nevertheless, though a qualitative approach can lead to new research questions and directions (Cassell and Symon, 2011), the generalizability of the findings has yet to be examined using larger sample sizes (Lee et al., 1999).

Second, although the study aimed to describe perceived trustworthiness factors and risk-taking behaviors in teams, we only considered data on an individual level of analysis. Thus, the current study takes the perspectives of individual members within their teams. Future research might also consider multi-level issues (Klein and Kozlowski, 2000; Kozlowski and Klein, 2000) and validate our taxonomy of team trust with quantitative data from all team members of several teams and by investigating shared perceptions and trust variance in teams (De Jong and Dirks, 2012; Fulmer and Gelfand, 2012). Moreover, by investigating all members of teams in a longitudinal design, future research might test whether risk-taking behavior of one team member resulting from trustworthiness perceptions can alter the trustworthiness perception and risk-taking behaviors of the other team members, creating trust spirals and feedback loops (Mayer et al., 1995; Zand, 1972). In addition, future research might enrich the trust literature by examining hierarchical multi-level perspectives in terms of investigating trust relationships of individuals in teams within organizations (Kozlowski and Klein, 2000; Searle et al., 2011).

Third, the current study was conducted in Germany with professionals from diverse branches and industries. Future research might examine whether team trustworthiness and risk-taking behaviors vary as a function of culture (Wasti et al., 2011). Moreover, further moderating conditions such as familiarity of team members, team diversity, or temporal perspective of a team project might be important. Fourth, although we asked the interviewees directly about distrust and trust in the interview questions, theoretically we assumed trust to be a unidimensional construct with distrust and trust as two ends of one dimension (low and high trust) and measured it accordingly. There is an ongoing debate as to whether distrust is the opposite end of the trust dimension or whether trust and distrust are two related, but distinct constructs (see Guo et al., 2017; McKnight and Chervany, 2001; Schoorman et al., 2007, 2015, for reviews). Future research should address this debate and investigate whether team trust and distrust are influenced by the same or by different antecedents, and whether they lead to the same or different behavioral consequences.

Fifth, although we have measured the relative degree of virtuality in each situation with multidimensional continuous scales, the data did not meet the statistical preconditions of a logistic regression (e.g. independence of error terms, linearity of independent variables). Thus, in order to compare the relationship between team trust and its antecedents and consequences as a function of the relative degree of the virtuality of the team, we decided to dichotomize the variable "perceived virtuality." Finally, the collected data resulted from interviews, which only allow for assessing conscious cognitive processes. Future research that uses techniques to measure unconscious, implicit trust processes would contribute to the current trust literature.

Practical implications

Many practitioners recognize that trust is an important condition for team success (e.g. Rumpf and Akin, 2013). The resulting taxonomy of team trust can be used to derive initial practical measures for creating a climate of trust in teams. The findings are a first indicator that similar antecedents of team trust are perceived to be crucial in face-to-face and in virtual teams. Even if the communication channels vary in virtual and face-to-face

teams, both virtual and face-to-face team members might increase their perceived trustworthiness by providing more information about their ability, benevolence, predictability, integrity, and transparency.

For example, in order to increase perceived task-related ability, online profiles, shared data-bases, information in email signatures as well as online feedback systems (Geister et al., 2006) could inform about the reputation, area of expertise, and qualifications of each team member. Concerning team-related ability, task- and team-related benevolence as well as transparency factors, chat systems, team meetings, informal online and offline chats as well as discussion boards could provide opportunities for building a positive team climate, helping each other and discussing problems and mistakes. Concerning task-related predictability and team-related integrity, identifying and committing to shared team values, norms, and communication rules is important for both face-to-face and virtual teams. Finally, a clear description of task responsibilities, feedback about work processes as well as workflow management systems could help to increase the perceived transparency in the team.

In addition, the specified risk-taking behaviors in our taxonomy can serve as behavioral indicators of the trust climate in the team. In case a team leader, an external coach, or the team members themselves are interested in the degree of team trust in the team, observing and coding actual risk-taking behaviors would provide a promising method for a valid team trust diagnostic in addition to conducting surveys assessing the perceived trustworthiness in the team.

Conclusion

The current study explored perceived trustworthiness factors as antecedents, and risk-taking behaviors as consequences of trust in virtual and face-to-face teams in the field. In addition, we derived a taxonomy explaining the emergence and proximal consequences of trust in teams and integrating prior research and theories on trust antecedents and risk-taking behavior. We found five main categories of perceived trustworthiness (ability, benevolence, predictablity, integrity, transparency) and three main categories of risk-taking behavior (disclosure, reliance, contact-seeking). All categories were mentioned in face-to-face and in virtual team situations suggesting that our model of team trust is applicable for virtual and face-to-face teams. Together, these findings provide a first step in improving the theoretical understanding of team trust emergence and risk-taking behavior in current forms of teamwork. We hope that future research will provide further validation and refinement of the qualitative findings gained in this study.

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Note

1 In accordance with established conventions (e.g. Kozlowski and Ilgen, 2006; Mathieu et al., 2008), we use the terms “team” and “group” interchangeably in this article.

References

Aubert BA and Kelsey BL (2003) Further understanding of trust and performance in virtual teams. *Small Group Research* 34(5): 575–618.

Bateman TS and Organ DW (1983) Job satisfaction and the good soldier: The relationship between affect and employee "citizenship". *Academy of Management Journal* 26(4): 587–595.

Bell BS and Kozlowski SWJ (2002) A typology of virtual teams: Implications for effective leadership. *Group and Organization Management* 27(1): 14–49.

Bierly PE, Stark EM and Kessler EH (2009) The moderating effects of virtuality on the antecedents and outcome of NPD team trust. *Journal of Product Innovation Management* 26(5): 551–565.

Breuer C, Hüffmeier J and Hertel G (2016) Does trust matter more in virtual teams? A meta-analysis of trust and team effectiveness considering virtuality and documentation as moderators. *Journal of Applied Psycholog* 101(8): 1151–1177.

Cabin RJ and Mitchell RJ (2000) To Bonferroni or not to Bonferroni: When and how are the questions. *Bulletin of the Ecological Society of America* 81(3): 246–248.

Cassell C and Symon G (2011) Assessing "good" qualitative research in the work psychology field: A narrative analysis. *Journal of Occupational and Organizational Psychology* 84(4): 633–650.

Clark WR, Clark LA and Crossley K (2010) Developing multidimensional trust without touch in virtual teams. *Marketing Management Journal* 20(1): 177–193.

Colquitt JA, Scott BA and LePine JA (2007) Trust, trustworthiness, and trust propensity: A meta-analytic test of their unique relationship with risk-taking and job performance. *Journal of Applied Psychology* 92(4): 909–927.

Costa AC (2003) Work team trust and effectiveness. *Personnel Review* 32(5): 605–622.

Costa AC and Anderson N (2011) Measuring trust in teams: Development and validation of a multifaceted measure of formative and reflective indicators of team trust. *European Journal of Work and Organizational Psychology* 20(1): 119–154.

Costa AC, Roe RA and Taillieu T (2001) Trust within teams: The relation with performance effectiveness. *European Journal of Work and Organizational Psychology* 10(3): 225–244.

Dayan M and Di Benedetto CA (2010) The impact of structural and contextual factors on trust formation in product development teams. *Industrial Marketing Management* 39(4): 691–703.

De Jong BA and Dirks KT (2012) Beyond shared perceptions of trust and monitoring in teams: Implications of asymmetry and dissensus. *Journal of Applied Psychology* 97(2): 391–406.

De Jong BA, Dirks KT and Gillespie N (2016) Trust and team performance: A meta-analysis of main effects, moderators, and covariates. *Journal of Applied Psychology* 101(8): 1134–1150.

De Jong BA and Elfring T (2010) How does trust affect the performance of ongoing teams? The mediating role of reflexivity, monitoring, and effort. *Academy of Management Journal* 53(3): 535–549.

Dekker DM and Rutte CG (2007) Effective versus ineffective communication behaviors in virtual teams. *Proceedings of the 40th Hawaii International Conference on System Sciences*. Waikoloa, HI.

Dekker DM, Rutte CG and Van den Berg PT (2008) Cultural differences in the perception of critical interaction behaviors in global virtual teams. *International Journal of Intercultural Relations* 32(5): 441–452.

Dietz G and Den Hartog DN (2006) Measuring trust inside organisations. *Personnel Review* 35(5): 557–588.

Dirks KT and Ferrin DL (2001) The role of trust in organizational settings. *Organization Science* 12(4): 450–467.

Dirks KT and Ferrin DL (2002) Trust in leadership: Meta-analytic findings and implications for research and practice. *Journal of Applied Psychology* 87(4): 611–628.

Duarte DL and Snyder NT (2006) *Mastering Virtual Teams: Strategies, Tools, and Techniques that Succeed*. New York: Wiley.

Edmondson AC (2002) *Managing the risk of learning: Psychological safety in work teams*. Division of Research, Harvard Business School.

FitzGerald K, Seale NS, Kerins CA and McElvaney R (2008) The critical incident technique: A useful tool for conducting qualitative research. *Journal of Dental Education* 72(3): 299–304.

Flanagan JC (1954) The critical incident technique. *Psychological Bulletin* 51(4): 327–358.

Fulmer CA and Gelfand MJ (2012) At what level (and in whom) we trust trust across multiple organizational levels. *Journal of Management* 38(4): 1167–1230.

Geister S, Konradt U and Hertel G (2006) Effects of process feedback on motivation, satisfaction, and performance in virtual teams. *Small Group Research* 37(5): 459–489.

Germain ML (2011) Developing trust in virtual teams. *Performance Improvement Quarterly* 24(3): 29–54.

Gibson CB and Gibbs JL (2006) Unpacking the concept of virtuality: The effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on team innovation. *Administrative Science Quarterly* 51(3): 451–495.

Glaser BG and Strauss AL (1967) *The Discovery of Grounded Theory:Strategies for Qualitative Research*. New Brunswick, NJ & London: Aldine Transaction.

Guo SL, Lumineau F and Lewicki RJ (2017) Revisiting the foundations of organizational distrust. *Foundations and Trends in Strategic Management* 1(1): 1–88.

Henttonen K and Blomqvist K (2005) Managing distance in a global virtual team: The evolution of trust through technology-mediated relational communication. *Strategic Change* 14(2): 107–119.

Hertel G, Geister S and Konradt U (2005) Managing virtual teams: A review of current empirical research. *Human Resource Management Review* 15(1): 69–95.

Hoch JE and Kozlowski SW (2014) Leading virtual teams: Hierarchical leadership, structural supports, and shared team leadership. *Journal of Applied Psychology* 99(3): 390–403.

Holland JL (1996) Exploring careers with a typology: What we have learned and some new directions. *American Psychologist* 51(4): 397–406.

Iacono CS and Weisband S (1997) Developing trust in virtual teams. In: *Proceedings of the 30th Annual Hawaii International Conference on System Sciences*. Maui, Hawai, 412–420.

Jarvenpaa S and Leidner D (1999) Communication and trust in global virtual teams. *Organization Science* 10(6): 791–815.

Jarvenpaa SL, Knoll K and Leidner DE (1998) Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems* 14(4): 29–64.

Kirkman BL and Mathieu JE (2005) The dimensions and antecedents of team virtuality. *Journal of Management* 31(5): 700–718.

Klein KJ and Kozlowski SW (2000) From micro to meso: Critical steps in conceptualizing and conducting multilevel research. *Organizational Research Methods* 3(3): 211–236.

Kozlowski SWJ and Ilgen DR (2006) Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest* 7(3): 77–124.

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

Langfred CW (2004) Too much of a good thing? Negative effects of high trust and individual autonomy in self-managing teams. *Academy of Management Journal* 47(3): 385–399.

Lee TW, Mitchell TR and Sablynski CJ (1999) Qualitative research in organizational and vocational psychology, 1979–1999. *Journal of Vocational Behavior* 55(2): 161–187.

Lewicki RJ, Tomlinson EC and Gillespie N (2006) Models of interpersonal trust development: Theoretical approaches, empirical evidence, and future directions. *Journal of Management* 32(6): 991–1022.

Li F (2007) New work organization and new ways of working: From teleworking to virtual teams. In: Li F (ed.) *What is E-Business? How the Internet Transforms Organizations*. New York: Wiley, 183–196.

McEvily B and Tortoriello M (2011) Measuring trust in organisational research: Review and recommendations. *Journal of Trust Research* 1(1): 23–63.

McKnight DH and Chervany N (2001) While trust is cool and collected, distrust is fiery and frenzied: A model of distrust concepts. *Amcis 2001 Proceedings*, 171. Available at: https://aisel.aisnet.org/amcis2001/171 (accessed 16 December 2018).

McNab AL, Basoglu KA, Sarker S and Yu Y (2012) Evolution of cognitive trust in distributed software development teams: A punctuated equilibrium model. *Electronic Markets* 22(1): 21–36.

Majchrzak A, Malhotra A, Stamps J and Lipnack J (2004) Can absence make a team grow stronger? *Harvard Business Review* 82(5): 131–137.

Mathieu J, Maynard MT, Rapp TL and Gilson L (2008) Team effectiveness 1997–2007: A review of recent advancements and a glimpse into the future. *Journal of Management* 34(3): 410–476.

Mayer RC and Davis JH (1999) The effect of the performance appraisal system on trust for management: A field quasi-experiment. *Journal of Applied Psychology* 84(1): 123–136.

Mayer RC, Davis JH and Schoorman D (1995) An integrative model of organizational trust. *Academy of Management Review* 20(3): 709–734.

Maynard MT, Gilson LL, Jones Young N and Vartiainen M (2017) Virtual teams. In: Hertel G, Stone D, Johnson R and Passmore J (eds) *The Wiley Blackwell Handbook of the Psychology of the Internet at Work*. Chichester: John Wiley & Sons, Ltd, 315–346.

Meyerson D, Weick KE and Kramer RM (1996) Swift trust and temporary groups. In: Kramer RM and Tyler TR (eds) *Trust in Organizations: Frontiers of Theory and Research*. Thousand Oaks, CA: SAGE, 166–195.

Mitchell A and Zigurs I (2009) Trust in virtual teams: Solved or still a mystery? *ACM SIGMIS Database* 40(3): 61–83.

Pandit NR (1996) The creation of theory: A recent application of the grounded theory method. *The Qualitative Report* 2(4): 1–15.

Polzer JT, Crisp CB, Jarvenpaa SL and Kim JW (2006) Extending the faultline model to geographically dispersed teams: How colocated subgroups can impair group functioning. *Academy of Management Journal* 49(4): 679–692.

Robert LP, Denis AR and Hung YTC (2009) Individual swift trust and knowledge-based trust in face-to-face and virtual team members. *Journal of Management Information Systems* 26(2): 241–279.

Rousseau DM, Sitkin SB, Burt RS and Camerer C (1998) Not so different after all: A cross-discipline view of trust. *Academy of Management Review* 23(3): 393–404.

Rumpf J and Akin N (2013) Führung virtueller Teams [Leadership of virtual teams]. *Gruppendynamik und Organisationsberatung* 44(4): 373–387.

Schoorman FD, Mayer RC and Davis JH (2007) An integrative model of organizational trust: Past, present, and future. *Academy of Management Review* 32(2): 344–354.

Schoorman FD, Wood MM and Breuer C (2015) Would trust by any other name smell as sweet? Reflections on the meanings and uses of trust across disciplines and context. In: Bornstein BH

and Tomkins A (eds) *Motivating Cooperation and Compliance with Authority*. New York: Springer International Publishing, 13–35.
Searle R, Den Hartog DN, Weibel A, et al. (2011) Trust in the employer: The role of high-involvement work practices and procedural justice in European organizations. *The International Journal of Human Resource Management* 22(5): 1069–1092.
Simons T (2002) Behavioral integrity: The perceived alignment between managers' words and deeds as a research focus. *Organization Science* 13(1): 18–35.
Smith JB and Barclay DW (1997) The effects of organizational differences and trust on the effectiveness of selling partner relationships. *The Journal of Marketing* 61(1): 3–21.
Society for Human Resource Management (2012) *SHRM survey findings: Virtual teams*. Available at: http://www.shrm.org/research/surveyfindings/articles/pages/virtualteams.aspx (accessed 3 March 2015).
Stewart KJ and Gosain S (2006) The impact of ideology on effectiveness in open source software development teams. *MIS Quarterly* 30(2): 291–314.
Walther JB and Bunz U (2005) The rules of virtual groups: Trust, liking, and performance in computer-mediated communication. *Journal of Communication* 55(4): 828–846.
Wasti SA, Tan HH and Erdil SE (2011) Antecedents of trust across foci: A comparative study of Turkey and China. *Management and Organization Review* 7(2): 279–302.
Webber SS (2008) Development of cognitive and affective trust in teams: A longitudinal study. *Small Group Research* 39(6): 746–769.
Wilhelmy A, Kleinmann M, König CJ, et al. (2016) How and why do interviewers try to make impressions on applicants? A qualitative study. *Journal of Applied Psychology* 101(3): 313–332.
Williams KD and Karau SJ (1991) Social loafing and social compensation: The effects of expectations of co-worker performance. *Journal of Personality and Social Psychology* 61(4): 570–581.
Wilson JM, Straus SG and McEvily B (2006) All in due time: The development of trust in computer-mediated and face-to-face teams. *Organizational Behavior and Human Decision Processes* 99(1): 16–33.
Zand DE (1972) Trust and managerial problem solving. *Administrative Science Quarterly* 17(2): 229–239.

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Appendix. Coding map of identified categories and subcategories.

Main category	Subcategory	Criteria for coding into this category
Factors of perceived trustworthiness		
Task-related ability	Competence	Items represent expert knowledge, sovereignty, perceived ability, strength, assertiveness, capacity, work experience, measuring up to performance expectations, defective working (negative), generation of good results/successful performances, overtaxing (negative), qualification, meeting the demands of the position
Task-related ability	Reputation	Items represent customer feedback, third person's recommendation, positive previous experience, report of previous successes, shared successes
Task-related ability	Conscientiousness	Items represent structured working, decent working, perfectionism, accuracy, good preparation, preliminary discussion and debriefing, tactical working, sense of duty, checking of tasks
Task-related ability	Media literacy	Items represent looking for personal conversation when in difficulties, kick-off-meeting vs. lack of face-to-face contact, adequate handling of media (e.g. phrase emails), fit of medium and content
Team-related ability	Proactivity	Items represent independence, no re-delegation, responsibility, interest in work, indifference (negative), extra-role behavior, commitment, (lack of) own personal initiative (negative), refusal to work (negative), ambition, motivation to work, (lack of) performing voluntary tasks (negative)
Team-related ability	Positive humor	Items represent positive humor, fun, office parties
Team-related ability	Friendliness	Items represent sympathy, creation of positive atmosphere, friendliness, impolite behavior (negative), showing interest in colleagues (small talk), first-name-basis. please, thank you and no interruption in conversations, mutual coffee drinking/lunch
Team-related ability	Feedback culture	Items represent admission of mistakes, reporting mistakes appreciatively, providing feedback, constructive conflict resolutions, appreciation of work, reporting mistakes to boss instead of resolving them (negative), delayed feedback (negative), support after mistakes, showing understanding for mistakes, no admission of weaknesses/mistakes (negative), suggestions for improvement upon criticism, learning from mistakes, expressing criticism openly, mentioning external reasons for the sake of justification upon criticism (negative), personal attacks (negative)
Team-related ability	Participation	Items represent making decisions jointly, openness for ideas and suggestions, including team members' wishes, implementing suggestions, opinions and ideas, flat/no hierarchies, finding a common consensus, asserting one's own ideas uncompromisingly (negative)

Appendix. (Continued)

Main category	Subcategory	Criteria for coding into this category
Task-related benevolence	Task support	Items represent egoism (negative), (declining) cooperation (negative), extra-role support, helping with job training, denial of support (negative), denial of help (negative), answering questions, support with high workload, reassurance, helpfulness, explanation of circumstances, work delegation despite high strain (negative), work delegation without offer of mutual support (negative)
Task-related benevolence	Autonomy	Items represent omission of control, offering room for maneuver, promotion through demanding tasks, "confiding" of responsible tasks, free job design/working hours, no work delegation (negative), great leeway in decision-making
Team-related benevolence	Emotional care	Items represent being there for others with problems, listening, motivating, supporting, encouraging and motivating in wearing situations, helping with private matters, reassurance upon stress, "taking care"
Team-related benevolence	Loyalty	Items represent waiving one's own benefits to grant others an advantage, representing decisions together, no doubting of colleagues' work, exposing and doubting colleagues openly (negative), harming others for own benefit (negative), stabbing others in the back (negative), rolling off work on others (negative), solidarity, blaming colleagues (negative)
Task-related predictability	Keeping commitments	Items represent providing results that were agreed on, adhering to work instructions, fulfilling prescribed tasks, adhering to mutually agreed arrangements, unexcused missing at meetings (negative), fulfilling tasks differently than discussed (negative), not respecting of deadlines (negative), adhering to schedules, making promises and not keep them (negative)
Task-related predictability	Availability	Items represent prompt feedback, prompt reply to emails, frequent communication, no reply to group emails (negative), no reaction to inquiries (negative), immediate availability, synchronous communication (fast sending forth and back of messages), confirmations of receipt
Task-related predictability	Consistency	Items represent doing what you say, appearing predictable, fulfilling others' expectations, being cranky (negative), often changing opinions (negative)
Team-related integrity	Confidentiality	Items represent not telling confidential information to third parties, wrongly passing information on to others (negative), not talking about others' mistakes, not passing on of events, "squealing" (negative)
Team-related integrity	Ethical values	Items represent moral acting, opportunism (negative), speaking badly behind someone's back, accordance of values, lying (negative), keeping one's word, identification, similar performance claims, unethical behavior (negative), stealing (negative), blasphemy (negative), "kiss up, kick down" (negative)
Task-related transparency	Information transparency	Items represent clear communication of information, complete information, regular team meetings, regular arrangements, information about noncompliance of tasks, punctual communication of information, communication of realistic deadlines, reasons as to why and when a task has to be done, explanation of backgrounds

(Continued)

Appendix. (Continued)

Main category	Subcategory	Criteria for coding into this category
Task-related transparency	Responsibility assignment	Items represent clear instructions, no multiple assignment to tasks, clear responsibilities/roles, clear task areas
Team-related transparency	Sharing private information	Items represent talking about private matters, sharing mutual private interests
Team-related transparency	Openness	Items represent discussing confidential matters, speaking openly to one another
Risk-taking behaviors		
Disclosure	Sharing confidential information	Items represent being cautious in what to tell (negative), not telling anything anymore (negative), sharing information, telling private information, sharing work-related information, openness, aloofness (negative)
Disclosure	Discussing mistakes and conflicts openly	Items represent prompt checks with colleagues via phone in case of missing feedback, confessing own mistakes openly, reporting mistakes to the supervisor (negative), discussing conflicts openly with colleagues, sharing the own opinion openly, learning from mistakes, open discussions, being afraid of making mistakes (negative), avoiding to talk about conflicts (negative)
Reliance	Asking for help	Items represent no restraint to ask for help, denial of support (negative), asking someone else for support (negative), providing support, asking for support openly
Reliance	Forbearance from control	Items represent forbearance from control, doing copies of important documents (negative), documenting all processes (negative), delegation of tasks, doing detailed instructions how the work has to be done (negative), no documentation of work processes, monitoring the processes (negative), clear communication of expectations and deadlines (negative), giving autonomy in work processes, delegating only easy tasks (negative)
Contact-seeking	Affirmation of future teamwork	Items represent voting out team members (negative), searching for another team/job (negative), asking for a new team (negative), staying with the team despite other job opportunities, avoidance of team work/interdependent work (negative), quitting the job (negative)
Contact-seeking	Spending leisure time together	Items represent sharing leisure time with colleagues, doing lunch breaks together with the team, acting as friends, avoidance of private appointments (negative), sharing private activities

Note. Please contact the authors if you wish to have a detailed list of all behavioral items.