

**SAFE TODAY, TOMORROW, AND TOGETHER:
A DYNAMIC PERSPECTIVE ON TEAM PSYCHOLOGICAL SAFETY**

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To
Nicolas,
William August,
&
Sunniva

No one teaches me more about psychological safety than you.

Acknowledgements

“Different methods for all three of your papers in the dissertation! Are you crazy?”

The shocked but well-intentioned comment came from a colleague in the department. And no, I am not crazy—just curious and passionate about learning. Having served 15 years in the military, I have been part of many teams: some good teams, where we solve our tasks and thrive at the same time, and some not as good, where cooperation was poor. What could explain these differences? Moreover, what can explain that the same Bård, with my personality, could behave differently from one team to another depending on who I was working with? That curiosity is what took me into academia. Now, looking back at my PhD journey, I have learned a great deal, and I hope you learn something new when reading this dissertation.

This PhD journey would not have taken place or been very educational had it not been for the people around me. Thanks to all the inspiring researchers I have met along the way. I had heard stories of the cruel research environment where the focus was on showing how smart I am and how stupid you are, along with theories without practical relevance. I wondered how someone with my practical background—who once offered a critical thinking course at the Royal Norwegian Naval Academy with the title “Research says...bullshit!”—would fit into such an environment. Well, thanks to meeting all you friendly and helpful people, I now feel like a natural part of the research environment, for which I am truly grateful.

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Thanks to the person who had my desk before me. When I arrived, there was a single post-it on the board that said, “Ask the WHY question.” Coincidence or not, I have carried that message with me and reminded myself that the curiosity that brought me into academia will also describe me as a researcher. My ambition as a researcher has been to contribute

evidence-based knowledge that is understandable, accessible, and useful to laypeople. Now that I have moved out of my office, I left one thing for the next person: that same note.

To my family—mom, dad, and my siblings Jartrud, Alvin, and Herlaug—thank you for always believing in me, teaching me the value of believing in myself, and equipping me with the perseverance to reach the goals I set. To the coolest team of all—my beloved children Nicolas (4), William August (7), and Sunniva (8)—I am sorry that I have sneaked out to write a sentence or two in the middle of children’s TV and traveled around the world to conferences when we were supposed to be on vacation together. I do apologize, and I honestly feel a lump in my throat and a tear in my eye when writing this. Everything comes at a cost. Having three small children makes a PhD journey more unpredictable and challenging. Still, you have been an invaluable part of this project. Thank you for running into my arms when I come home late, reminding me of what really matters. We may yell at each other, but we always end our days telling each other how much we love each other. To me, that combination of candor and love is the best description of a psychologically safe environment.

Last but hardly least, thank you to my beloved wife Tonje. I could never have done this without you. That sounds like a platitude, but it is still a fact. Your sincere cheering for me is amazing. I can go away for days, and when I come home, I am never met with any sense of having to pay back on dishes or putting kids to bed. Completing a PhD demands teamwork, and you are my dream teammate. My pride in what we have achieved in these years is great, but it is surpassed by my humility and gratitude for having you by my side.

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Abstract

There is an increasing focus in organizations on building psychologically safe teams. This follows a large—and rapidly growing—body of research supporting the importance of team psychological safety for effective teamwork. Still, there is a lack of research on the dynamics of team psychological safety. This is somewhat surprising given the ever-changing nature of teams and leaves us with an incomplete understanding of team psychological safety. This dissertation makes several important contributions to the research field.

Paper 1 provides a comprehensive overview of the temporal dynamics of team emergent states, of which team psychological safety is one. This literature review shows that team emergent states have no universal pattern, why team emergent states should be measured as emergent, why team emergent states arise, the consequences of temporal dynamics, and why studying the emergent element of these states matters. Overall, the paper raises awareness of the importance of taking the “emergent” in team emergent states seriously.

In Paper 2, I explore the dynamic nature of team psychological safety. By studying teams from when they are established and over different time horizons, this paper reveals how temporally dynamic team psychological safety may indeed be and how its emergence and development relate to the practices of the team. Since team psychological safety may both wax and wane, time itself is neither sufficient nor necessarily positive. Instead, team psychological safety reveals itself as a perishable good.

Where Papers 1 and 2 emphasize the *temporal* dynamics of team psychological safety, Paper 3 addresses the *within-team* dynamics—more specifically, how sharedness among team members (that is, team psychological safety climate strength) moderates the relationship between team psychological safety and team performance. Moreover, explorative analyses reveal how sharedness is not necessarily beneficial. In particular, when psychological safety is low, a safe team member among the unsafe may positively impact team performance.

In sum, this thesis contributes to the research field by identifying the emergent nature of team emergent states in general and team psychological safety in particular and by revising the view of team psychological safety as necessarily being perceived similarly among team members. I discuss the theoretical contributions and practical implications of these findings.

Keywords: team emergent states, team psychological safety, temporal dynamics, team psychological safety climate strength, team performance

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INTRODUCTORY CHAPTER

Introduction

“What do teams need to build psychological safety?” I asked a colleague of mine from our time as leadership mentors in the military. “Time,” he replied.

Time. One of the most natural things—and important for team members to build psychological safety. Or is it? After talking with my former colleague, I went to the literature to see what we knew about psychological safety and time. To my surprise, there was scarcely any research on psychological safety that studied the role of time. My curiosity about how teams can get the most out of teamwork and the discovery of this research gap kicked off my PhD journey and led to the dissertation you now hold in your hand. Before going into greater depth on how I have worked and what I have found, let us first take a step back and consider why this topic should be of interest.

Teams are a preferred way of organizing work in most organizations today. Team members can draw on one another’s capacities, experiences, and networks, extending the performance potential compared to individual work (Burke et al., 2006). However, due to collaboration issues, many teams do not reach their potential (Forsyth, 2010). The interpersonal risk associated with teamwork can keep team members from sharing their ideas or contributing wholeheartedly and prevent teams from achieving the shared outcomes they work toward (Edmondson, 2018). Thus, a fundamental enabler for collaboration in teams is team psychological safety (Roussin et al., 2016), which is “a shared belief that the team is safe for interpersonal risk taking” (Edmondson, 1999, p. 354). More specifically, team psychological safety describes a climate in which team members are not afraid to ask questions, do not fear being humiliated, are comfortable sharing ideas, can ask for help, and can safely admit mistakes (Edmondson, 2018). Team psychological safety has positive effects on areas like creativity (Palanski & Vogelgesang, 2011), knowledge sharing (J. Yin et al., 2019), team learning (Wong et al., 2010), and team effectiveness (Yoo et al., 2022).

Despite the significant attention paid to psychological safety and the dramatic increase in the number of studies examining it over the last decade—at the individual, team, and organizational levels—there remain gaps in the literature that have motivated this dissertation. First, the role of *time* is largely neglected. Most studies on team psychological safety are cross-sectional (Frazier et al., 2017; Newman et al., 2017), taking a still photograph of something that is dynamic in nature (Marks et al., 2001). If psychological safety is subject to change, treating it as a stable team trait can foster misleading conclusions, as the validity of conclusions drawn from cross-sectional studies will depend on the precise timing of the cross-sectional snapshot. Thus, ignoring the dynamic nature of teams may leave us with an incomplete understanding (Cohen & Bailey, 1997; Ilgen et al., 2005; Leenders et al., 2016; Schecter et al., 2017). The need for studies on how team psychological safety develops over time was raised over two decades ago by Edmondson (1999), but we still lack sufficient insights into the matter (Edmondson & Lei, 2014; Frazier et al., 2017; Newman et al., 2017). Importantly, these temporal dynamics may have implications for team functioning. The positive relationship between team psychological safety and team performance (Frazier et al., 2017) is, for Edmondson (2008), explained by how psychological safety may activate certain team member behaviors that are necessary for teams to perform well. As team psychological safety has positive effects on team learning behavior (Creon & Schermuly, 2019) and voice behavior (Detert & Burris, 2007), it is reasonable to assume that such behaviors will be reduced in periods of low team psychological safety, thus negatively affecting the team. Hence, if the perception of team psychological safety is subject to change, these temporal dynamics may matter for the processes and performance of a team.

Second, how team members' perception of psychological safety may differ within teams has also largely been neglected. Based on the assumption that team members tend to have similar perceptions of psychological safety because they have similar experiences and

contextual influences (Edmondson, 1999, 2004), psychological safety typically characterizes the team as a unit rather than as an attribute found in the individuals who make up a team (Edmondson, 2012). However, team phenomena do not necessarily emerge through *agreement* of team members' attributes; they can also result from *dispersion* (Chan, 1998). Accordingly, team members do not necessarily agree on how safe a team is (e.g., Edmondson & Mogelof, 2006; Roussin et al., 2016; Schulte et al., 2012). Still, few studies take this into account when aggregating individual responses (e.g., on surveys) to the team level, thus overlooking potential individual differences between team members. Importantly, as with temporal dynamics, *within-team* dynamics of psychological safety may also impact team outcomes (Hirak et al., 2012; Koopmann et al., 2016). Team psychological safety not only contributes to more team learning behavior but also to more team members displaying these behaviors (Edmondson, 2008). A central idea behind using teams to solve tasks is to achieve more than the team members could have done through individual work; the whole is supposed to be greater than the sum of its parts (L. L. Thompson, 2018). However, one can imagine that in a team where only some members perceive the team to be psychologically safe, the contribution of team members will differ, with some likely not contributing the way they could if they did not fear negative consequences to the same extent. Thus, considering that all team members need to contribute for teams to reach their full potential, a lack of sharedness of team psychological safety perceptions may impact team performance.

Through this dissertation, I aim to help fill these gaps in the literature. With such scant research on team psychological safety temporal dynamics, Paper 1—"Taking the Emergent in Team Emergent States Seriously: A Review and Preview," coauthored by Vidar Schei and Therese E. Sverdrup¹—investigates what we can learn from the temporal dynamics of related team emergent states: that is, "properties of the team that are typically dynamic in nature and

¹ Accepted for publication in *Human Resource Management Review* 33 (2023). First published online August 5, 2022.

vary as a function of team context, inputs, processes, and outcomes” (Marks et al., 2001, p. 357). While previous reviews in the field commonly conclude that our understanding of temporal dynamics of team emergent states is limited (Cronin et al., 2011; Humphrey & Aime, 2014; Kozlowski & Chao, 2012; Mathieu et al., 2015; Rapp et al., 2021; Waller et al., 2016), we provide an extensive overview of 115 longitudinal papers and contribute with the first literature review that summarizes and analyzes the work on temporal dynamics in team emergent states.

In Paper 2, “The Emergence and Development of Team Psychological Safety: A Team Practice Lens,” I extend the literature on team psychological safety by exploring how team psychological safety emerges from the point at which a team is established and further develops over time. Moreover, I seek to understand these temporal dynamics through the lens of team practices. Through two explorative case studies in different contexts and over different time horizons, I contribute to the research field by identifying how psychological safety unfolds over time, answering calls in literature reviews and a meta-analysis for more studies on the temporal dynamics of psychological safety (Edmondson & Lei, 2014; Frazier et al., 2017; Newman et al., 2017). Moreover, I follow up on a suggestion from O’Neill and Salas (2018) in their review of effective teamwork in organizations by taking the dynamic nature of teams into account in general and studying the emergence and maintenance of team psychological safety through a dynamic lens in particular. In addition to identifying how team psychological safety may both increase and decrease over time—like a perishable good depending on the practices of the team more than time itself—I also identify how differently team members within the same team may perceive team psychological safety.

Paper 3 follows up on the question of the sharedness of team psychological safety perceptions and brings it into the research field of team climate strength. In this paper—“Safe Among the Unsafe: Psychological Safety Climate Strength Matters for Team Performance,”

coauthored by Henning Bang, Therese E. Sverdrup, and Vidar Schei²—we study the impact that the degree of shared perceptions of team psychological safety within a team may have on team performance. More specifically, we study the moderation effect of team psychological safety climate strength (i.e., the degree of shared perceptions within a team) on the relationship between team psychological safety (i.e., the average of team members' perceptions) and team performance. Through this paper, we answer the calls from Perrigino et al. (2021) for more research on team climate strength in general and from Newman et al. (2017) to study team psychological safety climate strength in particular. Moreover, through descriptive analyses of how perceptions of team psychological safety may differ within a team, we follow up on Perrigino et al. (2021), who encourage researchers to explore climate strength in depth through research questions rather than formalized hypotheses. We find that although team psychological safety climate strength is generally positive for team performance, a *lack* of sharedness may actually be beneficial for team performance in teams low on psychological safety.

This dissertation is structured as follows. In the Theoretical Framework, I provide an up-to-date overview of the literature on psychological safety before presenting a more detailed theoretical background for positioning the three papers. The Methodology section that follows provides an elaboration of my philosophical assumptions and how they shaped my methodological choices. I then move on to the Discussion, which presents the main findings, theoretical contributions, practical implications, limitations, and suggestions for future research, and follow up with the Conclusion. The three papers then follow. Table 1 gives an overview of the papers.

² Accepted for publication in *Small Group Research*. First published online September 9, 2022.

Table 1. Overview of the Three Papers in This Dissertation.

	Paper 1	Paper 2	Paper 3
Title / Reference	Fyhn, B., Schei, V., & Sverdrup, T. E. (2023). Taking the emergent in team emergent states seriously: A review and preview. <i>Human Resource Management Review</i> , 33(1), Article 100928. https://doi.org/10.1016/j.hrmr.2022.100928	Fyhn, B. (2022). <i>The emergence and development of team psychological safety: A team practice lens</i> . [Working paper].	Fyhn, B., Bang, H., Sverdrup, T., & Schei, V. (2022). Safe among the unsafe: Psychological safety climate strength matters for team performance. <i>Small Group Research</i> . Advance online publication. https://doi.org/10.1177/10464964221121273
Aim / Research question	What can be learned from research that examines team emergent states over time?	How does team psychological safety emerge and develop over time, and how can we understand these temporal dynamics through the practices of the team?	To what extent does team psychological safety climate strength moderate the relationship between team psychological safety and team performance?
Theoretical lens	Team emergent states (Marks et al., 2001; Rapp et al., 2021)	Team psychological safety (Edmondson, 1999); team emergent states (Marks et al., 2001); team development theory (e.g., Gersick & Hackman, 1990); climate emergence (Schneider & Reichers, 1983)	Team psychological safety (Edmondson, 1999); climate strength and dispersion models (Chan, 1998); team climate strength (Perrigino et al., 2021)
Context	Teams with interdependency and a common goal (e.g., work teams)	Short-term project teams and long-term interdisciplinary project teams	Management teams
Methodology	Literature review; identifying papers studying the temporal dynamics of team emergent states; descriptive analyses	Two case studies; longitudinal and convergent parallel design based on quantitative surveys and qualitative semi-structured interviews	Survey-based data; hierarchical regression analysis to examine moderation effects; descriptive additional analyses to explore sharedness
Main findings	Team emergent states have no universal pattern; team emergent states should be measured as emergent; common antecedents and outcomes of temporal dynamics; how we study the emergent in team emergent state matters for what we find.	Team psychological safety develops in various ways, potentially decreasing or fluctuating. Connecting, clarifying, supporting, and performing team practices shape the emergence and development of team psychological safety.	Team psychological safety climate strength positively moderates the relationship between team psychological safety and team performance. For low levels of team psychological safety, teams perform better when team members do not agree on the level of team psychological safety.

Theoretical Framework

The aim of this section is to provide a theoretical framework for my dissertation. It differs from Paper 1—a literature review—in two especially significant regards. First, while Paper 1 addresses the temporal dynamics of team emergent states, this section focuses solely on psychological safety. Notably, at this point, I include studies on psychological safety regardless of level of analysis: individual, team, or organization.³ Second, Paper 1 provides a comprehensive literature review following a systematic approach, while this section aims to provide a broader overview of the literature. I consider it important to describe in some detail how the field has moved from early research on psychological safety to the latest published papers and to situate where my research fits and how it contributes to the field. After this broad overview, I specifically address the most relevant literature in two regards: temporal dynamics of psychological safety and team psychological safety dispersion. This research is key to the positioning of my empirical papers (Papers 2 and 3) and is further elaborated in the papers themselves.

Psychological Safety

History and Definitions

The history of the psychological safety construct dates to the early 1960s. It was Carl R. Rogers (1958) who first wrote about the importance of safety in establishing a helping relationship—“that it is safe to be transparently real” (p. 12)—and the term *psychological safety* first appeared in his book *On Becoming a Person* in 1961. C. R. Rogers (1961) describes psychological safety as essential for honest communication, learning, and creativity

³ Through my years of reading the literature on psychological safety, I have noticed how papers to various extents take the level of analysis into account in references and citations. As all levels of analysis are closely related—psychological safety is an individual perception that is potentially shaped by the team of which one is part, and organizations are comprised of these teams—limiting this theoretical framework to a single level would not provide the broad, up-to-date overview of the field that I seek to offer. In the latter part of the literature review, where I position my three papers within existing research, I emphasize studies at the team level since the context of teams plays a more important role.

in therapeutic relationships based on an unconditional, positive regard: “It involves an acceptance of and a caring for the client as a separate person, with permission for him to have his own feelings and experiences, and to find his own meanings in them” (p. 244). C. R. Rogers (1961) was addressing not only therapists, however, but also anyone with a facilitating function—including teachers and parents—in building a climate where one’s real self can emerge; psychological safety is depicted as essential for both learning and creativity.

Schein and Bennis (1965) brought the psychological safety construct into organizational theory, emphasizing the importance of feeling safe to learn. This safety consisted of feeling included and experiencing a setting in which one could fail without personal risk. Thus, the authors address fear⁴ as a potential obstacle for learning to occur. Only when one feels certain that failure will be tolerated will one engage wholeheartedly in a learning process (Schein & Bennis, 1965). Thus, successful change at the organizational or team level depends on individuals’ psychological safety.

Studying the psychological conditions of personal engagement, Kahn (1990) identifies three psychological conditions as important for people to express themselves at work: meaningfulness, availability, and safety. Kahn (1990) describes psychological safety as “feeling able to show and employ one’s self without fear of negative consequences to self-image, status, or career” (p. 708). In general, people in his study were more engaged in situations where they felt safe, and Kahn (1990) argued that this safety was important for taking the risk of expressing oneself in various contexts, including therapeutic relationships, families, groups, and organizations.

⁴ Notably, neither Schein and Bennis (1965) nor other theorists on psychological safety of whom I am aware argue that fear itself is negative. On the contrary, fear is a natural part of our human selves, and we may very well depend on it to stay alive in certain situations. The fear discussed by these researchers concerns the risk of expressing oneself if one worries that this may have negative consequences (cf. the definition of psychological safety by Kahn [1990]).

Edmondson (1999) focuses on psychological safety in work teams and defines *team psychological safety* as “a shared belief held by members of a team that the team is safe for interpersonal risk taking” (p. 350). According to Edmondson (2004), psychological safety “consists of taken-for-granted beliefs about how others will respond when one puts oneself on the line, such as by asking a question, seeking feedback, reporting a mistake, or proposing a new idea” (p. 4). Such beliefs may differ from one team to another, and perceptions of psychological safety tend to be similar among team members subject to similar experiences and contextual influences (Edmondson, 1999, 2004). Thus, psychological safety typically characterizes a team as a unit rather than as an attribute of the individuals making up the team (Edmondson, 2012). However, Higgins et al. (2022) suggest psychological safety to be a collective construct (cf. the “shared unit-level property” in Kozlowski and Klein [2000]) that in some instances resembles an organization more than a team. Though most studies emphasize psychological safety as a team-level construct, psychological safety is still studied at different levels—individual, dyadic, group, and organizational (Frazier et al., 2017; Newman et al., 2017). Additionally, though this approach is less common, Singh et al. (2018) studied psychological safety at the *community* level.

Psychological Safety: Feeling or Perception?

Related to the different levels at which psychological safety may reside, there is a conceptual difference as to how that safety is described. C. R. Rogers (1961), Schein and Bennis (1965), and Kahn (1990) all describe psychological safety as a *feeling*. However, according to Edmondson (2003), psychological safety is a *cognitive* group-level construct originating in team members’ assessments of interpersonal risk within their team. Thus, *team psychological safety* as a team climate construct builds on team members’ *perceptions* of consequences (Edmondson, 2014). These perceptions are connected to a *belief* (cf. Edmondson’s [1999] definition of team psychological safety presented above) that the

benefits of speaking up outweigh the costs of doing so. Nevertheless, both Edmondson (1999) and Kahn (1990) use the term “fear”—commonly recognized as a feeling—as the opposite of psychological safety. Thus, distinguishing whether psychological safety is a feeling or perception is not necessarily straightforward. Potentially, one could feel safe on a personal level but still perceive that one’s team is an unsafe place in which to take risks.

Indeed, seeing psychological safety as a feeling or perception is not necessarily an oppositional gesture. Kahn (1990) and Sanner and Bunderson (2015) describe contexts in which team members may feel more or less safe, and it is their perception of their particular context that is measured through surveys on psychological safety (e.g., Edmondson, 1999). Another word for such a context is *room*. As risk-taking behavior in collaboration (e.g., admitting mistakes or sharing ideas) is unlikely to occur unless one perceives that there is room to do so without negative consequences, psychological safety is essentially about creating this room for candor (Edmondson, 2018). Indeed, although he uses the term *safety* rather than *psychological safety*, Joseph Sandler notes the following in “The Background of Safety” (1960):

The act of perception is a very positive one, and not at all the passive reflection in the ego of stimulation arising from the sense-organs; [...] the successful act of perception is an act of integration which is accompanied by a definite *feeling of safety* (p. 352, emphasis in original).

The Status of Psychological Safety Research

The increased attention paid to psychological safety among researchers over the last decade has been nothing short of remarkable (see Figure 1). As of October 2022, a total of 1395 papers on psychological safety had been published in peer reviewed journals.⁵ A little

⁵ The figures cited come from a Scopus search carried out on October 5, 2022, for papers published in peer reviewed journals containing *psychological safety* in title, abstract, or keywords.

under half (647) contain the words *team* or *group*, 423 contain the word *organization*, and 311 contain the word *individual*.⁶ The number of papers rose notably after 2016, and the increase in attention has not slowed. In fact, more papers have been published in 2021 and thus far in 2022 (553), than for the entire 2016–2020 period (539).

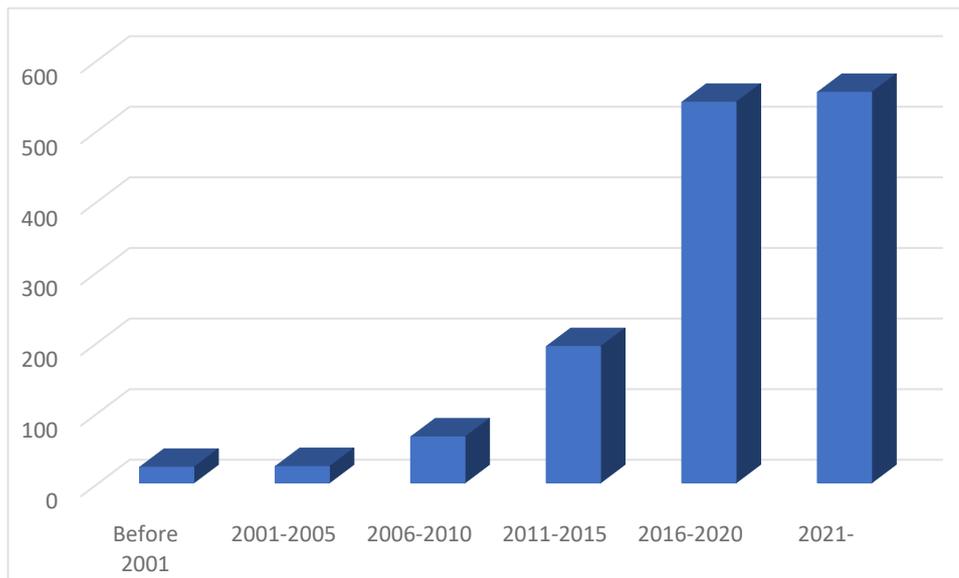


Figure 1. Number of papers published on psychological safety.

The rise in the amount of research on psychological safety reflects an increased emphasis on the topic among practitioners. Amy Edmondson, the most prominent researcher in the field, explains psychological safety as “a crucial source of value creation in organizations operating in a complex, changing environment” (2018, p. xvi). The environments facing organizations today are characterized by unprecedented levels of change (Maynard et al., 2015); the expression “change is the new normal” has quickly become a popular saying. The dynamic reality of today’s organizations places different demands on teamwork and makes adaptation essential (Burke et al., 2006). This flexibility is “crucial for team success as effectiveness in today’s workplace hinges upon teams that are flexible and

⁶ These numbers include papers that have two or more of these keywords, indicating the level of which psychological safety is studied. Excluding other keywords, the numbers of papers are as follows: 331 for *team* or *group* (excluding *organization* and *individual*), 168 for *organization* (excluding *team*, *group*, and *individual*), and 78 for *individual* (excluding *team*, *group*, and *organization*).

dynamic in the unavoidable presence of change” (Frick et al., 2018, p. 411). Thus, the enhanced importance of learning and innovation in contemporary organizations is one possible explanation for the increased focus on psychological safety (Edmondson & Lei, 2014).

Moreover, interest in psychological safety among practitioners increased tremendously following Google’s Project Aristotle, which started in 2012 and lasted several years. In their study, Google discovered that the most important quality distinguishing their most effective teams from their other teams was psychological safety.⁷ Though this was an internal study and has not been published in an academic organ, it had a clear impact on researchers’ interest in the topic. More recently, the importance of psychological safety for effective collaboration has been tested in a wide range of settings, such as multinational teams (Mohan & Lee, 2019), financial companies (Coutifaris & Grant, 2022), and the health care sector (O’Donovan & McAuliffe, 2020).

Related Constructs

There are several constructs related to psychological safety in the organizational sciences, and our understanding of psychological safety may benefit from knowledge of these other constructs because they may overlap to some extent.

A construct that is somewhat difficult to distinguish from psychological safety is *participative safety*, which Anderson and West (1998) define as “an interpersonal atmosphere of non-threatening trust and support” (p. 240). This construct is part of the *team climate inventory* and, together with three other constructs (vision, task orientation, and support for innovation), measures a team’s atmosphere for innovation (Anderson & West, 1998).

Participative safety originally included two components: team members’ participation in

⁷ For more details, see Duhigg, C. (2016, February 25). What Google learned from its quest to build the perfect team. *The New York Times Magazine*. <https://www.nytimes.com/2016/02/28/magazine/what-google-learned-from-its-quest-to-build-the-perfect-team.html>

decision making and intragroup safety, meaning that team members were comfortable expressing themselves (West & Anderson, 1996). Thus, this term can be interpreted somewhat more broadly than psychological safety. However, as participation in decision making may be difficult to distinguish from the perception of safety, participative and psychological safety are closely linked (Edmondson, 2004; Hülsheger et al., 2009), and some studies use these terms interchangeably (e.g., Binyamin et al., 2018; Fairchild & Hunter, 2014).

Another construct related to psychological safety is *psychosocial safety climate*, which Dollard and Bakker (2010) refer to as the collection of “policies, practices, and procedures for the protection of worker psychological health and safety” (p. 580). Hall et al. (2010) distinguish a *psychologically safe climate*, which is one with freedom from fear, from a *psychosocial safe climate*, which involves freedom from psychological harm and injury. Moreover, a psychosocial safety climate may foster psychological safety but also affect other psychosocial hazard factors at work, such as high work pressure and low job control (Hall et al., 2010).

A third related construct, trust, has received substantial scholarly attention. Notably, trust is included in the definition of participative safety above and is often cited when explaining psychological safety. For example, Kahn (1990) describes psychological safety through trust: “people felt safe in situations in which they trusted that they would not suffer for their personal engagement” (p. 708). Thus, by representing a quality of the relationship between team members, trust can be viewed as a driver of psychological safety (Edmondson, 2004). For example, Joo et al. (2022) found organizational trust to determine psychological safety among employees.

There are numerous definitions of trust that are connected to its application across different disciplines. In the organizational sciences, trust is regarded as an interpersonal

construct and concerns the willingness to make oneself vulnerable to the actions of others (Mayer et al., 1995). Thus, both trust and psychological safety involve a perception of vulnerability or risk in collaboration (Edmondson, 2004). According to Edmondson (2004), the two constructs can be distinguished by trust primarily being a *choice*—“giving others the benefit of the doubt” (p. 7)—that resides in dyadic relationships, whereas psychological safety concerns “whether others will give you the benefit of the doubt” (p. 7) and resides at the group level. However, trust may be both affect-based and thus emotional and cognition-based and thus rational (Kanawattanachai & Yoo, 2002; McAllister, 1995). Moreover, trust can describe shared perceptions, for example in form of *team trust* (De Jong & Elfring, 2010; Fulmer & Gelfand, 2012). Thus, the two constructs are clearly overlapping.

Nevertheless, trust may be a broader construct than psychological safety. According to Mayer et al. (1995), trust is comprised of three facets: ability, benevolence, and integrity. Whether a person trusts another in one or more of these aspects may determine that person’s level of risk taking in the relationship. For example, one may trust another person to have the ability to perform a certain task but not necessarily trust that person socially and thus avoid sharing personal information with that individual. This kind of risk taking depends on the perceived benevolence and integrity in that relationship. This distinction is important since the theory on psychological safety does not say anything about the motivation to use this safety. I may perceive high psychological safety; however, without benevolence and integrity, I may use my perceived safety in a way that is not constructive for my surroundings, such as self-promotion (Grailey et al., 2021) and even reduce others’ perceptions of psychological safety with my own somewhat exaggerated sense thereof. In such cases, psychological safety would not likely lead to the desired outcomes. Thus, we need more than psychological safety—trust being one.

The Nomological Net of Psychological Safety

A recent meta-analysis (Frazier et al., 2017) and two literature reviews (Edmondson & Lei, 2014; Newman et al., 2017) provide extensive overviews of the nomological net of psychological safety. Below, I provide an overview of the essence of the two most recent reviews while prioritizing more recent studies not included in these reviews to provide a more up-to-date account. In addition, since some of the earliest work on psychological safety (e.g., C. R. Rogers, 1961) is not included in previous reviews, that is also discussed.

Moreover, the empirical studies in this dissertation emphasize *team* psychological safety; each of those papers includes a review of the relevant literature specifically addressing the team level. However, Frazier et al. (2017) conducted a homology across levels by using study level as a moderator and found that the relationships between psychological safety and the factors in its nomological network did not differ across levels. Similarly, Newman et al. (2017) do not distinguish between levels of analysis when reviewing the literature. In their visualization of the nomological net, Newman et al. (2017) systematize based on study level, however, show that the factors are both relatively similar across levels and have effects across levels. Thus, to provide an updated overview of the nomological net, I present literature that is not limited to a specific level of analysis.

Antecedents to Psychological Safety

In C. R. Rogers's (1961) early work on psychological safety, three associated processes are suggested to be necessary for psychological safety to emerge: accepting the individual as of unconditional worth, providing a climate in which external evaluation is absent, and understanding empathically. By the last aspect, C. R. Rogers (1961) reveals the importance of going beyond a general and shallow "I accept you" and actually investing in understanding the other person: "if I understand you empathically, see you and what you are

feeling and doing from your point of view, enter your private world and see it as it appears to you—and still accept you—then this is safety indeed” (p. 303).

In a work setting, Kahn (1990) identifies four general factors directly influencing psychological safety: interpersonal relationships recognized by support and trust, group and intergroup dynamics (i.e., personal engagement depending on informal and unconscious roles), supportive and resilient management, and role performances within the protective boundaries of organizational norms. Related to Kahn’s (1990) emphasis on management style and processes, Edmondson (1999) focused on team leader coaching, such as being supportive of and not responding defensively to questions and challenges, and contextual support like providing adequate resources and information as key antecedents to psychological safety in teams.

Based on the most recent meta-analysis (Frazier et al., 2017) and literature review (Newman et al., 2017) on psychological safety, antecedents to psychological safety can be categorized into support from organization, support from leader, support from peers, work design characteristics, personal traits, and differences among team members; see Table 2 for more details.

Table 2. Antecedents of Psychological Safety Based on the Most Recent Meta-Analysis and Literature Review.

	Terms and examples from reviews	
Category of antecedents	<i>Frazier et al. (2017)</i>	<i>Newman et al. (2017)</i>
<i>Support from organization</i>	Organizational support as an element of a supportive work context	Supportive organizational practices: <ul style="list-style-type: none"> • Organizational support • Access to mentoring • Diversity practices
<i>Support from leader</i>	Positive leader relations: <ul style="list-style-type: none"> • Inclusive leadership • Leader–member exchange • Transformational leadership • Trust in leadership 	Supportive leadership behaviors: <ul style="list-style-type: none"> • Leader inclusiveness • Support • Trustworthiness • Openness • Behavioral integrity
<i>Support from peers</i>	Peer support as an element of a supportive work context	Relationship networks: <ul style="list-style-type: none"> • Familiarity • Network ties • High-quality relationships • Membership of the inner circle
<i>Work design characteristics</i>	Work design characteristics: <ul style="list-style-type: none"> • Autonomy • Interdependence • Role clarity 	Team characteristics: <ul style="list-style-type: none"> • Shared team rewards • Formal team structures • Engagement in boundary work • Collective responsibility
<i>Personal traits</i>	<ul style="list-style-type: none"> • Learning orientation⁸ • Proactive personality • Emotional stability • Openness to experience 	
<i>Differences among team members</i>		Individual and team differences: <ul style="list-style-type: none"> • Self-consciousness • Subjective status • Cognitive styles

⁸ In addition to being studied as a personal trait at the individual level, learning orientation is also studied at the team level (e.g., Wilkens & London, 2006).

As previously noted, there has been a remarkable increase in studies on psychological safety since the reviews summarized in Table 2 were published in 2017; several of the newer studies have confirmed the antecedent categories in the table but broadened our understanding by combining them. For example, confirming the importance of support from leaders and the organization, Joo et al. (2022) found that organizational trust and empowering leadership accounted for a majority (68%) of the variance in psychological safety among employees. Moreover, recent studies have offered insights into *other* antecedents to psychological safety, such as a climate of generalized respect that does not distinguish between individuals and satisfies one's need of belonging (K. M. Rogers & Ashforth, 2017) and supervisors' prosocial motivation (Frazier & Tupper, 2018). Interestingly, the effect of prosocial motivation on employees' psychological safety was mediated by supervisors' own psychological safety. Thus, a prosocial motivation among leaders may foster psychological safety for the leaders themselves, which may have positive effects on followers' psychological safety (Frazier & Tupper, 2018).

Some studies have examined the importance of *feedback* for psychological safety. C. E. Johnson et al. (2020) studied the roles of feedback and psychological safety in educational settings. Key to fostering a safe feedback environment was establishing a setting for open dialogue and candor, offering support and assistance, reducing the potential power distance between educator and learner, permitting mistakes, focusing on learning strategies, sharing information, and responding constructively.⁹ In a related study on feedback, Coutifaris and Grant (2022) found that when leaders appeared vulnerable and sought feedback, this contributed positively to employees' psychological safety. However, when this was not followed up in practice, the effect on psychological safety did not endure. What seemed to

⁹ Based on this explorative work, C. E. Johnson et al. (2021) created The Feedback Quality Instrument, which consists of five domains: set the scene, analyze performance, plan improvement, foster psychological safety, and foster learner agency.

have a more powerful and enduring effect on psychological safety was when leaders dared to share critical feedback they had received with others. These leaders appeared more dedicated and trustworthy, and their vulnerability—fostering psychological safety—did not come at the expense of being viewed as competent or effective.

Leaders showing *curiosity* about followers may also foster psychological safety and subsequent follower voice (P. S. Thompson & Klotz, 2022). Interestingly, this relationship was moderated by leader gender, with the relationship stronger for male than for female leaders. The researchers explain this difference by reactions to gender stereotypes. If we expect female leaders to exert more communal behavior, such as being open and caring, their curiosity is less likely to be noticed and thus does not have a strengthening effect on perceptions of psychological safety. However, in male leaders from whom we may expect more agentic behavior like assertiveness and certainty, curiosity was evaluated more positively and had a stronger effect on followers' psychological safety because it was counter to males' stereotypical communal behavior (P. S. Thompson & Klotz, 2022). Notably, although the authors studied multiple sectors to increase generalizability, efforts to replicate their study in other national cultures than the United States with potentially different stereotypes related to gender could serve as a limitation to their findings.

Remtulla et al. (2021) found eight facilitators to psychological safety in primary care multidisciplinary teams: leader inclusiveness, an open and non-judgmental atmosphere, support within silos from individuals to whom one could relate, boundary spanners who are responsible for linking sub-groups, chairing meetings, strong interpersonal relationships, and small teams. Moreover, hierarchy, perceived lack of knowledge, dominating personalities within the team, and authoritarian leadership as exemplified by enforcing rather than discussing decisions could function as *barriers* to team psychological safety.

When considering *negative* antecedents to psychological safety, status conflict may negatively affect psychological safety (H. W. Lee et al., 2018). Moreover, Gerlach and Gockel (2018) found that relationship conflict had a negative effect on psychological safety among school staff. Notably, when there were subgroups among the staff, task conflict also had negative effects on psychological safety for those belonging to the principal's out-group (Gerlach & Gockel, 2018). Furthermore, according to Triplett and Loh (2018), a perceived lack of personal control over one's work life may have a negative impact on psychological safety. However, in their study across four different organizations, trust moderated this relationship: those with higher trust¹⁰ were more likely to experience control over their work lives, leading to higher psychological safety, while those with lower trust were inclined toward a lack of control over their work lives, leading to lower psychological safety.

Another potential antecedent to psychological safety with somewhat mixed findings is *personality*. Though one qualitative study hypothesizes that personality impacts psychological safety (Grailey et al., 2021), this was not thoroughly tested. Frazier et al. (2017) found support for a positive relationship between certain personality traits (proactive personality, emotional stability, and learning orientation) and psychological safety, but openness to experience (one of the Big Five personality traits widely used in scholarship) was not related to psychological safety in their analyses. Moreover, at the group level of analysis, antecedents involving support and work design seemed to be more important for psychological safety than personality factors (Frazier et al., 2017). According to Edmondson (1999, 2018), psychological safety is an experience of a work climate that affects people in similar ways regardless of personality. However, whether or not personality plays a role in determining psychological safety, personality *fit* still may do so. Xu et al. (2019) found that when both

¹⁰ Trust in this study was measured by two components that were then summed: one's own willingness to share information and perceptions of the other team members' trustworthiness.

supervisor and subordinate had proactive personalities, the subordinate perceived higher psychological safety than when this personality trait was not congruent between the two.

Diversity is another potential antecedent to psychological safety, although that depends on the kind of diversity in focus. Creon and Schermuly (2019) found perceived subgroups in the form of perceived dissimilarities among team members to be negatively related to psychological safety, while objective diversity in terms of gender and age was neither positively nor negatively related to psychological safety. However, in a study among school staff, demographic faultline strength (i.e., the extent of alignment on demographic attributes across members of a group) was negative for psychological safety (Gerlach & Gockel, 2018). Creon and Schermuly (2019) discuss how diversity attributes may be situationally specific and how subgroups based on impression management processes like sensing approval or rejection and interpreting mimics and gestures may have a more powerful impact on perceived psychological safety than objective diversity attributes like gender and age. In a related study, S. Chen et al. (2017) found psychological safety to moderate the relationship between demographic faultline strength and team performance. Whereas a moderate level of faultline strength was optimal for team performance when psychological safety was low, there was no difference in team performance based on degree of faultline strength when psychological safety was high. Hence, psychological safety was more important for team performance than degree of diversity in objective demographic parameters like age, gender, education, and formal experience. That leads us to the issue of outcomes of psychological safety.

Outcomes of Psychological Safety

In the oldest theoretical sources, psychological safety was regarded as important for creative thinking (C. R. Rogers, 1961), individual and organizational learning (Schein & Bennis, 1965), and personal engagement at work (Kahn, 1990). Since then, psychological

safety has been positively linked to outcomes such as creativity and risk taking (Palanski & Vogelgesang, 2011), information sharing (Bunderson & Boumgarden, 2010), commitment (Detert & Burris, 2007), voice behavior (Bienefeld & Grote, 2014; Liang et al., 2012), and team learning (Edmondson, 1999; Wong et al., 2010). Table 3 summarizes the outcomes of psychological safety identified through the most recent meta-analysis (Frazier et al., 2017) and literature review (Newman et al., 2017) on psychological safety.

Table 3. Outcomes of Psychological Safety Based on the Most Recent Meta-Analysis and Literature Review.

Category of outcomes	Terms and examples from reviews	
	<i>Frazier et al. (2017)</i>	<i>Newman et al. (2017)</i>
<i>Team and organizational outcomes</i>	<ul style="list-style-type: none"> • Task performance • Creativity 	<ul style="list-style-type: none"> • Performance • Innovation • Creativity
<i>Personal outcomes and attitudes</i>	<ul style="list-style-type: none"> • Engagement • Commitment • Satisfaction 	<ul style="list-style-type: none"> • Organizational commitment • Work engagement
<i>Communication</i>	<ul style="list-style-type: none"> • Information sharing • Citizenship behaviors (including voice) 	<ul style="list-style-type: none"> • Communication • Knowledge sharing • Voice behavior
<i>Learning</i>	<ul style="list-style-type: none"> • Learning behaviors 	<ul style="list-style-type: none"> • Learning behaviors

The large number of studies on positive outcomes of psychological safety contributes to the robustness of the construct as an important ingredient for goal achievement, collaboration, and the work environment. Nevertheless, there are studies that have *not* found a positive link between psychological safety and organizational outcomes, indicating that there may be some boundary conditions or contextual differences impacting the outcome. Below, I provide an overview of what recent research has taught us about the importance of psychological safety, considering types of outcomes not previously studied, boundary conditions, contextual differences, and potential dark sides.

In their review of *safety culture*, which focuses on reducing accidents and errors in organizations, Salas et al. (2020) found team psychological safety to be one of five central team emergent states (mutual trust, collective efficacy, situation awareness, and shared mental models were the others) necessary to build a safety culture where all team members comply with and participate in safety performance behaviors. Since many decisions are made in teams, the authors highlight the importance of collective attitudes and perceptions, or the team-level safety climate: “if too many team members lack positive attitudes and perceptions toward formal safety policies, a poor safety climate may develop and propagate ineffective norms throughout the organization and impact safety culture in the long term” (Salas et al., 2020, p. 299). In other words, team psychological safety may also have an important impact on organizational outcomes.

As different kinds of *leadership* have been studied as antecedents to psychological safety, that form of safety may also affect the way leadership is conducted. Aufegger et al. (2019) found psychological safety to be an important element for shared leadership to emerge in acute healthcare teams, along with shared mental models, social support, and shared situational awareness. The authors explain this link through the necessity for “greater respect and openness for team members, the ability to ask for help and advice and a greater commitment to their roles and responsibilities” (p. 318) for leadership to be shared among team members. Furthermore, although earlier studies found a positive relationship between inclusive leadership and psychological safety (e.g., Carmeli et al., 2010), Yoo et al. (2022) found inclusive leadership to negatively moderate the relationship between psychological safety and knowledge sharing. Thus, the authors suggest that psychological safety and inclusive leadership are complementary mechanisms; if psychological safety is low, the team will depend more on inclusive leadership to share knowledge, and vice versa.

Building on previous research confirming the positive relationship between psychological safety and *creativity* and *innovation*, Agarwal and Farndale (2017) found that psychological safety also leads to higher *creativity implementation*, so that employees' ideas are further developed, transformed, and implemented. Indeed, Soleas (2021), reviewing the literature on how environmental factors impact the motivation to innovate, confirms psychological safety as a necessary criterion to promote innovation. Psychologically safe and innovative environments “were characterized as ones that provided opportunities for workers to pursue passion projects, created stability, gave individuals resources to see their ideas through to completion, and were flexible with methods used to meet goals” (p. 10).

Another area in which recent studies have provided insights is the importance of psychological safety for *team effectiveness*. Building on Hackman's (1987) conceptualization of team effectiveness, Yoo et al. (2022) found psychological safety to be positive for all three of its aspects: team performance, team satisfaction, and growth experience of team members. In a virtual team setting, Schei et al. (2020) also found support for a positive relationship between psychological safety and both team performance and team satisfaction. Similarly, at the organizational level, Frazier and Tupper (2018) add the importance of satisfaction to understand how psychological safety and performance relate. More specifically, psychological safety among employees had a positive indirect effect on helping behavior and task performance, as mediated by thriving.

Continuing on the relationship between psychological safety and *performance*, previous studies have found this relationship to be positive at both the organizational (e.g., Baer & Frese, 2003) and team levels (e.g., Bradley et al., 2012). Still, some studies did *not* find a positive relationship between psychological safety and performance (e.g., Faraj & Yan, 2009). In the study by Koopmann et al. (2016) on teams in research and development, team psychological safety predicted team member creative performance but not team member task

performance. Moreover, in a study of sales and service teams, S. Kim et al. (2020) found that team psychological safety did not directly affect team effectiveness. However, they did report a mediating effect of psychological safety on team effectiveness through efficacy and learning behavior. Since learning behaviors in teams, such as asking questions and voicing concerns, involve interpersonal risk taking, one needs to perceive that one is psychologically safe enough to do so without incurring negative consequences (Edmondson, 1999). Indeed, Creon and Schermuly (2019) support the positive relationship between psychological safety and such behavior. With less focus on fearing negative consequences from, say, sharing ideas or asking for help, more focus can be directed toward tasks that lead to increased performance. These studies thus support Edmondson's (2008) suggestion that psychological safety is not a direct driver of performance; however, it is important for performance through its activation of team member behaviors.

Psychological safety may not always turn out to be positively related to team performance due to *contextual* reasons. According to Edmondson and Lei (2014), psychological safety plays a consistent role in enabling performance, particularly where there is uncertainty and a need for either creativity or collaboration to accomplish the work at hand. Furthermore, psychological safety is relevant for understanding learning across levels (Edmondson & Lei, 2014). Psychological safety enables individuals to focus on collective goals rather than on self-protection and overcome learning anxiety or defensiveness (Schein, 1993). However, not all contexts are that dependent upon learning. As Sanner and Bunderson conclude in their meta-analysis on the relationship between psychological safety, team learning, and team performance (2015), "the results of this study suggest that psychological safety may be insufficient to stimulate learning in groups where the task environment does not require learning" (p. 1).

In addition to the learning context as a potential boundary condition for the importance of psychological safety, *motivation* and *accountability* may serve as other boundary conditions. Whether a team shares a belief about the importance of development and are open-minded toward learning may determine the level of psychological safety and the impact of psychological safety on team learning (Harvey et al., 2019). Indeed, S. M. Kim et al. (2021) found a negative relationship between team psychological safety and team members' perceptions of team performance; they explained this result by noting that "if individual team members are extremely psychologically stable, they may have little tension or motivation to improve their performance" (p. 970). Edmondson (2008) discusses how psychological safety needs to function along with accountability to meet the demanding goals of the organization. To avoid a comfort zone characterized by high psychological safety and low accountability, true learning happens when employees perceive themselves as both safe and accountable.

Building on *accountability* as a potential boundary condition of psychological safety at the organizational level, Higgins et al. (2022) studied the organizational performance of schools and found that psychological safety was not positive for performance, as measured by whether a school met a defined performance threshold for student achievement. In fact, the schools that performed best had low levels of psychological safety combined with high levels of felt accountability. According to Higgins et al. (2022), this somewhat surprising negative effect of psychological safety on organizational performance can be explained by where teachers direct their attention—either speaking up about the good of the organization or focusing on their own comfort—and a context with low role interdependence, because individual teachers do not rely heavily on one another to accomplish their core duties. This supports the potential motivational and contextual boundary conditions on the effects of psychological safety on organizational outcomes: "Free or open dialogue in and of itself may not produce the results intended" (Higgins et al., 2022, p. 38). That is, one may need

something more than psychological safety, such as felt accountability, so that psychological safety goes beyond just being comfortable speaking up, which is not itself necessarily beneficial for organizational performance. Higgins et al. (2022) reveal the possibility that there are not only potential boundary conditions when psychological safety is helpful but also potential downsides—also called dark sides in the management literature.

The Dark Sides of Psychological Safety

At the time of the meta-analysis by Frazier et al. (2017) and literature review by Newman et al. (2017), there was a lack of research on the potential *dark sides* of psychological safety. One exception is Pearsall and Ellis (2011), who found that when psychological safety was high and combined with a utilitarian attitude, team members were more likely to cheat. Thus, when perceiving the reduced interpersonal risk that describes a psychological safe climate (Edmondson, 1999), people tended to take advantage of opportunities that were not necessarily congruent with ethical standards. Since Pearsall and Ellis (2011), several other papers have addressed the dark sides of psychological safety, giving us a better understanding of potential downsides to consider when attempting to build psychological safety in teams and organizations.

One potential downside to psychological safety is reduced work motivation (Deng et al., 2019). Psychological safety may alleviate concerns about how others will react (Edmondson, 1999). However, there is also a potential motivational upside of feeling evaluated and responsible; one may be more focused and contribute more. Deng et al. (2019) found a dual pathway in which fear of failure mediates the *positive* effect of psychological safety on risk-taking behaviors (i.e., group voice and learning behavior), while work motivation mediates the *negative* effect of psychological safety on risk-taking behaviors. As such, to use psychological safety to its fullest required both alleviating the fear of failure so

that team members feel free to take necessary risks while also ensuring that team members feel accountable so that psychological safety does not curb their effort.

Grailey et al. (2021) found several potential downsides of psychological safety among critical care staff in hospitals, such as how an overload of information could confuse decision makers more than help them, and how sharing inputs that were not time-critical could disturb focus in critical situations. Moreover, when speaking up was perceived to be about self-promotion and not in the interests of the work environment—and perhaps not even in the best interests of the patient—it contributed to lower psychological safety in the work environment. Accordingly, Y. Zhang and Wan (2021) suggest that in making room for taking interpersonal risks without concern lies the danger of “destructive behavior that could obstruct the team process and undermine the team effectiveness” (p. 378). Such potential downsides of excessive psychological safety have also been examined by Edmondson (2004), who noted that “if people are too comfortable with each other, they may spend an inappropriate amount of time in casual conversation at the expense of their work” (p. 34). Thus, teams need a clear and compelling shared goal, effort and thought, interpersonal competence, and some sort of censorship as to what kind of contribution is appropriate at what point during collaboration (Edmondson, 2004). In addition, Edmondson (2004) discussed potential challenges at the organizational level. For example, intergroup tensions may occur in organizations if some teams have high psychological safety while other teams lack that safety. In such cases, excessive psychological safety may create barriers to communicate across teams.

X. Zhang et al. (2020) found a positive indirect effect between charismatic leadership that uses charm and persuasive communication to exert influence and unethical pro-organizational behavior such as enhancing the company’s interest on behalf of critical social values, as mediated by psychological safety. This relationship was strengthened with high performance pressure. Thus, though charismatic leadership may have positive effects on

psychological safety, it will not necessarily lead to positive outcomes, especially if charisma is not used with socially acceptable intentions and employees experience pressure to perform solely or largely to satisfy the leader.

It is common for research on the potential dark sides of psychological safety to note that this safety is not necessarily used for the good of the team or the organization. The theory on psychological safety does not address motivation. As such, without undermining the importance of psychological safety for desirable outcomes, which is supported by numerous studies, this research stream helps us see that we need something more than psychological safety to collaborate successfully. This is especially important following the increased interest in psychological safety, which has become something of a buzzword among many practitioners; we must base and make use of psychological safety on the right premises. Overall, the literature indicates that psychological safety is a vital ingredient but is not in itself a complete recipe for enhanced team and organizational performance.

Psychological Safety as a Mediator

Team emergent states like team psychological safety may function as mediating mechanisms between team inputs and outcomes (Ilgen et al., 2005). Psychological safety, regardless of study level, is commonly treated as a mediator. Some studies do treat psychological safety as a moderator;¹¹ for example, Hans and Gupta (2018) found psychological safety to moderate the relationship between job characteristics and shared leadership. However, studies treating psychological safety as a mediator dominate the literature. Of the 44 empirical studies on antecedents to psychological safety that Newman et al. (2017) reviewed, most (38) treated psychological safety as a mediator. Since these studies find that psychological safety mediates a relationship between A and B, they reveal that A may be antecedents to psychological safety and B may be outcomes of psychological safety.

¹¹ Because I identified only a few papers that treat psychological safety as a moderator, I do not include a separate section on this role.

Thus, they also add insights to the papers already reviewed on antecedents and outcomes.

Below, I present some common areas where there are several studies on the mediating role of psychological safety.

Learning is one such area; in one of the first studies on the mediating effect of psychological safety, Edmondson (1999) found team psychological safety to mediate the relationship between context support, team leader coaching, and team learning behavior. Based on that work, she developed a team learning model where team psychological safety transfers the effect of context support and team leader coaching to team learning behavior, leading to increased team performance. This model has since been tested and supported, including in military exercises (Hedlund et al., 2015).

A topic related to learning is *knowledge sharing* (and knowledge hiding). J. Yin et al. (2019) found that psychological safety mediated the effect of intellectual stimulation and inspirational motivation, two dimensions of transformational leadership theory, on knowledge sharing. Jiang et al. (2019) studied the mediating effect of psychological safety on the relationship between knowledge-hiding behaviors and thriving at work and found that employees who hid their knowledge from their colleagues perceived less psychological safety and were less likely to thrive in their jobs. According to Men et al. (2020), psychological safety mediates the negative relationship between ethical leadership and knowledge hiding in work teams. In a related study, Peng et al. (2019) found that psychological safety mediated the negative effects of self-serving leadership—when leaders prioritize their own needs over others or the organization—on team creativity, such that self-serving leadership threatened the psychological safety of followers, which again led to less team creativity.

Conflict management is another area where psychological safety has been studied as a mediator. It was found to fully mediate the relationship between organizational trust and group conflict (Joo et al., 2022), between empowering leadership and group conflict (Joo et

al., 2022), and the negative relationship between status conflict and team creativity (H. W. Lee et al., 2018). O'Neill and McLarnon (2018) reviewed the literature on conflict management in teams and proposed that team psychological safety positively mediates the relationship between performance feedback and conflict management processes. More specifically, positive performance feedback may lead to collectivistic conflict management processes like showing openness to others' perspectives through team psychological safety, while negative performance feedback may lead to individualistic conflict management processes like competitiveness as a result of lower team psychological safety. Thus, team psychological safety may explain the effect of performance feedback within the team.

Moreover, psychological safety mediates several relationships between *leadership* and outcomes. Erkutlu and Chafra (2019) found employees' psychological safety to fully mediate the relationship between leader psychopathy and organizational deviance; because it is negatively related to both factors, psychological safety can buffer the positive effects of leader psychopathy on organizational deviance. Moreover, psychological safety mediated the relationship between inclusive leadership and innovative work behavior (Javed et al., 2019), inclusive leadership and reduced psychological distress (Ahmed et al., 2021), paradoxical leadership and promotive voice behavior (Xue et al., 2020), and identity leadership and athletes' satisfaction with team performance (Fransen et al., 2020).

In addition, psychological safety has been studied in relation to *agile* team methods. Peeters et al. (2022) found that agile ways of working led to increased team engagement and performance in a multinational bank context and that psychological safety partially mediated this relationship. Thus, psychological safety—as a potential outcome of agile ways of working—may help explain why this increasingly popular approach to work may lead to increased engagement within and improved performance by teams. Thorgren and Caiman (2019) explored psychological safety-related challenges in implementing agile methods across

workplace cultures and reported that implementation was particularly challenged in three areas: inclusiveness, collective responsibility, and openness in communication. Different expectations on these areas may cause agile implementation to take more time and effort. Thus, Thorgren and Caiman (2019) advise organizations to be particularly aware of these challenges to psychological safety for more successful implementation of agile methods. Cai et al. (2018) incorporated Kahn's (1990) conditions for personal engagement at work, psychological meaningfulness, psychological availability, and psychological safety, when studying the effect of using enterprise social media on agility performance in organizations. They found that psychological safety mediated the positive relationship between enterprise social media and employees' proactivity and adaptability.

On another timely topic—sustainable organizational practices—Iqbal et al. (2020) found psychological safety to mediate the relationship between sustainable leadership and sustainable performance of organizations in light of climate change. The authors found that sustainable leadership led to increased psychological safety in the organization and that the positive effects of sustainable leadership on sustainable performance worked through a psychologically safe environment, encouraging knowledge sharing and openness (Iqbal et al., 2020). Also emphasizing sustainability, Neukam and Bollinger (2022) found psychological safety to be a necessary ingredient for creative capacity within firms; more specifically, it is essential for creating solutions that meet today's sustainability requirements rather than a creativity that could lead to harmful solutions. Thus, in a psychologically safe climate, there is not only room for creativity, however, also room to discuss potential unwanted side effects of solutions vis-à-vis sustainability.

Lastly, another timely topic that has motivated studies on the mediating role of psychological safety is the COVID-19 pandemic. During the pandemic, H. Lee (2021) studied psychological safety in relation to organizational support and social comparison emotions.

Her findings support the view that during crisis management, employees' need for autonomy and flexibility is even higher than usual and that supervisors' management styles relate strongly to the psychological safety of employees. That is, based on social comparison emotional patterns, control and monitoring by the supervisor led to lower psychological safety among employees, whereas support and leading by example fostered higher psychological safety. In H. Lee's (2021) study, the use of online communication was seen as a specific form of organizational support through which the organization could communicate its care for its employees and not merely a channel for communication regarding tasks, which impacted psychological safety in the organization. In a related study, Kerrissey et al. (2022) found that psychological safety among emergency department staff led to less worsening burnout during the pandemic, along with greater process adaptation in the face of uncertainty. Moreover, feeling heard mediated these relationships. In light of the high rates of turnover in the hotel industry connected to the COVID-19 pandemic, Sobaih et al. (2022) studied the impact of transformational leadership and psychological safety on turnover intention. Transformational leadership had a significant negative impact on intention to leave and this relationship was mediated by psychological safety. Thus, the authors argue that psychological safety may have positive effects on turnover challenges, even if transformational leadership is not present.

The Dynamics of Psychological Safety

Despite the extensive nomological net on psychological safety that has grown so remarkably in recent years, there are still some areas where we lack sufficient knowledge. Meta-analyses and literature reviews by Edmondson and Lei (2014), Frazier et al. (2017), and Newman et al. (2017) point out several topics that can advance our understanding of psychological safety, two of which are the *temporal* dynamics of psychological safety and *within-team* dynamics; that is, psychological safety climate strength, of the degree of

consensus or dispersion in terms of psychological safety perceptions among the members of a team.

Psychological Safety Temporal Dynamics

In the most frequently cited paper on psychological safety, Edmondson (1999) acknowledges that her cross-sectional design limits the ability to explore dynamic issues of psychological safety: “how shared beliefs are created gradually in teams over time as a consequence of minor events and subtle interactions cannot be assessed in this study. [...] Given the inherently dynamic nature of learning, this snapshot approach provides an incomplete picture” (p. 379). Even though she then called for more research on how psychological safety develops over time, Edmondson and Lei (2014) still acknowledge our limited insights regarding “how psychological safety unfolds and builds, or lessens, or even is destroyed” (p. 38). More than 20 years after first call, there are to my knowledge still *no* papers aimed specifically at how psychological safety develops over time.¹² However, I have identified 10 empirical papers in which it is measured twice or more.¹³ Though these studies do not necessarily discuss how and why psychological safety develops, the existence of measurements at multiple time points could help us understand potential changes in psychological safety over time.

In five of the 10 studies, psychological safety appeared relatively stable over time. Studying psychological safety at the team level, Coutifaris and Grant (2022), H. H. Johnson and Avolio (2019), Mohan and Lee (2019), and Takai and Bittorf (2020) all made use of two measurement times over a somewhat similar time period (9–12 months or two academic

¹² While time is covered in the meta-analysis on psychological safety by Frazier et al. (2017), it is only considered as to *timing of measurement*—comparing correlations between psychological safety and other variables when measured at different time points compared to measuring them at the same time.

¹³ This number is based on the same procedure as in Paper 1 and its literature review on the temporal dynamics of team emergent states (see The Review Process section in Paper 1 for further details). In that review, four studies on team psychological safety are included. The additional six studies in this section were added for the following reasons: they were either published after the literature review (3) or examine psychological safety at the individual (2) or organizational level (1).

semesters). In these four studies, early psychological safety correlated with later psychological safety. Edmondson and Mogelof (2006) made use of daily surveys in innovation teams across various time periods (six weeks to 10 months) but collapsed scores into just three phases. In their study, the level of psychological safety also remained relatively stable. Still, psychological safety appeared to have a dynamic relationship with other variables in several of these studies. For example, goal clarity only predicted psychological safety in later project stages (Edmondson & Mogelof, 2006), feedback sharing only had an effect on psychological safety at the last measurement (Coutifaris & Grant, 2022), a reciprocal relationship between collective global leadership and psychological safety was only found at the later stages of team lifecycles (Mohan & Lee, 2019), and psychological safety only correlated with team performance in the first of two semesters (Takai & Bittorf, 2020). Thus, though psychological safety did not appear to be temporally dynamic based on level, these studies do reveal some of the dynamic nature of psychological safety through changes and variations in its relationship with other variables.

In four other studies, psychological safety appeared to be temporally dynamic based on its level changing over time. Interestingly, psychological safety developed differently in these studies. Ahmed et al. (2021) measured psychological safety among nurses in a hospital three times over three months during the pandemic and found that psychological safety *increased* as much as 34.8% over this period, which could be explained by a similar increase in the nurses' experience of inclusive leadership. Schulte et al. (2012) found psychological safety to *decrease* in national service teams based on three measurements over 10 months, while Dusenberry and Robinson (2020) found psychological safety to *fluctuate* based on three measurements over the course of a student semester. Notably, in the experiment by Dusenberry and Robinson (2020), psychological safety increased when the whole semester was considered, regardless of training intervention, but there was a drop in psychological

safety toward the end of the semester. Liang et al. (2012) reported that perceptions of psychological safety at the individual level collected just six weeks apart were only moderately correlated, indicating that psychological safety levels within individuals may change over time, even relatively short periods like several weeks.

In the last of the 10 identified papers where psychological safety was measured twice or more, Higgins et al. (2022) studied psychological safety as a collective organizational construct and suggested that psychological safety emerges from interactions over time. Using longitudinal data that span three years, the researchers found somewhat surprisingly that in terms of organizational performance, even relatively low levels of psychological safety in any given year were beneficial. Higgins et al. (2022) did not report how the levels of psychological safety evolved over these years.

Due to the relatively few longitudinal papers on psychological safety, the mixed findings in those papers that do exist, and a generally limited focus on psychological safety temporal dynamics—some of these papers do not even mention whether or not psychological safety has changed—there are thin empirical grounds on which to assess how psychological safety may develop over time. Thus, it is useful to look to other relevant literature, such as the dynamics of team emergent states.

Psychological Safety as a Team Emergent State

Edmondson (1999) introduced psychological safety as a team phenomenon after finding significant variations in psychological safety between teams. As a team phenomenon, team psychological safety is categorized as a *team emergent state* (Rapp et al., 2021): “properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes” (Marks et al., 2001, p. 357).

Team emergent states describe established norms and shared understandings; for example, cohesion indicates how committed team members are to the team (Goodman et al.,

1987), while team potency refers to a shared belief regarding the team's ability to be successful (Shea & Guzzo, 1987). While team emergent states tap into the attitudes and feelings of team members, *team processes* describe the interactions or behaviors within a team (Marks et al., 2001). This distinction is useful when investigating team emergent state dynamics, as those states can be both products of previous team processes and inputs to subsequent ones (Marks et al., 2001). In this cyclical pattern lies some of the dynamic understanding of this concept. However, the distinction between states and processes is not always clear. For example, Marks et al. (2001) use team conflict as an example of a team process, whereas Okhuysen and Richardson (2007) argue that it is a team emergent state. Both perspectives are understandable since conflict can describe a state-like situation and a process-like interaction. Other team constructs interchangeably referred to as emergent states and processes or something in between are team learning, shared or collective leadership, and behavioral integration. The different interpretations of these constructs may be one reason why several papers refer to fuzzier concepts like emergent phenomena, emergent constructs, and emergent properties.¹⁴

Moreover, team emergent states can be cognitive, motivational, or affective (Marks et al., 2001). A cognitive state “concerns members’ beliefs regarding a specific factor [while] the affective category concerns members’ feelings, attitudes, and emotions, and the motivational category concerns members’ intensity, direction, and regulation of effort toward task accomplishment” (Rapp et al., 2021, p. 4). However, the distinction between categories and which team emergent state belongs to which category are not always clear. For example,

¹⁴ Despite my fear of making things even more complicated, the reader may have noticed a potential paradox in the term *emergent state*. At least to me, *emergent* has dynamic associations, while *state* sounds like something static. If a state is dynamic, is it a state? If something is a state, can it be dynamic? I can understand that the field has not established a clear distinction between a process and a state. However, since my motivation is not focused on word choice or refuting this established concept but on studying the dynamic element of team emergent states as described in the definition by Marks et al. (2001), I have no problem accepting the term for this purpose.

some papers treat motivational and affective emergent states as a single category (G. Chen et al., 2005; DeChurch & Mesmer-Magnus, 2010). In their taxonomy of team emergent states, Rapp et al. (2021) introduced “amalgams,” which are combinations of cognitive–affective and cognitive–motivational, thus opening the way to a somewhat different categorization. For example, different variants of team trust were categorized as cognitive, affective, and cognitive–affective states. Furthermore, commonly studied team emergent states, such as cohesion and shared mental models, are referred to as *psychosocial traits* by Cohen and Bailey (1997). However, Marks et al. (2001) consider them to be team emergent states based on their dynamic nature, since they can “vary frequently, even in fairly short periods of time” (p. 358), whereas traits are considered to be more enduring characteristics. Hence, the dynamic nature of these constructs is one reason for the introduction of the term *emergent state* from the beginning. Still, and despite later work on team emergent states referring heavily to the definition by Marks et al. (2001), a small amount of research considers the dynamic nature of these states (Coultas et al., 2014; Waller et al., 2016). That is where our literature review comes in.

Thus—returning to team psychological safety as a team emergent state categorized as a dynamic phenomenon by its nature—it is somewhat surprising that very few papers study team psychological safety through a dynamic lens. The reliance on cross-sectional research designs has not abated since Edmondson (1999) warned about how it limits our understanding of psychological safety dynamics (Edmondson & Lei, 2014). Notably, this dominance of cross-sectional designs is not unique to psychological safety. Our understanding of the emergence and changes associated with team phenomena is limited by restrictive and static research methods that do not take the dynamic nature of teams into account (Kozlowski, 2015; Kozlowski & Chao, 2012). Temporal dynamics in teams—fluctuations and the implications of time—are under-researched in general (Lehmann-Willenbrock, 2017).

According to Kozlowski and Bell (2013), temporality is one of the most neglected and critical issues in team research. As Cronin et al. (2011) note, “we know that groups are dynamic entities, and yet we rarely study them as such” (p. 571). Though Coultas et al. (2014) find an increase in the amount of longitudinal research on team emergent states, the evolution of that emergent state is seldom the area of interest; rather, the attention is on whether a given emergent state at one time influences another variable at another time. Hence, these designs do not examine the temporal dynamics of the emergent state itself (Coultas et al., 2014). Accordingly, Waller et al. (2016) refer to an active conversation in the field that expresses deep dissatisfaction with current approaches to the study of groups and teams and challenges static studies of team dynamics. Several scholars have called for more emphasis on team development over time (e.g., Bradley et al., 2013; Lehmann-Willenbrock, 2017; Mathieu et al., 2015).

The, at least to some extent, ignored *emergent* element of team emergent states actualizes Paper 1. Through a comprehensive and integrative review of all team emergent states that have been studied dynamically to date, we aim to identify (Research Question 1):

What can be learned from research that examines team emergent states over time?

Moreover, studying team emergent states like team psychological safety through a dynamic lens may increase our overall understanding of the phenomenon. With the limited research on the temporal dynamics of team psychological safety—and the absence of studies that deeply explore the dynamic nature of psychological safety—we know little of how psychological safety emerges and develops in teams over time. Moreover, according to Edmondson and Lei (2014), psychological safety does not emerge naturally. Thus, considering the dynamical relationships between psychological safety and other variables discussed above, we cannot simply assume that the nomological net described in this dissertation will hold over time. This opens the way for an exploration of what characterizes

those teams that experience an increase in psychological safety over time and those that do not. Hence, this necessitates a more thorough investigation of how psychological safety in teams emerges and develops over time, with due consideration of how teams actually make use of this time. In Paper 2, I explore (Research Question 2):

How does team psychological safety emerge and develop over time, and how can we understand these temporal dynamics through the practices of the team?

Within-Team Dynamics

Shared Perceptions of Team Phenomena

According to Edmondson (2004), perceptions of psychological safety tend to be similar among team members subject to similar experiences and contextual influences. The central characteristic of a group-level phenomenon is *sharedness* (Chan, 1998). Team members' perceptions of the environment can gradually resemble one another and lead to a "group mind," a mental state based on individual expectations and beliefs that is more than just the sum of these individual properties (Klimoski & Mohammed, 1994). Not only do team members share perceptions to some extent, but this collective property influences the actions and behavior of team members (Kozlowski & Klein, 2000). According to Hackman (1993), teams can act as "self-correcting performance units" in organizations. Still, the team itself does not behave; however, its members can coordinate and influence one another so they perform as a "seamless whole" as a team (Edmondson, 2004).

The degree that team members share perceptions has been widely addressed, though it is normally approached indirectly from a methodological perspective. The reason is how team-level data are commonly collected and measured: through individual-level data from team members, such as individual answers on a scale of items. To justify aggregating such data to the team level, a certain part of the variability must reside at that level and be explained by team membership (Woehr et al., 2015). Common indices for demonstrating

agreement and consistency among team members are *r_{wg}* and intra-class coefficients (ICCs; Chan, 1998; Woehr et al., 2015). When some preset criteria for aggregation are met, researchers aggregate these data to the team level. Taking the mean of individual perceptions and aggregating them to the group level is the dominant method when analyzing team constructs (N. T. Carter et al., 2018) and describing a team climate; that is, “individuals’ shared perceptions about various aspects of the organization (e.g., safety, justice, diversity)” (Perrigino et al., 2021, p. 151).

However, several studies have found that perceptions within teams are not necessarily shared (e.g., Costa et al., 2016; De Jong & Dirks, 2012; Jung & Sosik, 2003). This has methodological implications, since averaging individual scores to a team-level mean when there is a lack of sharedness can represent poor construct validity (Woehr et al., 2015). Moreover, a lack of sharedness within teams has theoretical implications. In their framework for different ways team-level phenomena can emerge, Kozlowski and Klein (2000) present various models on a continuum, ranging from shared perceptions with no or little dispersion among team members on one end (composition model) to a highly dispersed distribution of perceptions on the other (compilation model). In practice, a team-level phenomenon will normally emerge through a combination of these extremes (Kozlowski & Klein, 2000). Studying within-team dispersion could provide important insights into team dynamics and divergent perceptions between team members, providing us with a more complete understanding of the team phenomenon of interest (Waller et al., 2016).

Shared Perceptions of Team Psychological Safety

Most studies on team psychological safety make use of composition models, taking the average of team members’ perceptions—and thus overlooking potential individual differences. Still, studies where there have been within-team differences in team psychological safety perceptions suggest that there is more involved than simply averaging

individual perceptions into a higher-level team construct. Schulte et al. (2012) found that team members tended to shift their perceptions of psychological safety over the course of the team's life span and showed how teams with the same mean levels of psychological safety had very different network structures and emergence of psychological safety. Edmondson and Mogelof (2006) explored whether psychological safety characterized the individual (shaped by personality), the group (shaped by interpersonal experience), or the organization (shaped by corporate culture). In this longitudinal study, psychological safety varied across teams at the beginning and end of the project. However, at the project midpoint this safety was unexpectedly not significantly different across teams. Furthermore, both organizational and individual differences played a role in the experience of psychological safety. Despite inconsistent support, Edmondson and Mogelof (2006) concluded that group-level influences still dominated.

Research like this, which indicate that there is more to the matter than simply considering psychological safety as a team phenomenon, has led to an interest in studying the within-team dynamics of team psychological safety. In their review, Waller et al. (2016) challenge the common assumption of homogeneity among team members' perceptions for team emergent states in general and for team psychological safety in particular, since the construct per definition is operationalized as "a shared belief" (Edmondson, 1999). Newman et al. (2017) find it surprising that there is such a notable lack of work on *psychological safety strength* (i.e., the degree of consensus among individuals' perceptions)¹⁵ and call for studies on the predictors, outcomes, and potential moderating effects of psychological safety strength.

The Moderating Effect of Team Psychological Safety Climate Strength

It is in the nature of team psychological safety that it is beneficial for the team that team members perceive enough safety to share their ideas, concerns, and questions

¹⁵ See Paper 3 for further elaboration on team psychological safety climate strength as a conceptual approach to within-team dispersion.

(Edmondson, 1999). If such safety is shared (i.e., there is a strong climate), more of the team's potential can be exploited through a balanced contribution of all team members. On the contrary, if only a few team members experience this safety, it is not difficult to imagine a more unbalanced exchange of information and contribution among team members. According to Hackman (2002), inappropriate weighting of member contributions is a cause of process loss and thus negative for team performance. Following such logic, one could assume that team psychological safety climate strength had a unique positive effect on team performance. Still, that would indicate that a team in which the members agree that there is low team psychological safety would perform better than a team in which team members disagree on the level of team psychological safety simply because the team low on team psychological safety shared the perception of this being an unsafe team. There is no empirical support for such an assumption. Rather, the impact of climate strength is likely to depend on the level of the climate through an interaction effect (Lindell & Brandt, 2000).

Two empirical papers have studied psychological safety climate strength; both used climate strength as a moderator. Koopmann et al. (2016) found that team psychological safety climate strength moderated the relationship between team psychological safety and average team member task performance, but not the relationship between team psychological safety and average team member creative performance. Studying hospital units, Hira et al. (2012) included unit psychological safety climate strength in their supplementary analyses and found that in units with a stronger psychological safety climate, the psychological safety level was more positively related to learning from failure and contributed positively to unit performance.

With few empirical studies on psychological safety climate strength, I allow myself to turn to the literature on related team emergent state—team trust—to learn more about how climate strength may affect team outcomes. Team trust climate strength has shown different

impacts on team performance. Buvik and Tvedt (2016) found no moderating effect of team trust climate strength on the relationship between team trust and team performance in cross-functional project teams. However, De Jong and Dirks (2012) did find an asymmetry in team trust to moderate the relationship between mean intrateam trust and team performance.

Despite the increased interest in the sharedness of perceptions of team phenomena in general (Perrigino et al., 2021) and the call from Newman et al. (2017) for studies on psychological safety strength, we still know little about the impact of shared perceptions of psychological safety on team outcomes. In Paper 3, we choose the context of management teams and study (Research Question 3):

To what extent does team psychological safety climate strength moderate the relationship between team psychological safety and team performance?

Summary of Theoretical Background

In this section, I have presented the literature on psychological safety from its foundational period to the most recent advances in the field. Moreover, I have outlined the key literature on two aspects of team psychological safety—the temporal dynamics of team psychological safety and the sharedness of team psychological safety perceptions—and through that positioned the three papers in this dissertation. Psychological safety is commonly treated as a static phenomenon and a shared belief within a team. These assumptions may not always be descriptive or valid, as shown by a review of the literature. Considering the importance that team psychological safety has for team performance and our insufficient knowledge of the dynamic nature of team psychological safety—both over time and within teams—this dissertation offers a dynamic perspective on team psychological safety.

Methodology

Having mapped the research field and positioned my dissertation through gaps in the literature, I now move on to how I have worked to help fill those gaps. In this section, I reflect

on my ontological and epistemological assumptions, which shaped my approach to the research questions, and how that approach relates to my methodological assumptions and choices.

Philosophy of Science

Some Personal Reflections to Start Out With

In the context of research, a paradigm is defined as “the basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways” (Guba & Lincoln, 1994, p. 105). My mother taught me to be honest, and honest I shall be. At the beginning of my PhD journey, terms like *research paradigms*, *ontology*, and *epistemology* were confusing, even discouraging. I did not really understand them, and I did not really understand why I should bother understanding them. Could I not simply follow my curiosity and conduct my research in the way I thought most appropriate to satisfy that curiosity? It did not become more motivating when I met attitudes like “if you belong to this paradigm (e.g., being a positivist), you have to do like this...” I did not feel that I belonged to either the positivists or social constructionists or any other “camp” out there and considered the whole philosophy of science discussion rather provocative.

It would look nice if I presented a pretty overview on how my ontological, epistemological, and methodological assumptions fit my methodological choices from the very beginning. However, that would not be true. I have collected large amounts of data that I ended up not using, at least for the papers in this dissertation, not because they are not interesting and worth pursuing, but because I genuinely did not know where I wanted to go with the data before I started out. Thus, I ended up with data that were ill-suited to answer the research questions I set out to investigate. Taking a grounded reflection around my ontological and epistemological assumptions at an earlier stage in my PhD would have been beneficial because they did not always drive my methodological choices. Thus, my PhD

journey into psychological safety dynamics has also been a journey in trying and failing. Nevertheless, these valuable experiences have led to substantive reflections and learning and a feeling along the way of identification with philosophy of science after all. I now understand more of my philosophical stance—how it has shaped my research and how it has been shaped by doing research.

A Philosophical Journey

Ontology concerns one's view on the nature of reality (Guba & Lincoln, 1994). From the “pure” realist who holds that there is one true reality that is possible to identify to the “pure” relativist who holds that there are multiple realities that individuals perceive differently, I find myself somewhere in between. However, when I started my PhD to answer the question of what teams need to do to build psychological safety, I approached the task with realism. I believed I could find some general explanatory mechanisms that led to psychological safety. In searching for such an answer, I found that psychological safety in teams fluctuated over time. Again, I focused on which mechanisms could explain these changes. With little explanation to be found in existing research, I turned to literature on other team emergent states to find possible explanations that could be relevant for psychological safety fluctuations. Behind this was a realistic assumption that there is a truth out there, and I wanted to find it.

However, along this journey, I started questioning my assumptions. If I could not find consistent patterns of psychological safety development, perhaps that was because there is no true reality on psychological safety developing, whether this or that. Moreover, as I saw that individuals on the same team could perceive this safety very differently and that the existing research to a large extent neglected these dynamics—through cross-sectional snapshots and overlooking individual differences by considering team psychological safety only as the mean of all team members—a *critical realist* began to grow inside me. While critical realism

acknowledges that there is a reality, it also holds that our understanding of this reality will always be limited (Fleetwood, 2005). This is due to reality being multi-layered (Denzin & Lincoln, 2018). Fletcher (2017) describes the layers with an iceberg metaphor: there is a *real* level acknowledging that there are causal mechanisms and an *actual* level acknowledging that these causal mechanisms lead to events, whether we can observe them or not. However, both these layers are below the surface. What we are able to observe is the *empirical* level—the tip of the iceberg—where events are understood through our interpretation (Fletcher, 2017). Thus, there is an inherent limitation as to what we as researchers can discover, and we discover it through our own eyes and through the choices we make in areas like research designs. This necessitates a critical examination of how our ability to see through these layers of reality may limit our understanding of a phenomenon (Denzin & Lincoln, 2018). From my perspective, our understanding of psychological safety was limited due to static-driven and aggregation-based methodologies. To contribute to our conceptual understanding, I sought to contribute to the literature by taking this empiricism into account (MacInnis, 2011), thus questioning the degree of stability and sharedness of team psychological safety.

However, my philosophical journey was not over. Our ontological assumptions should drive our *epistemological* assumptions: “What is the nature of the relationship between the knower or would-be knower and what can be known?” (Guba & Lincoln, 1994, p. 108). Thus, if one believes that there is a reality that is possible to identify, a belief in objectivity necessarily follows: that the researcher and data sources are interdependent of one another and replicated findings are proofs of the “real” truth. However, if our findings are created in the interaction between the researcher and the data sources, reality is indeed subjective to some extent. Two specific aspects made me reflect upon this. The first concerns the concept of psychological safety itself. Psychological safety originates from perceptions of a work environment (cf. the definition by Edmondson [1999]), and Edmondson (2004) argues that

perceptions of psychological safety tend to be similar among individuals who are subject to similar experiences and contextual influences. Thus, team psychological safety is an element of a team climate (Perrigino et al., 2021; Rapp et al., 2021). However, as Perrigino et al. (2021) conclude after reviewing the literature on team climates: “If we see, will we agree? Not necessarily” (p. 174). Hence, the strengths as measured by the degree of shared perceptions among individuals of these climates may vary. This is something I discovered early on in my own empirical data. Thus, even though we are subject to similar experiences and influences, our perceptions of psychological safety may differ considerably. Without attempting to dismiss the notion of psychological safety as essentially a group-level phenomenon (Edmondson & Lei, 2014)—because there is indeed a large degree of within-group agreement justifying such a notion—I do seek to demonstrate that psychological safety is more than that. It is also a result of our individual, *subjective* perceptions of our surroundings that are essentially constructed in the interaction between two or more individuals.

The second aspect that made me reflect further upon my epistemological stance was when a participant told me that being measured on psychological safety made him more aware of how he affected the psychological safety in his team. Since I measured these teams daily (see Paper 2 for details), I was apparently contributing to my subjects’ experience of psychological safety to some extent. This made me more aware of the effect of my role as a researcher in collecting and later interpreting these data. I was not an objective figure independent of the data sources; rather, I was also a subject interacting in the process of knowledge creation. Moreover, I felt motivated to explore these dynamics and try to understand the experiences of the individuals holding these different perceptions. Both these experiences led me to consider if my views fit better with a *social constructivist* paradigm. Social constructivists argue that perceptions arise through social interactions between

individuals (Hacking & Hacking, 1999). This social interplay shapes the work environment, and perceptions of the work environment in turn shape the social interplay (Nienaber et al., 2015). Thus, if psychological safety is constructed in the interactions between two or more individuals, it appears natural to approach the topic from a social constructivist perspective.

However, our need for psychological safety resides deep within our nature as human beings (C. R. Rogers, 1961). Though there are not likely any strict natural laws on how psychological safety comes about and what its outcomes will always be, I believe that there are certain elements that are generalizable to most human beings. Indeed, H. W. Lee et al. (2018) see psychological safety through an evolutionary perspective; more specifically, our evolving ability to perceive and make sense of risks in the environment. Thus, in order to understand the relationship between status conflict and psychological safety, H. W. Lee et al. (2018) emphasize our inherent ability to interpret hostility from others (i.e., high status conflict) and the negative impact that may have on psychological safety perceptions. Still, individuals will perceive potential threats differently: some will run and climb a tree when meeting a Norwegian moose, while others will stay put and watch with interest. In a similar way, the interpersonal risk in a team meeting can be perceived differently, even though the stimuli may be similar. Thus, there is an element of relativism: the world is how I interpret it. As the nearly century-old Thomas theorem suggests: "It is not important whether or not the interpretation is correct—if men define situations as real, they are real in their consequences" (Thomas & Thomas, 1928, p. 572). Thus, in extreme cases, people can make things up and treat them as if they were real. Nevertheless, the fact that human minds sense fear is not simply made up in those minds. There is an actual risk of my actions having negative consequences for me—in both the forest and the board room—and our minds have been shaped by evolution to sense those possible outcomes and choose how to behave accordingly. Thus, H. W. Lee et al. (2018) suggest psychological safety as an important mediator from an

evolutionary perspective in general and as mediating the relationship between status conflict and team creativity more specifically. As shown in the Theoretical Background section, studies on psychological safety as a mediator are abundant. We sense something that affects our psychological safety that shapes our behavior. Through that process, to me, there are elements of one true reality *and* of multiple realities.

Pragmatism

In looking back at this journey of educational experiences and philosophical reflections, then, I have still not categorically rejected any of these ontological or epistemological stances. I have identified myself with several paradigms and seen their value. Though realist and relativist ontologies may seem contradictory, I do not necessarily see them that way. Rather, they can complement each other. With such a pluralistic view, I have concluded that I belong within a *pragmatic* paradigm. Defining pragmatism is not straightforward, as it covers numerous traditions (Haack, 2004). Its history as a philosophical movement goes back to Charles Peirce in the 1870s (Haack, 2004), if not the ancient Greek philosophers discussing whether there were universal, relative, or multiple truths (R. B. Johnson et al., 2007). My ambition is not to contrast the different views of pragmatic thinkers throughout history—that would be a dissertation or two in itself—but instead to emphasize below certain key aspects of this research paradigm with which I identify myself with and reflect on how it has shaped my stance as a researcher.

Within a pragmatic paradigm, “truth is what works at the time. It is not based in a duality between reality independent of the mind or within the mind” (Creswell, 2014, p. 11). On the contrary, *pluralism* is key to understanding pragmatism (Koopman, 2006), as “pragmatism cuts across this transcendental/empirical distinction by questioning the common presupposition that there is an invidious distinction to be drawn between kinds of truths” (Rorty, 1982, p. 4). Pragmatists acknowledge both that there is a reality that can be

objectively tested and that there is a subjective reality created in social or other contexts (Creswell, 2014; Holmwood, 2011; Koopman, 2006). In other words, there is a real world, but we may still interpret it differently (Morgan, 2007). Moreover, building on this pluralism with no transcendental truths (Ray, 2004) is an emphasis on *humanism*, which involves the belief that instead of our being passive receivers of some kind of truth, we are active inquirers (Haack, 2004). Thus, “truth” is shaped by our active contributions to it (Koopman, 2006). Indeed, “the truth of an idea is not a stagnant property inherent in it. Truth happens to an idea. It becomes true, is made true by events” (James, 1907, p. 142). Hence, pragmatism represents a humanization of science (Holmwood, 2011) and is concerned with “actions, situations, and consequences rather than antecedent conditions” (Creswell, 2014, p. 10).

Moreover, a key element of pragmatism is that reality involves the notion of a *community* (Ray, 2004). According to Rorty (1980), pragmatism is about accepting that there are certain universal contingencies and thus that not everything is up to the subjective mind, with the most important contingency to accept is that “our fellow-humans as our only source of guidance” (p. 726). The discussion above about team psychological safety is to me a good example of this community of pluralism and humanism. A team is a type of community that most of us have experienced through work, school, sports, or other settings. As demonstrated above, psychological safety is commonly studied within teams as it can be representative of the work environment in a specific team and differ from the work environment in another team within the same organization (Edmondson, 2004). The truth about this team psychological safety is created in the interactions between the team members, which are based on their experiences. The reaction of one team member when another team member comes up with a suggestion or comment will likely shape perceptions of the team’s psychological safety. Thus, an outsider cannot rightfully claim that “no, your team is safer than you say it is.” The truth is created and resides among the members of that specific community. Still,

there is room for different perceptions of psychological safety between members within a given team. Though you and I experience the same stimuli, we may interpret them differently (Perrigino et al., 2021). Thus, there is a potential pluralism when it comes to team psychological safety perceptions.

Following the notion of our interpretive perceptions within a community as a basis for creating reality, a pragmatist considers these perceptions to be fallible (Haack, 2004). For example, a team member may perceive a lack of team psychological safety after coming up with a suggestion due to the interpretation of another team member's body language and seeming lack of interest. Still, that body language may represent something else from the sender's point of view; he sat back in his chair because he found the suggestion interesting indeed and wanted to reflect on it before offering a spoken response. Hence, things are not necessarily the way they seem to be. That is determinative of a pragmatist's approach to beliefs—others' as well as one's own (Koopman, 2006). A pragmatic scientific attitude involves being willing and able to question one's beliefs when experience is against them (Peirce, 1905). Even instinctive beliefs and “common sense” should be subject to criticism (Haack, 2004).

As a researcher, I value the concept of fallibility. My inherently fallible nature as a human being means that I will make mistakes and that I may be wrong. As uncomfortable as that may be, I should always be open to being questioned. Accordingly, I see it as my duty as a researcher to question others. After reading that psychological safety typically characterizes a team as a unit rather than as attributes of that team's individuals (Edmondson, 2012) but saw in my empirical data that psychological safety could differ substantially between members of the same team, I sought to challenge the proposition that psychological safety was a group-level phenomenon. I did not believe it was wrong, since things are not necessarily black or white, but I thought it deserved to be challenged. According to Popper (1968), science does

not proceed by looking at confirming instances of an assumption. Instead of seeking confirmation, Popper (1968) claims that researchers should value *falsification*. Personally, I was motivated from both the methodological perspective—that the mean level was not sufficiently representative of a team’s diverse psychological safety perceptions—and the practical perspective: that there were people in seemingly safe teams, when considered at the mean level, who did not perceive it safe to express themselves and that this had implications for both their well-being and team performance. Although the notion of psychological safety primarily being a group-level phenomenon survived my falsification procedure, I believe that by attempting to revise this proposition (MacInnis, 2011), I contribute to the understanding of psychological safety as *more* than just a group-level phenomenon.

With this pluralistic and fallible scientific attitude and a “genuine desire to find out how things are” (Haack, 2004, p. 6), a pragmatic researcher is driven by anticipated consequences and is open to using “whatever works” when it comes to methods (Cherryholmes, 1992). I have been driven by my curiosity and tried to let my research questions govern my methods, not the other way around, and tried to combine the strengths of different methods. However, and this turns to criticism of the pragmatic worldview, it sounds too easy to simply include the best of both worlds—positivistic as constructionist—and consider every perspective and worldview in my research like Winnie the Pooh: “Yes please, both!”¹⁶ There are indeed limitations to this research paradigm as with any other. One of the founders of pragmatic philosophy, Charles Peirce, stated that “there is no doubt, then that pragmatism opens a very easy road to the solution of an immense variety of questions. But it does not follow from that that it is true” (Peirce, 1997, CP 5.26).

¹⁶ A Norwegian-speaking reader would probably know this term well. However, I am a bit reluctant to use this allusion since it is a citation taken out of its context, changed through translation, and not descriptive of what A. A. Milne originally wrote. When asked about “Honey or condensed milk with your bread?”, Winnie the Pooh answered: ““Both”, and then, so as not to seem greedy, he added, “but don’t bother about the bread, please.”” However, with apologies to Milne for continuing to use this somewhat greedier Norwegian translation, it serves the point well.

Pragmatism has been criticized for being “a vague, ambiguous, and overworked word” (Rorty, 1980, p. 719), and its followers may seem like “fuzzy-minded” researchers straddling a positivism seeking causal explanations on the one hand and the position that there is no objective truth on the other (Rorty, 1982). Thus, pragmatic philosophy is regarded by some as an anti-philosophy (Rorty, 1982). However, others would strongly object to that. According to Peirce (1905), pragmatism does not attempt to wash away the discussion of what is and is not true. On the contrary, and somewhat in parallel with a constructionist stance, a pragmatist acknowledges that what is believed to be true by a person is indeed the truth for that person.

Nevertheless, when I try to combine the strengths of different methods and perspectives, I need to be aware that I may lose out on these same strengths: some of the objectivity that a positivist can claim through rigorous testing and some of the subjectivity that a constructionist can reveal through open exploration. Moreover, there are practical issues with trying to do everything: it takes time and becomes more complex than my limited cognitive capacity can comprehend. Furthermore, when the emphasis is on consequences and an approach that holds that the ends justify the means, I need to acknowledge that my findings are also consequences of my actions. Thus, the “truth” depends on the method, and one can always question whether things would have looked differently if one used a different method.

A related criticism to pragmatism is that the constant questioning of reality ends up with unmotivated criticism of settled beliefs (Holmwood, 2011). Personally, I find it challenging to cooperate with others who criticize seemingly just to criticize. To me, that tends to negativity. However, I believe that *motivated* criticism that is undertaken for a greater purpose than showing off or making someone else feel stupid leads to learning and useful knowledge building. According to Koopman (2006), “at the heart of pragmatism is thus a resolute hopefulness in the abilities of human effort to create better future realities” (p. 109).

As long as our motivation to question—others as well as ourselves—is driven by a higher purpose, such as the quest for truth, we can make better use of our critical abilities.

Furthermore, our criticism as pragmatics should be founded in practical problems (Holmwood, 2011). For fear of losing the reader in my attempt to find myself here, I think it is time to round off my reflection on this matter for now. Pragmatism describes my approach to most challenges in life, and the practical relevance of my research has been essential to me. If people cannot understand what I am working on, it is not because they are stupid; it is because I have failed in my self-defined mission to communicate it in an understandable way. I guess it comes down to always asking myself the “so what?” question and creating a psychologically safe space within the research community where we can ask each other that question in a well-intentioned way.

Methodological Assumptions

Our *methodological* assumptions should follow and be consistent with our ontological and epistemological assumptions (Guba & Lincoln, 1994). According to Morgan (2007), a pragmatic approach emphasizes three methodological aspects: abduction, intersubjectivity, and transferability. These three aspects are aligned with my view and how I have worked to build my research designs, carried out data collection, and undertaken data analysis.

Abduction, though defined in different ways, can be understood as a combination of induction and deduction in which one builds on theory not necessarily to test hypotheses but as a source of inspiration and interpretation of data (Alvesson & Sköldbberg, 2017). I have worked iteratively, moving back and forth between data and theory, both within single studies and for the larger PhD project. As I detail below, this iterative approach had a specific impact on my methods. In Paper 2, I went from thinking that team psychological safety is studied at the aggregate level to dig deeper because of the different perceptions that surfaced. In Paper 3, I asked “so what?” and connected my findings to the research field of team climate strength. I

do believe in the importance of questioning our own and others' stances, exploring whether there could be more to the matter than what current research indicates, and then trying out the theories we develop.

Intersubjectivity in pragmatic work relates to the assumption that the dichotomy between subjectivity and objectivity is artificial (Morgan, 2007). As a researcher, I must attempt to approach a research question from an objective standpoint, focusing on something other than simply confirming my own assumptions. At the same time, I should acknowledge that as a researcher I am a central part of the research process and that there is no such thing as pure objectivity when human beings are involved. We see the world through our own eyes, and even though you and I may see the same object, we may still interpret it differently.

Concerning *transferability*; there is always an issue of the degree to which findings from one case or specific context can be transferred to another (Creswell, 2014). Dualism is again key to the pragmatic researcher in this regard (Morgan, 2007). I believe it is important to question the extent to which my findings are context specific, consider how they would look in another setting under different circumstances, and be honest about a potential lack of transferability. Still, research becomes uninteresting if we do not seek any generalizability. I believe there is a time to curiously dive in with the aim of exploring a given set of circumstances, a time to reflect on the impact of those circumstances on the findings, and a time to test whether those findings hold under different circumstances.

Since pragmatism seeks to consider multiple perspectives and worldviews, it also opens up different methods (R. B. Johnson et al., 2007). Thus, pragmatism is the primary philosophical framework in mixed methods research (Creswell, 2014; R. B. Johnson et al., 2007; Morgan, 2007). Not surprisingly then, I have made use of different methods in my work on this dissertation. Now that I have presented my ontological, epistemological, and

methodological assumptions, I continue with how these assumptions led to my methodological *choices*.

Methodological Choices

The dissertation consists of three papers that employ different methods: a literature review in Paper 1, a combination of quantitative and qualitative methods through a convergent parallel design in Paper 2, and a quantitative moderation analysis in Paper 3. Before going into more detail on each paper, I emphasize that all three papers share the context of teams. Cohen and Bailey (1997) define a team as follows:

A collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems [...] and who manage their relationships across organizational boundaries. (p. 241)

Interdependence and a common purpose are what distinguishes a team from a group (Wageman et al., 2012). I chose teams as the context for studying psychological safety for two main reasons. Most importantly, my PhD journey started from a curiosity that grew inside of me through many years of experience working in teams in the military: what could explain why some teams performed better and were more motivating to be in than others, and what could explain that I, despite having the same personality, could behave differently from one team to the next? Second, much of the work carried out in today's organizations is conducted in teams (Benishek & Lazzara, 2019). How well these teams function has important implications on the individual, team, and organizational levels (Mathieu et al., 2008; Salas et al., 2020).

Paper 1

The first paper in this dissertation is the literature review "Taking the Emergent in Team Emergent States Seriously: A Review and Preview," coauthored by Vidar Schei and

Therese E. Sverdrup. The aim of this literature review was to identify what could be learned from the research that examines team emergent states over time. Thus, we included papers where the team emergent state of interest was measured more than once. Moreover, we chose to include qualitative papers that otherwise might be excluded because they did not meet the inclusion criteria of more than one measurement. Though ontological and epistemological stances are rarely explicitly discussed in the papers, one can to some extent interpret them through the qualitative and explorative methodology they employ. As such, they provide important aspects when it comes to the temporal dynamics of team emergent states. From my point of view, drawing on various approaches and research building on different assumptions is important for advancing the field of team temporal dynamics. Thus, it was motivating to both obtain a complete picture of the breadth of the research conducted in this field and to provide the field with the first literature review summarizing these papers. In that spirit, the literature review not only contains analyses across papers but also a comprehensive overview with details on methods and findings for all 115 included papers so that future researchers could get the most out of the work behind the literature review (see Appendices 1–5 in Paper 1).

Furthermore, we analyzed the papers on temporal dynamics of team emergent states in five categories: team cohesion, team trust, team cognition, team confidence, and other team emergent states (i.e., those that had relatively few longitudinal papers). For each category, we conducted descriptive analyses of *how* the team emergent state changed over time, *why* the team emergent states did or did not change, and *what* the consequences of changes in the team emergent state were. Moreover, we analyzed across categories, searching for commonalities on team emergent states temporal dynamics in general. This approach—looking for common patterns across papers, what could explain them, and what their outcomes were—builds on a

somewhat positivistic stance: that there is some more or less objective truth out there, and by combining all the papers on this topic, we could get closer to that truth.

In the literature review, we show through figures and tables what these “objective” data can tell us when combining all 115 papers. While we did not identify a universal pattern in how team emergent states change over time, we can offer the field the lessons we learned during this work. That team emergent states showed no universal pattern when combining knowledge from all these papers raises the question of whether we expected there to be such a pattern? I am well aware that I now mix methods and findings in a methodology section, but perhaps the truth about how team emergent states change over time is that there is no one “truth.” For a positivist, it could seem like a waste of time to spending years on a literature review if that is the outcome. For a pragmatist, however, that may make it even more interesting because it shows the fascinating complexity of these dynamics. Temporal dynamics in teams are not mathematics—they are results of human interactions.

Moreover, through our analyses in this review, we shed light on the role of research designs in terms of how the number of measurement times, study period lengths, and intervals between measurements relate to the findings. The recognition of our role and choices as researchers in what we find is important to communicate, and through this mapping of the field, we hope to have contributed to future research designs, regardless of epistemological stance. Furthermore, since we show that temporal dynamics has been under-researched and that our knowledge on the matter is relatively limited for the various team emergent states, we now have empirical grounds to suggest more inductive approaches in the future. Our identification and inclusion of qualitative papers were important in this regard; though we did not find many (nine qualitative and 12 mixed methods papers), we were able to draw out key areas for future research and exemplify how they could be studied through qualitative methods that differ from the quantitative methods most frequently used. Of course, we also

benefited, as we hope readers of the review will, from the many interesting findings in these 21 papers, along with the rest of the research we examined.

Paper 2

In the second paper, “The Emergence and Development of Team Psychological Safety: A Team Practice Lens,” I study how team psychological safety emerges and develops over time and explore how these temporal dynamics relate to team practices. In that paper, I define *team practices* as “activities within a team that shape and are shaped by team member behavior and characterize how team members interact.” My focus on team practices accords with my stance as a pragmatic researcher by emphasizing the differences we humans can make (Koopman, 2006) and highlighting actions rather than antecedent conditions (Creswell, 2014). Though we know a lot about the antecedents to psychological safety (as covered in the Theoretical Background section), they generally involve static mechanisms like team structures and work design characteristics and are rarely studied through a dynamic lens. Thus, while I do not challenge the importance of these antecedents, I do make the methodological choice based on my ontological and epistemological beliefs to focus on what team members actually *do*.¹⁷ Theoretically, I build this approach on climate emergence theory and how interactions between team members may shape the climate of a team (Schneiders & Reichers, 1983).

When studying team psychological safety through a dynamic lens, I consider several aspects to be important. First, we should follow teams from the point at which they are

¹⁷ Though the term *team practices* is commonly used (e.g., Baiden et al., 2006; Dietze & Kahrens, 2022; Gibbs et al., 2021; Lynn et al., 1999; Scott-Young & Samson, 2009), I have not found a clear definition of it. Other terms could also describe what team members do that shapes their climate, such as *team activities* or *teamwork processes* (Marks et al., 2001). However, to me, the term *team activities* has the right associations with specifically arranged activities (e.g., teambuilding activities), while *processes* connotes a deductive Input-Process-Output model, neither of which I intend to study in the current paper. Still, I note that Huetterman et al. (2017) use the term *processes* when inductively exploring the development of team identification. From my point of view, *team practices* is the best term for the purposes of this thesis. In the paper, I elaborate on why team practices are important to study (building on climate emergence theory), how the practice term is used in other fields (e.g., strategy-as-practice), and propose a definition of the term.

established, because team psychological safety—or its absence—becomes a factor as soon as there is a team. The literature on team development describes how teams can evolve over time in various ways: experiencing particular shifts (e.g., Gersick, 1988), going through certain phases (e.g., Tuckman, 1965), or developing more dynamically (e.g., McGrath, 1991). Common to most theories on team development is that what happens in the early phases can set the stage for the later one (Mathieu & Rapp, 2009). Thus, in Paper 2, I emphasized studying teams where I could follow them from the beginning.

Second, we need to consider the different contexts that teams face. For example, some teams have more time to build team psychological safety than others. Thus, in Paper 2, I conduct two studies, each in a different context and with different time horizons: short-term project teams (11 days) in a humanitarian aid organization and long-term interdisciplinary project teams in a public administration (nine months). The *common* features in both contexts were a project setting with a joint responsibility for delivering a result within a certain time frame and that the teams were followed from the point at which they were established. Besides the much longer time horizon, the teams in the second study *differed* from those in the first study in terms of familiarity with one another, diversity in background and age, and motivation for teamwork. These contextual factors can affect the findings in team research (Hackman, 2012) and need to be considered before drawing any general conclusions. Indeed, the magnitude of the positive relationships between psychological safety and both learning and performance have varied between studies, depending on the context. These relationships have been found to be stronger in uncertain environments (Edmondson & Lei, 2014) and knowledge-intensive team tasks (Sanner & Bunderson, 2015). Still, I believe that potential contextual differences should not stop us from aiming to discover what is true *across* contexts. Thus, in Paper 2, it has been important to both analyze what is different and thus dependent on the context and what is similar and seemingly less dependent on the context.

A third important aspect to consider when studying temporal dynamics is how we view *time* in itself. Time is on the one hand an objective construct and follows some generally accepted laws. Still, time can also be relative and a result of our perception (George & Jones, 2000). Thus, I might obtain different answers if I *measured* the relationship between time and psychological safety by measuring psychological safety several times and objectively analyzing the pattern than I would if I *asked* the same person subjectively how time relates to her or his perception of psychological safety. For this reason, mixed methods can be useful when studying temporal dynamics. One can examine how psychological safety develops over time through repeated quantitative measures—where the perception of psychological safety is still subjective but the element of time is substantially more objective—and try to understand this development through the eyes of participants, whether through interviews or surveys. I value both realistic and relativistic approaches and believe that we may gain more knowledge on team psychological safety temporal dynamics by employing both. Conversely, I believe we could miss out on valuable insights if we only consider one approach. For example, we lose the objective aspect of time if we rely only on subjective reflections made in retrospect; meanwhile, only trying to find causal explanations could lead us to lose the constructionist insights into how time may also be perceived differently. As I detail below, the findings revealed that although several participants perceived time spent together in the team as positive for the development of psychological safety, the quantitative measures showed something different: what was *perceived* as positive for psychological safety was not necessarily so. By combining different methods, one can study commonalities and inconsistencies between what they show us and try to interpret why that is the case (Denzin, 2017). More than this being a question of research quality and the validity of our findings, this may teach us something about the phenomenon itself.

This leads to the strengths of mixed methods research. Offering a conceptual framework based on published mixed methods research, Greene et al. (1989) draw out five purposes of employing mixed methods: *triangulation* (convergence and corroboration), *complementarity* (elaboration, enhancement, and clarification), *development* (using results from one method to inform the other), *initiation* (discovering paradoxes and contradictions), and *expansion* (providing more breadth and range). According to Denzin (2017), the inherent weaknesses of any methodological paradigm will prevail if one relies solely on one method, even when within-method triangulation is employed. Through between-methods triangulation—i.e., combining a mix of methods (Patton, 1999)—one can through identifying convergence, inconsistency, or contradiction achieve more thorough explanations and insights (Denzin, 2017) and increased confidence in one’s findings (Jick, 1979). However, the use of mixed methods must be relevant for the research question at hand and designed accordingly. Given the paucity of knowledge on team psychological safety emergence and development over time, I find an explorative approach suitable. Based on the aspects discussed above concerning temporal dynamics, qualitative and quantitative data may combine to offer insights that one or the other approach might not unearth. Thus, I argue that mixed methods is the best approach for this topic. Below, I show how I followed up this initial rationale for employing mixed methods by integrating the quantitative and qualitative data throughout the research process.

For Paper 2, I designed an explorative case study (R. K. Yin, 2015) that made use of a convergent parallel design in which quantitative and qualitative data are collected in parallel (Creswell, 2014). The data collection was somewhat similar for the two studies, although it was adjusted for the significantly different time horizons. In Study 1, team psychological safety was measured daily over 11 days through an electronic survey, and participants were interviewed after the project had ended. In Study 2, team psychological safety was measured

once a month over nine months, and participants were interviewed twice: in the first weeks of teamwork and at the end of the study period. My methodological triangulation was primarily simultaneous (Morse, 1991), with limited interaction between the quantitative and qualitative data during the data collection phase. However, in Study 2, analyses of the quantitative data collection were brought into the second set of interviews. That way, participants could see how their own psychological safety had developed throughout the period; the goal was to improve their ability to reflect upon experiences as distant in time as nine months and reduce the potential attribution bias associated with retrospective sensemaking in interviews (Eisenhardt & Graebner, 2007; Reis & Gable, 2000). This exemplifies how quantitative and qualitative data can be combined in different stages of the research process (Sieber, 1973) and complement each other (Greene et al., 1989).

In the data analysis, quantitative and qualitative data were analyzed independently before being combined and interpreted together (Creswell, 2014). Quantitative data were used for descriptive purposes and categorization, and qualitative data were used for interpretation and exploration (Sieber, 1973). More specifically, I was able to capture team psychological safety as it unfolded through quantitative measurements. Through qualitative comments given in the surveys and semi-structured interviews, I obtained a deeper insight into and understanding of how team members experienced their team psychological safety throughout this period and what could explain differences between teams. Thus, analyses were conducted both within and across cases (Miles et al., 2013). Furthermore, the qualitative data analysis followed a thematic approach (Braun & Clarke, 2006). I worked iteratively, going back and forth between reducing data through collapsing codes with somewhat similar meanings, connecting related codes, and structuring them at three different levels (empirical themes, conceptual categories, and aggregate dimensions). Moreover, building one study on another, I

could discuss the findings from Study 2 in light of those from Study 1 and look for complementarities, contradictions, and expansion (Greene et al., 1989).

Triangulating between data and methods, and in Paper 2 between studies, is valuable not only for a thorough examination of the research question but also for testing the validity of findings and strengthening the overall research quality of a study through converging, corroborating, grounding, and modifying (N. Carter et al., 2014; Greene et al., 1989; Sieber, 1973). I have taken several measures to enhance the validity and reliability. With mixed methods, *transparency* is key for high-quality research (Bryman et al., 2008). I started out with a pilot study and designed Study 1 based on experiences and insights from that effort. Similarly, I designed Study 2 based on experiences and insights from Study 1. Showing and telling this journey and the entire process from research question to conclusion has been important to me in both Paper 2 and in this dissertation. Additionally, I have attempted to be explicit and transparent on the *rationale* for using mixed methods and the *integration* of the different types of data (Fàbregues & Molina-Azorín, 2017), and I have prioritized discussing the *generalizability* and *transferability* of the findings as, for example, by discussing the different contexts in sufficient detail.

In addition to transferability, Lincoln and Guba (1985) and Bryman et al. (2008) highlight dependability, credibility, and confirmability as research quality criteria specifically relevant for qualitative approaches. To ensure *dependability*, which concerns how conclusions are made (Symon & Cassell, 2012), I emphasize demonstrating my choices and procedures throughout the research process so that others can evaluate them, and I have tried to be explicit about what I can and cannot conclude. As such, the combination of quantitative and qualitative data can enhance meaningfulness and truthfulness (Dzurec & Abraham, 1993). To establish *credibility*, the qualitative parallel to internal validity (Lincoln & Guba, 1985), I followed participants over time through repeated surveys to avoid snapshot biases (Bakker,

2014; Reis & Gable, 2000), gathered qualitative data in surveys along with quantitative measures for a deeper understanding of potential changes in psychological safety, reduced retrospective sensemaking bias (Maxwell, 1992), looked deeper than the team level to open up individuals' perceptions of psychological safety, and triangulated between methods and studies, as noted above. Moreover, bringing the results from the surveys—both team psychological safety scores and qualitative comments—into the final interviews in Study 2 served as a member check that enabled participants to validate and elaborate on the results.

Still, despite strengths with the mixed methods design of the current studies, there are also limitations—such as small samples vulnerable to dropouts, changes in team composition, and simplification of a complex picture where more than team practices will impact team psychological safety emergence and development over time. Details on these limitations are thoroughly discussed in Paper 2 itself. Some of the limitations relate to *confirmability*—“whether personal biases have been kept in check” (Bryman et al., 2008, p. 266)—and how I as a researcher may have shaped my own findings. Triangulating and looking for verification and contradictions were key to enhancing confirmability (Lincoln & Guba, 1985). Still, our subjectivity as researchers may challenge research quality (Miles et al., 2013). Though I have tried to remain critical of my own interpretation and checked my preliminary interpretation with participants in the final interviews, the research process is still affected by my interpretation. In interpretive epistemologies, including a pragmatic paradigm, “the knower and the known interact and shape one another” (Denzin & Lincoln, 2018, p. 19). I acknowledge that as an inherent limitation. Nevertheless, that should not in my opinion stop us from conducting interpretive research. Aiming for *trustworthiness* in my research (Pratt et al., 2020), I want to be upfront, try to improve research quality along the way, and be honest about the limitations of my work, so that I can both learn from and contribute constructively to other researchers' designs.

Though mixed methods are potentially fruitful, they are not always the answer. To me, it has been important that employing these methods adheres to my ontological and epistemological beliefs, that they are relevant and indeed necessary to answer the research question, and that the rationale for using mixed methods is followed throughout the research process by a thorough integration of the findings from each data type. In a perfect world, we could study every team member in numerous teams through every second of every day for an unlimited amount of time. That might lead us closer to the truth or help us understand objective reality—if there is such a thing. But mixed methods are time consuming and challenging. I have through this journey developed a profound understanding and humility around how hard research can be: how much noise has to be canceled out to isolate the topic of interest, how respondents in longitudinal studies no longer want to be respondents, and so on. Thus, even though one of the conclusions in Paper 1 is that we need more longitudinal research on team emergent states, and Paper 2 follows that in an ambitious way—longitudinal, mixed methods, and two studies—Paper 3 takes a different approach. That is not because I changed my belief about the importance of exploring team psychological safety over time but followed from my pragmatic worldview: there is also a time to ask “so what?” Valuing the relativistic approach of interpreting team dynamics the way they are socially created through the interactions within a team does not need to contradict the realistic approach seeking potential causal explanations that may be valid across teams.

Paper 3

The third paper in this dissertation, “Safe Among the Unsafe: Psychological Safety Climate Strength Matters for Team Performance,” was written with Henning Bang, Therese E. Sverdrup, and Vidar Schei. Though employing a quite different research design, it picks up thematically where Paper 2 leaves off and—in a sense—does the same methodologically. A key finding in Paper 2 was how perceptions of team psychological safety could differ between

members of the same team. By studying team psychological safety only as a team phenomenon and making use of the mean level of all team members' perceptions, the researcher neglects individual differences within the team. Where Paper 2 identifies and explores how this lack of sharedness may exist within a team, Paper 3 brings this issue into the field of team climate strength and studies whether it matters for team outcomes. More specifically, we study the moderating effect of team psychological safety climate strength—the degree of shared perceptions within a team—on the relationship between team psychological safety as measured by the average of team members' perceptions and team performance.

The context for Paper 3 is management teams that are responsible for the overall performance of a business unit or an entire organization (Cohen & Bailey, 1997). Since management teams are characterized by the need to exchange information and coordinate activities (Wageman et al., 2008), and team psychological safety is particularly important in such settings (Sanner & Bunderson, 2015), we consider this a suitable context to study the relationship between team psychological safety and team performance.

The sample consists of 160 management teams with a total of 1,149 team members. The data are cross-sectional and survey-based, and were collected by the second author, Henning Bang, over a period of two and a half years. Participants responded to items on team psychological safety and team performance, and data were aggregated to the team level for further analyses. The team psychological safety score was the average (mean) of the team members' ratings on the psychological safety scale, the team psychological safety climate strength score was the dispersion (standard deviation) of the team members' ratings, and the team performance score was the mean value of the team members' subjective evaluations of their team's performance.

Through a hierarchical regression analysis, we found that there was a positive relationship between team psychological safety and team performance (supporting our first hypothesis) and that team psychological safety climate strength positively moderated that relationship (supporting our second, and main, hypothesis). Considering that the mean and standard deviation are statistically related, which could have caused a potential bias in our results, we conducted a similar hierarchical regression analysis, replacing median as the measure of team psychological safety and replacing standard deviation with range as the measure of climate strength. Moreover, to investigate whether nested data structures and a relatively high empirical correlation between team psychological safety and climate strength (.58) influenced our results, we conducted a structural equation model in which within-team variability (i.e., climate strength) was modeled as a random path coefficient at the between level (Feng & Hancock, 2022). Both these additional analyses had results similar to our main analysis, indicating that our findings were robust and valid. Moreover, as probing the moderation effect indicated that climate strength could have different effects depending on the level of team psychological safety, we conducted additional explorative analyses, which are detailed below.

We took several measures to ensure research quality in Paper 3. *Internal consistency* was controlled for and confirmed through high Cronbach's alpha values, and before conducting the main (moderation) analyses, the team-level data were analyzed with respect to aggregation justification (*rwg*, ICC(1), and ICC(2)) and controlled for common method variance (using Harman's single-factor test and a confirmatory factor analysis). To ensure *internal validity*, in addition to the robustness analyses described above, we conducted correlation analyses to check whether team composition variables (i.e., team size and mean and diversity in age, gender, or team tenure) were related to the dependent variable. Moreover, we conducted a *t*-test comparison between low- and high-performing teams to

confirm that the subjective performance score was indeed a good indicator of team performance (Malhotra et al., 2017). Additionally, the response rate in these teams was remarkably high (close to 100%), which made the data highly suitable for conducting analyses on dispersion. Furthermore, the *external validity* and *generalizability* of our findings were strengthened through a relatively large sample of management teams ($N = 160$) that had an equal gender balance (50.1% male, 49.9% female), different sectors (57.0% private sector, 43.0% public sector), and different hierarchical levels in their organizations (50.4% top-, 31.9% middle-, and 17.7% lower-level management teams). Nevertheless, there are some limitations to our findings. For example, though we controlled for common method variance, we cannot exclude potential common method bias. Related to that, since our dependent and independent variables were measured at the same time, we cannot make any causal inferences in our research model. In Paper 3, we describe these limitations in greater detail.

Notably, the cross-sectional research design in Paper 3 differs from the longitudinal design in Paper 2. Since one of the main findings from Paper 2 was that the level of psychological safety can change over time, it may not seem intuitive to follow up with a cross-sectional study. However, there are several reasons for this choice of design. First, dynamics comprise more than temporal aspects; they also involve within-team dynamics. When identifying that there were different perceptions of team psychological safety in nearly all the teams I followed in my own empirical data collection, a next natural step was to investigate whether this was only of methodological concerns or mattered for team outcome. Indeed, pragmatic researchers are distinguished by being interested in practical consequences (Cherryholmes, 1992). This could of course be conducted longitudinally as well (see the section on suggestions for future research), but that would complicate the design to a considerable degree.

Second, complex “all-inclusive” designs are not necessarily beneficial. Putting too much into the mix may weaken the strength of the individual methods and divert focus from the key motivation for the study in the first place—going from “how” and “why” to studying “so what?” Thus, when studying mechanisms, it may be necessary to exclude some factors that are important, such as time, in order to discover anything at all. If we look for everything, we may end up with nothing.

Third, though I had the opportunity to choose a purely quantitatively approach, I did not end up there. Though the aggregation justification measures indicated a general agreement of psychological safety within the teams in the sample, I was curious about how things looked underneath that *rwg* score. Through additional analyses that explored the sharedness of psychological safety in Paper 3, we found that nearly all—159 of 160—teams had one or more “outliers”: team members who perceived the team psychological safety at least one standard deviation above or below the team’s mean score. Increasing the threshold to 1.5 standard deviations, we divided teams into four categories: *conform* (no outliers), *unsafe outliers* (at least one outlier below but no outliers above the mean), *safe outliers* (at least one outlier above but no outliers below the mean), and *polarized* (at least one outlier both below and above the mean). Delving more deeply into this matter, we found that not only did the *degree* of sharedness have implications for team performance, but also *how* these perceptions of team psychological safety differed had an influence (see the Main Findings section below).

The findings that emerged from these descriptive analyses made me reflect on how our epistemological and methodological assumptions can affect what we find. More specifically, aggregating individual experiences into a team phenomenon, justified by some pre-set criteria (e.g., a *rwg* level above 0.7), strikes me as a positivist approach. That may lead us closer to the “true” objective reality. Still, if that leads us to the conclusion that psychological safety is a team phenomenon (and only that), this simplification can obliterate personal differences that

may be important for understanding how teams develop psychological safety and perform, as was the case in this instance. The “genuine desire to find out how things are” (Haack, 2004, p. 6) may justify more or less any method in the purest pragmatic sense. However, since the descriptive and explorative analyses in Paper 3 do not build on any other validated method, they deserve to be both criticized and likely improved. Still, that is my hope as well: follow my curiosity, learn on the way, and hopefully contribute to the research field, perhaps both theoretically and methodologically.

Discussion

In this section, I present the main findings for each of the three papers in this thesis, before I discuss the dissertation’s overall theoretical contributions, practical implications, limitations, and suggestions for future research. The three papers are independent of one another, but they all contribute to research on team emergent states in general and team psychological safety in particular. Thus, in this section, I draw out key topics and emphasize the common threads that run through the papers.

Main Findings

In Paper 1, “Taking the Emergent in Team Emergent States Seriously: A Review and Preview,” we review the literature on the temporal dynamics of team emergent states and aim to identify what can be learned from the research that examines team emergent states over time. We summarize our findings in four lessons learned. First, team emergent states have no universal pattern. About two thirds of the included papers reveal that team emergent states may increase, decrease, or fluctuate over time. There are as many papers reporting an increase as there are papers reporting a decrease or fluctuation combined. Second, team emergent states should be measured as *emergent*. Studies with three or more measurement times reveal dynamics not covered by two measurement times; about one quarter of the studies show fluctuations that would be impossible to detect with only two measurement times, and—

regardless of the length of the study period—a majority of studies reveal temporal dynamics in team emergent states. Hence, those states emerge over both shorter and longer time spans. Third, we summarize why team emergent states emerge and what the consequences of that emergence are. Common variables, studied as both antecedents and outcomes of team emergent state temporal dynamics, include team performance, conflict, communication, and feedback. Fourth, we show how studying the emergent in team emergent state matters. Longitudinal studies enrich our understanding by revealing causality and reciprocation and how team emergent states may relate differently to other variables over time.

In Paper 2, “The Emergence and Development of Team Psychological Safety: A Team Practice Lens,” I explore how team psychological safety emerges and develops over time and what team members do that impacts their team psychological safety. Through two studies of project teams in two different contexts, I find that teams start out at fairly similar levels of team psychological safety. However, those levels develop quite differently from there over both the short and long time. I find that connecting, clarifying, supporting, and performing team practices shape the emergence and further development of team psychological safety. Interestingly, team psychological safety appears to be a perishable good, potentially fluctuating and decreasing over time. Thus, time together as a team does not appear to be sufficient for building team psychological safety—it depends on how teams use that time. Moreover, perceptions of team psychological safety are not necessarily shared. In fact, both studies in Paper 2 revealed that the perceptions of team psychological safety can differ substantially between members of the same team.

In Paper 3, “Safe Among the Unsafe: Psychological Safety Climate Strength Matters for Team Performance,” we study the impact that a lack of shared perceptions of team psychological safety within a team may have on team performance. More specifically, we study the moderating effect of team psychological safety climate strength (i.e., the degree of

sharedness) on the relationship between team psychological safety and team performance in the context of management teams. We find that team psychological safety is positively related to team performance and that this relationship is positively moderated by team psychological safety climate strength. Thus, the stronger the climate (i.e., high sharedness), the stronger the relationship between team psychological safety and team performance. However, despite the positive moderating effect of team psychological safety climate strength, when there are low levels of team psychological safety, teams perform better when team members do not agree on the level of team psychological safety. Exploring this matter further, we find that when team psychological safety is low, teams can benefit from having team members who perceive greater team psychological safety than the rest. Indeed, team members who are “safe among the unsafe” can lift the team’s overall performance.

Theoretical Contribution

Together with my coauthors, I contribute to the literature on team emergent states in general and team psychological safety in particular in several ways. First, the literature review in Paper 1 provides an overview of 115 longitudinal papers on team emergent states. Though these states are defined as “dynamic in nature” (Marks et al., 2001), surprisingly few studies have addressed their emergent aspect. Importantly, none of the previous reviews provides an overview of the dynamic aspect of team emergent states, and a common conclusion is that our understanding of temporal dynamics of team emergent states is limited (e.g., Cronin et al., 2011; Humphrey & Aime, 2014; Kozlowski & Chao, 2012; Mathieu et al., 2015; Rapp et al., 2021; Waller et al., 2016), even though there have been calls for such work for decades (Cohen & Bailey, 1997; Delice et al., 2019; McGrath, 1991; Terborg et al., 1976). Through our review, we take “the emergent in team emergent states seriously” and explore what we can learn from papers that do study temporal dynamics in team emergent states. While building on previous relevant reviews (e.g., Coultas et al., 2014; Mathieu et al., 2019; Mathieu

et al., 2008; Rapp et al., 2021), our paper is not limited to a certain team emergent state (e.g., Fry et al., 2017; Salas et al., 2015) or a specific time period (e.g., Cronin et al., 2011). Moreover, we provide an extensive overview of all 115 papers with details on methods, number of measurement times, samples, time spans, emergent state dynamics, patterns (*how*), antecedents (*why* dynamics do or do not occur), and outcomes (*what* the consequences of dynamics are). These details are often lacking in other reviews. By detailing how methods and findings are associated and discussing that connection further in the paper, we seek to contribute both theoretically and methodologically to the research field.

Second, this thorough investigation in Paper 1 allows us not only to study the emergent element in team emergent states but also provide empirical evidence on temporal dynamics for team emergent states in general and for the various categories of such states. For team psychological safety, there was little empirical evidence to discuss its temporal dynamics, as only four papers on that topic met the inclusion criteria for this review (cf. footnote 13). In three of them, team psychological safety appeared stable over time. However, they all measured psychological safety only twice and did not emphasize how time related to the emergence of team psychological safety. Nevertheless, team psychological safety revealed some of its dynamics through changing relationships with other variables over time. The indication of temporal dynamics of team psychological safety, as more strongly discovered for those team emergent states where temporal dynamics are studied to a greater extent (e.g., team cohesion and team trust), actualizes Paper 2, in which I seek to advance the research field by taking the emergent element in team psychological safety seriously.

Third, based on the importance of team psychological safety for team functioning (Frazier et al., 2017; Newman et al., 2017) and our lack of knowledge on how psychological safety builds and unfolds over time (Edmondson & Lei, 2014; see the Theoretical Background section), Paper 2 offers an *identifying* contribution that makes something known “that has yet

to be apprehended or given serious study” (MacInnis, 2011, p. 143). Exploring team psychological safety over time through both quantitative and qualitative methods, I contribute insights into team psychological safety temporal dynamics that had been called for in literature reviews (Edmondson & Lei, 2014; Frazier et al., 2017; Newman et al., 2017). Through two studies with different time horizons—short- and long-term project teams—I address this aspect more in greater depth than previous research in the field.

Fourth, though there is extensive research on antecedents to team psychological safety, Paper 2 is, to my knowledge, the first study to specifically address what teams do from the very start that impacts their team psychological safety. Thus, drawing on literature from climate emergence and team development, I extend the literature on team psychological safety by identifying which team practices are key for the emergence and development of team psychological safety. As such, I answer the call by H. H. Johnson and Avolio (2019) to study early activities that may aid team members feel safe and fully engage in teamwork. This resonates with the earlier call by Cohen and Bailey (1997) for researching team dynamics in general, highlighting the necessity of studying time and the lasting effects of activities in teams’ initial stages.

Fifth, in Paper 3, we contribute to the research field by addressing the question of whether shared perceptions of a team climate matter for team outcomes, an approach called for in reviews on team climate in general (Perrigino et al., 2021) and for team psychological safety in particular (Newman et al., 2017). To our knowledge, this is the first study to address the relationship between team psychological safety, team psychological safety climate strength, and team performance. Previous studies have focused on individual in-role performance in a team setting (Koopmann et al., 2016) and performance of larger hospital units (Hirak et al., 2012).

Sixth, in Paper 3, we not only study the *degree* of sharedness of team psychological safety in management teams but also *how* teams may differ in their perception of team psychological safety. Since little is known in this field, Perrigino et al. (2021)—in the latest review on climate strength—encourage researchers to explore such topics in greater depth, driven by research questions rather than formalized hypotheses. More specifically, we conduct descriptive analyses focusing on different constellations of how team psychological safety perceptions may differ within teams and discuss how these constellations relate to team performance.

Seventh, Papers 2 and 3 show that most teams have had a lack of sharedness when it comes to team psychological safety perceptions, although to differing degrees. For example, in Paper 3, we identified that nearly all teams had team members perceiving team psychological safety more than one standard deviation from the team's mean level of team psychological safety (159 out of 160). This empirical evidence, in addition to contributing to the limited literature on team psychological safety climate strength, adds important nuance to the view on team psychological safety as primarily a team-level phenomenon (Edmondson & Lei, 2014). By seeing what has been identified previously in a different way, we contribute by *revising* the literature on team psychological safety (MacInnis, 2011). By that, we do not refute the established notion of psychological safety primarily residing at the team level—we too find significant variation between teams, just as previous studies have—but we do identify the importance of looking beyond aggregated team-level data to understand team psychological safety more fully. The fundamental insight is that team psychological safety does not mean that all team members perceive this safety similarly. On the contrary, our data show that such sharedness is more the exception than the rule.

Practical Implications

Why should we care about team psychological safety dynamics? By working on this question, I have identified several implications for practitioners in the field. Practical implications are discussed in greater detail in each of the three papers. In this section, I present two key practical implications that build on findings across the papers.

First, team psychological safety needs attention over time. Paper 1 supports the view that team emergent states are dynamic over time; they can increase, decrease, and fluctuate. Similarly, in Paper 2, I found team psychological safety to develop in various ways. Some teams had a lower level of team psychological safety when the study period ended than when they were a newly formed team. Indeed, team psychological safety appears to be a perishable good. Even though we have it, we may lose it. As high-performance teams depend on not only *building* team psychological safety but also *sustaining* this safety throughout the challenges that are sure to come, a robust, durable form of psychological safety is desirable. Since time in itself is not enough for team psychological safety to emerge, we need to continue investing in this safety, and the practices of the team appear to be important for that purpose: *connecting* practices aimed at socializing and building relationships; *clarifying* practices fostering direction, guidance, and predictability; *supporting* practices such as contributing, encouraging, and including; and *performing* practices where the team emphasizes the collective and celebrates their wins.

Importantly, establishing early team psychological safety may contribute positively to subsequent communication and team processes (H. H. Johnson & Avolio, 2019). By knowing more about team practices that foster team psychological safety, teams may make greater use of the potential residing in the team as early as possible, making it more effective from the start. Still, a good start is not enough for team psychological safety to continue to grow, as exemplified through the use of team charters in Paper 2. In the team where the team charter

was not followed up in practice, it was of limited worth, whereas for the team that chose to follow through on its charter through their practices, it was of great value. Edmondson (2004) distinguished trust from psychological safety by noting that trust was a *choice*. Team psychological safety may not be an explicit choice we make, but it does appear to be a *result* of the choices we make and the practices that follow; it is not, however, the passive result of time passing by.

Second, we need to see the individuals and not just the team. In both Paper 2 and Paper 3, nearly all teams had one or more members who perceived team psychological safety considerably differently than the rest. If four of five members perceive a relatively high psychological safety, but one perceives a low safety, is it a safe team? According to the mean value, the answer is clearly yes. But that approach ignores the fact that one team member does not feel free to contribute the way the others do. That may challenge a common motivation behind using teams to solve tasks: to achieve more than the team members could have done through individual work (L. L. Thompson, 2018). Though having a shared understanding is an important attribute in effective teamwork (Salas et al., 2005), and very different perceptions may lead to process loss and coordination challenges (Hackman, 2002), some of the potential in teamwork lies in the diversity of team members. If they think too similarly, two heads will not necessarily think better than one—two heads will think just like one. Perceiving psychological safety may contribute to different views and perspectives being voiced (Edmondson, 1999). If not all team members feel that there is room to contribute fully, the inherent potential of the team will likely not be fully tapped.

Paper 3 shows how shared team psychological safety, or the lack thereof, has implications for team performance. Those teams where the level of psychological safety is high and team members agree that the team is safe perform best. Thus, the ambition for practitioners aiming at building safe teams should be to build team psychological safety for

the team as a whole and for the individuals, so that safety is genuinely shared. An important finding, however, is that shared perceptions of team psychological safety are not necessarily beneficial for team performance. Indeed, for teams relatively low in team psychological safety, they may benefit from one or more members perceiving more safety than the others. Thus, as lifting everyone's psychological safety in a team can be challenging and time consuming, in the short run, it may be worthwhile to ensure that at least some members perceive enough psychological safety to contribute fully. Even though the full potential of the team will not yet be reached, the contribution of individuals can make enough of a difference to lift the team's performance above the performance of a team where no one is particularly safe. Moreover, in addition to contributing to the team's performance, the "safe among the unsafe" may positively influence the psychological safety of others. For example, when relatively unsafe team members experience that others are taking the risk of voicing questions or ideas, these safe team members may function as role models by showing that it was not so dangerous after all and potentially reducing the perceived fear of taking interpersonal risks for those feeling more limited. Our actions do indeed speak louder than our words, and the effect of such role models on a team's psychological safety may be greater than other, more intentional measures aimed at building psychological safety.

Limitations and Future Research

Though I have taken several measures to ensure research quality (see the Methodology section), I certainly acknowledge certain limitations of the work presented in this dissertation. I have learnt how one, in order to provide insights into a specific matter, may need to exclude other aspects. A choice of something means not choosing something else, and all methodological choices have a downside. Thus, to me, it is important to be open on these matters for two main reasons: I may contribute to the important critical view we should all have when considering research—not just automatically buying into the notion that “research

says...” equals truth—and I hope to contribute beyond the knowledge presented by motivating and guiding future research. Specific limitations are discussed thoroughly in the respective papers, such as small sample sizes (e.g., in Paper 1, with limited number of studies on certain team emergent states, and in Paper 3 concerning the descriptive analyses) and context potentially limiting generalizability (e.g., in Paper 2, where contextual differences are discussed as specifically related to team psychological safety dynamics). In this section I emphasize two key limitations in the findings and offer suggestions on how they can be used as avenues for further research.

First, all three papers simplify what is a truly complex picture. In Paper 1, this concerns, for example, comparing findings of studies using quite different methodologies and time spans. In Paper 2, scores are collapsed over time into phases and within teams; neither approach is necessarily the best way to depict the temporal and internal dynamics of team psychological safety. Moreover, emphasizing team practices and their relation to team psychological safety dynamics excludes other elements, such as organizational practices, that may also impact how team psychological safety develops. In Paper 3, we simplify reality by using a cross-sectional design that does not take the emergent nature of team psychological safety into full account. As seen in Papers 1 and 2, due to potential temporal dynamics, not accounting for *when* one has measured safety may limit the conclusions drawn. Nevertheless, some simplification will likely always be necessary due to the limited capability of both human beings and any methodology: if I look for everything, I may end up finding nothing. However, based on the simplifications made, I suggest some other approaches that could further enlighten team psychological safety dynamics.

In general, I encourage a greater emphasis on sharedness of team psychological safety perceptions. Though there is indeed sufficient variation between teams in Paper 3 to justify aggregation from the individual to the team level, the results from Papers 2 and 3 show that

there is more to team psychological safety that cannot be captured by treating it solely as a team phenomenon. Still, there are limited studies on team psychological safety climate strength. Thus, to understand the within-team dynamics of team psychological safety more fully, I encourage future researchers to include the possibility that there may be considerable variation in perceived safety between members of the same team when designing their studies.

One particularly promising approach would be to combine the temporal aspects of team psychological safety with the dispersion aspects. Paper 2 offers indications that the level of team psychological safety may develop differently over time not only *between* teams but also in the perceptions of individuals *within* teams. Thus, time in itself is neither sufficient for team psychological safety to grow nor for strengthening the team psychological safety climate (i.e., whether perceptions of the psychological safety in the team become more or less shared over time). To my knowledge, there are no studies on how team psychological safety climate strength develops over time. Change in sharedness of perceptions over time is studied for team and collective efficacy (DeRue et al., 2010; Jung & Sosik, 2003), but not for other team emergent states (see Paper 1). Moreover, other team phenomena have been studied using Lang et al.'s (2018) longitudinal model of consensus emergence; for example, Uy et al. (2021) examined passion in teams. Importantly, individual differences themselves might be the reason for team-level dynamics (Kozlowski, 2015). Assuming homogeneity over time and across team members can challenge our understanding of team-level dynamics (Leenders et al., 2016). Thus, it would be fruitful for our understanding of team psychological safety dynamics to study how team psychological safety climate strength emerges.

Another approach would be to study team psychological safety through a dynamic lens, yet with “simpler” research designs than longitudinal designs. Though Papers 1 and 2 support the argument that longitudinal designs are necessary to understand the temporal

dynamics of team psychological safety, not all research can make use of longitudinal designs. Indeed, longitudinal work is complex and demanding of resources (Ancona et al., 2001; Arrow et al., 2004; Salas et al., 2015). Moreover, existing research on team psychological safety that is based on cross-sectional designs has provided important insights that we can build on further using other designs. A hopefully fruitful question then, is how to combine our knowledge from cross-sectional and longitudinal studies. Okhuysen and Richardson (2007) suggest the “building of bridges” between cross-sectional and longitudinal work, and Fry et al. (2017) offer one example; while they acknowledge the lack of longitudinal studies, they nevertheless build a model of trust dynamics based partly on cross-sectional studies. I encourage future cross-sectional work to look into what we know about temporal dynamics of team emergent states in general and team psychological safety in particular when designing studies—for example, taking into account how team psychological safety has related differently to other team emergent states or team processes at different points in time. Moreover, Koopmann et al. (2016) offer an example of studying the impact of time on team psychological safety through a cross-sectional lens. Using *team tenure* (i.e., how long team members had been part of the team) as a proxy for time, Koopmann et al. (2016) found a curvilinear relationship between team tenure and both team psychological safety and team psychological safety climate strength. More specifically, relatively new teams and longer-tenured teams had higher levels and stronger climates than moderately tenured teams. Thus, teams did not necessarily agree more on the degree of team psychological safety as time went by. I suggest further studies on this seemingly dynamic relationship between time and team psychological safety.

The second limitation concerns “so what?” How can we know that team psychological safety temporal dynamics matter for team outcomes when that has not been explicitly studied? I acknowledge that this logic is built on assumptions. As team psychological safety has

positive effects on team learning behavior (Creon & Schermuly, 2019) and voice behavior (Detert & Burris, 2007), it is reasonable to assume that such behavior will be degraded in periods of low team psychological safety, thus negatively affecting the team. Studying variation in affective commitment, Becker et al. (2013) found comparable fluctuations in behavioral outcomes like job performance and citizenship behavior. Hence, if the perception of team psychological safety is subject to change, such temporal dynamics may matter for a team's processes and performance. However, since these are assumptions, I encourage further research in the field of team psychological safety temporal dynamics that can not only contribute to our understanding of how this safety might develop over time but also reveal the implications of those dynamics. Thus, I suggest some approaches based on the work I have done with this dissertation.

One approach that could aim to falsify the assumption that team psychological safety temporal dynamics also lead to comparable dynamics in team behavior or team outcome (cf. the notion of falsification in the Methodology section) is to turn the assumption around: could there be a positive element associated with a negative change (i.e., a decrease) in team psychological safety? For example, a decrease in perceived team psychological safety can indicate a challenging process that the team has gone through, like a demanding, protracted conflict. Still, the team could potentially grow from that experience if it was properly dealt with. Perhaps teams experiencing fluctuations in psychological safety due to demanding experiences and handling them in a constructive way can increase their levels of safety above teams that have not experienced something that challenged their team psychological safety. By employing designs that combine a longitudinal perspective on team psychological safety with a longitudinal perspective on other variables, one could gain knowledge on these matters.

A similar approach with a different focus involves causality. Longitudinal designs are often used to study causalities or to avoid common method bias (Ployhart & Vandenberg,

2010); however, many of these designs study variable A at time 1 and variable B at time 2. Thus, though they are often called longitudinal designs (Ployhart & MacKenzie, 2014), they do not study the phenomenon of interest through a dynamic lens. Measuring team psychological safety and other variables longitudinally may increase our knowledge of how they relate over time and help identify directions of causality. For example, as Paper 2 showed, *performing* as a team has positive impact on team psychological safety perceptions. Thus, not only may team psychological safety matter for team performance (Paper 3), but team performance may also matter for—and be the cause of—team psychological safety. Moreover, they may cause each other. Similar reciprocal relationships with team performance have been found for team cohesion (Mathieu et al., 2015), team trust (Kanawattanachai & Yoo, 2002), and collective efficacy (Myers et al., 2004). Insights into such potential relationships may have both theoretical relevance (i.e., seeing the nomological net of psychological safety through a more dynamic lens) and practical implications (e.g., highlighting the importance of celebrating our wins). Thus, I encourage future research on this matter.

Another interesting approach—not directed at *temporal* but at *within-team* dynamics—would be to further explore the implications of shared perceptions of team psychological safety on team outcomes. Though Paper 3 finds team psychological safety climate strength to positively moderate the relationship between team psychological safety and team performance, we discovered that shared perceptions were not necessarily positive for team performance—that effect depends on the level of team psychological safety. Our finding that the “safe among the unsafe” contribute positively to team performance does not support the proposition by Y. Zhang and Wan (2021) that if the perception of psychological safety is not shared, it is more likely that dysfunctional behavior may occur in the team. Still, their proposition may also turn out to be true. One could imagine that some members take up

much more space than others or that members who are low on safety do not express their concerns when those high on safety express their opinions. The lack of clarity on this issue calls for further research.

With limited studies on team psychological safety climate strength and our finding on the potentially paradoxical implication of climate strength on team performance, I also suggest research in which the sharedness of team psychological safety perceptions is approached inductively. An alternative way of studying this topic is a qualitative exploration of how different perceptions of psychological safety within teams relate to team functioning, for example by interviewing members of teams with both high and low degrees of team psychological safety climate strength and team performance or using focus groups where team members reflect on their own and others' perceptions of how they function as a team.¹⁸ These approaches may add insights into not only the implications of the shared perceptions of team psychological safety but also various kinds of outcomes (e.g., individual in-role performance or the team as a whole) and what can explain sharedness or the lack thereof.

Conclusion

This dissertation offers a dynamic perspective on team psychological safety. By reviewing the literature on team emergent states—of which team psychological safety is an example—that has taken the emergent nature of these states into account, the dissertation details through four lessons learned how temporally dynamic team emergent states actually are and provide four lessons learned for future research (Paper 1). In Paper 2, I study the temporal dynamics of team psychological safety and explore how it emerges and develops in short- and long-term project teams in light of team practices. Paper 3 addresses how team psychological safety climate strength—whether or not team members share perceptions of

¹⁸ Being interested in practices within teams, I would normally speak highly of observation as a research method. However, it is worth asking whether psychological safety, understood as a perception, actually can be observed, or if we instead observe behavior that is a result of people's perceived psychological safety (e.g., voice behavior). Such perceptions are probably better addressed through individuals' reflections.

team psychological safety—matters for management team performance by moderating the relationship between team psychological safety and team performance.

This dissertation highlights that the psychological safety of a team is temporally dynamic—a perishable good that will not increase by simply spending time together. Rather, it is a result of connecting, clarifying, supporting, and performing practices in teams over time. Moreover, the psychological safety within a team can be perceived very differently among team members, and this has implications for team performance. Hence, team psychological safety does not build itself, and team psychological safety is not necessarily the same for all. Researchers studying team psychological safety should move beyond snapshots and simplified aggregation practices and take the emergent nature and internal dynamics of team psychological safety seriously.

Moreover, these findings have implications for practitioners. There is an increasing focus in organizations on building psychologically safe teams (Edmondson, 2018). However, team psychological safety is not the goal itself—it is a means to get there. With team psychological safety positively linked to numerous desirable team behaviors and outcomes, the dynamics of this safety should be emphasized if teams are to truly harvest the fruits of team psychological safety. The potential of the team will most likely remain a potential—rather than being realized—if team psychological safety is a one-time investment or something that not all team members share. True team psychological safety is built today, tomorrow, and together.

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PAPER 1

Taking the Emergent in Team Emergent States Seriously:

A Review and Preview

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Abstract

Team emergent states are properties that develop during team interactions and describe team members' attitudes and feelings (e.g., cohesion). However, these states' emergent nature has largely been neglected, as most studies do not examine the temporality of team phenomena. We review longitudinal studies on team emergent states and demonstrate that a majority of papers reveal their temporal dynamics but offer no universal patterns as to *how* such states emerge. The review reveals common variables related to temporal dynamics and highlights the importance of studying the development of team emergent states to enhance our knowledge of their causal directions, antecedents, and outcomes. We suggest that future research should clarify the *concept* of team emergent states, connect *theories* to research on temporal dynamics, adopt more *qualitative* approaches to answer "how" and "why" questions, and improve *research designs* to study meaningful forms of change. Lastly, we present practical implications for the HR field.

Keywords: team emergent states, team temporal dynamics, longitudinal studies

The research on teams and team processes is both broad and deep (Mathieu et al., 2017; Weiss & Hoegl, 2015). At its heart is understanding the dynamic nature of teams. Thus, the concept of team emergent states (TESs)—“properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes” (Marks et al., 2001, p. 357)—has received a great deal of attention (Rapp et al., 2021). However, although previous research has focused heavily on TESs, relatively few studies have examined their “emergent” element in any depth. For example, most studies measure TESs at only one point in time, making it difficult to reveal their temporal dynamics and the consequences of this temporality. A search of the Scopus database on cohesion in teams, the most frequently studied TES, retrieved more than 2,300 studies, only 40 of which (less than 2%) treated cohesion as dynamic.¹⁹ Somewhat ironically then, much previous research appears to deal with the “emergent” in TESs as a static concept.

The aim of this review is to identify what can be learned from the research that *does* examine TESs over time. We provide a comprehensive and integrative review of all TESs that have been studied dynamically to date—a total of 115 papers. In doing so, we extend previous reviews of TESs in several ways. First, this is the first review to assess the dynamic nature of TESs. While previous reviews conclude that our understanding of the temporal dynamics of TESs is limited (Coultas et al., 2014; Kozlowski & Chao, 2012; Rapp et al., 2021; Waller et al., 2016), none provides an overview of the dynamic aspect of TESs. Second, our review integrates all identified longitudinal papers on TESs, rather than being limited to a specific TES like team trust (Fry et al., 2017) or team cohesion (Salas et al., 2015), enabling us to examine differences and commonalities across various TESs in a way that single-TES reviews cannot achieve.

¹⁹ SCOPUS search for *cohesion* AND *team* or *cohesion* AND “*small group*” in titles, abstracts, or keywords.

We make several important contributions: First, we show that no universal pattern is revealed across studies as to how TESs develop over time. About two thirds of the 115 identified papers demonstrate that TESs do change; in fact, they increase in just as many studies as they decrease or fluctuate. Second, we reveal that research designs play an important role when studying temporal dynamics. Studies with three or more measurement times reveal dynamics that are not displayed by two measurement times. However, regardless of time span, a majority of studies disclose the temporal dynamics of TESs, which emerge over both shorter and longer time periods. Third, we find that there are common antecedents and outcomes across various TESs and that the most intensively studied variables related to TES temporal dynamics may well function as both antecedents and outcomes. These include team performance, conflict, communication, and feedback. Fourth, we show how longitudinal studies on TESs have added important knowledge to the research field by revealing causality and reciprocation and by indicating that TESs may relate differently to other variables (both antecedents and outcomes) at different time points. Finally, we point to four areas for future research on the temporal dynamics of TESs: developing the concept, bridging theoretical frameworks and empirical data, carrying out more qualitative studies, and crafting research designs that are suitable for detecting meaningful forms of change.

The Review Process

We sought to identify academic papers studying the temporal dynamics of TESs. TESs have been categorized in various ways (e.g., Chen et al., 2005; DeChurch & Mesmer-Magnus, 2010; Shuffler et al., 2018), and whether a team phenomenon is a TES is not always straightforward; for example, *team conflict* is a team process for Marks et al. (2001) and a TES for Okhuysen and Richardson (2007). This complicates the picture when considering which TESs to include in a review. We used the taxonomy of Rapp et al. (2021) when considering which TESs to include; theirs is the most recent and thorough categorization.

The review process consisted of several rounds of searches using the Scopus database. We sought to identify papers where the TES of interest was measured more than once. The first search consisted of combinations of the following keywords in titles or abstracts: 1. *emergent*; 2. *team* or “*small group*”; 3. *longitudinal*, *trajectory*, “*temporal dynamics*”, and “*repeated measure*”. The results contained constructs clearly defined as TESs, along with constructs referred to as *emergent phenomena*, *emergent constructs*, and *emergent properties*. Only TESs covered by Rapp et al. (2021) taxonomy were included.

The second search was similar to the first, with *emergent* replaced by each of the TESs found in the first search. This approach found longitudinal papers (with a minimum of two measurement times) for 12 different TESs. This explains why only part of the taxonomy of Rapp et al. (2021) is included in the present review—no longitudinal papers were identified among the remaining TESs.

The third search investigated the possibility that qualitative papers were left out due to the search criteria, as the papers identified through this stage relied primarily on quantitative methods. The keywords used in addition to the actual TESs were *team* AND *qualitative* AND variants of words addressing temporal dynamics: *time*, *dynamic*, *develop*, *point* (addressing two or more measurement points), *wave* (addressing two or more waves), *follow-up*, *trajectory*, *change*, *period*, *emerge*, and *evolve*. Furthermore, as the screening of the identified papers went on, reference lists containing additional papers that were potentially relevant for this review were recorded. This led to a total list of 363 papers.

We screened the papers using a set of inclusion criteria: First, only empirical papers were included. The conceptual papers proved very useful in getting an overview of the field but are not included in the review as they do not provide empirical findings regarding temporal dynamics. Second, we included papers satisfying the definition of teams according to Thompson (2014)—groups with interdependency and a common goal. Thus, we included

organizational teams, student teams, military teams, and sports teams. Groups outside this definition, such as social groups and patient groups, were excluded. Third, only papers written in English were considered. Fourth, we incorporated peer-reviewed papers published in journals, leaving out conference papers and book chapters.

Additional inclusion criteria were applied to the papers employing quantitative and qualitative methods, respectively. For the former, only those with a minimum of two measurement times for the TES of interest were included. Papers with several measurement times that measured different constructs each time were excluded. For qualitative papers, the selection criteria were not as straightforward, but we mainly included papers that had two or more rounds of interviews, observations over time, and/or discussed the temporal aspect of TESs.

After this thorough examination of all potential papers, *115 empirical papers* were retained for the review. Among these, 94 papers used a quantitative method, 12 employed mixed methods, and nine were qualitative. The longitudinal papers dealt with team cohesion (40 papers), followed by team trust (26), team cognition (26), team confidence (18), and “other TESs” (17). Some papers measured several TESs, while other papers reported on two studies. The vast majority of papers were published within the last 20 years (Figure 1),²⁰ and the 115 papers were published in a wide range of journals (76); the most frequent were *Journal of Applied Psychology* (6), *Small Group Research* (5), *Group and Organization Management* (4), and *Team Performance Management* (4).

²⁰ The review includes papers published up to and including 2020.

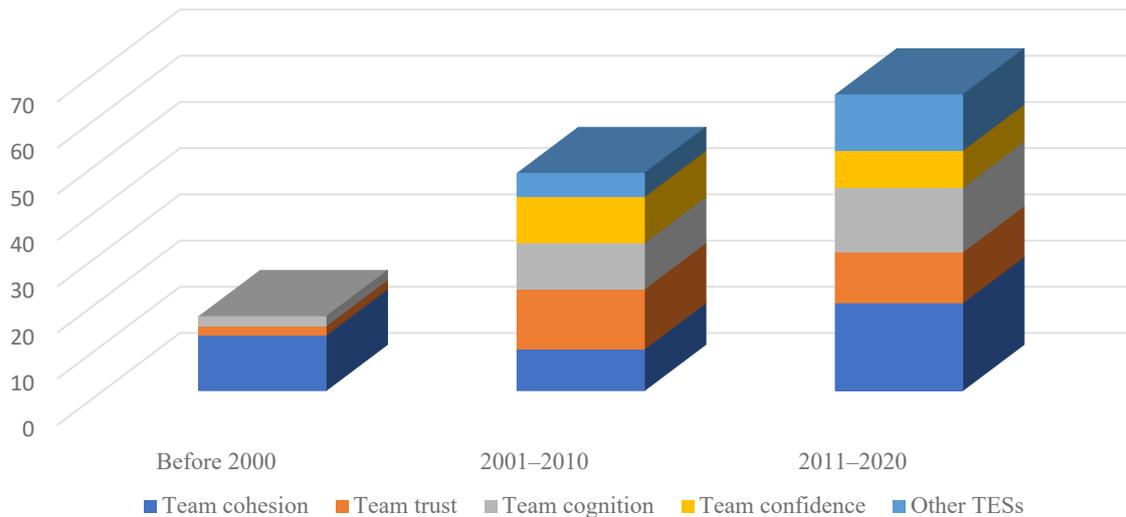


Figure 1. Longitudinal papers on TESs and their year of publication.

Team Emergent States

Below, we present the review by going through the TESs for which we have identified longitudinal papers. The structure when presenting each TES is as follows: First, we describe *how* the TES changes over time (potential patterns). Second, we focus on *why* (or why not) the TES changes over time (antecedents). Third, we point to *what* the consequences of these temporal dynamics are (outcomes). All identified papers are summarized in the tables included in Appendices 1–5.

Team Cohesion

Team cohesion has been described as a commitment of team members to the team’s overall task or to each other (Goodman et al., 1987), a felt attraction to a specific team (Salas et al., 2005), and a “bond” between team members (Casey-Campbell & Martens, 2009). Cohesion has been one of the most heavily studied group phenomena for several decades (Greer, 2012; McClurg et al., 2017). Still, the number of papers studying cohesion over time is scarce, given the large number of papers on cohesion in teams (Mathieu et al., 2015; Salas et al., 2015). Appendix 1 summarizes the research on temporal dynamics of team cohesion.

How Does Team Cohesion Change Over Time?

Of the 40 longitudinal papers on team cohesion, cohesion changes over time in 25 papers and appears stable in 13 papers; two papers explore cohesion from a qualitative perspective. Our analysis shows that there is no uniform pattern. Among the 25 papers with changes in cohesion, 10 see a significant rise, five find fluctuating patterns, three show a decrease, and seven papers report changes in cohesion, but it is unclear how.²¹

Why Does Team Cohesion Change (or Not)?

An *increase* in cohesion may be related to feedback (Bowen & Siegel, 1973), team-building (DiMeglio et al., 2005), a motivational climate (McLaren et al., 2015), and the use of humor in meetings (Ponton et al., 2019). Studying teams on a military exercise, the unique challenges the teams went through had a larger impact on cohesion than simply time spent together (Bartone et al., 2002). Walker et al. (2012) focused on organizational design factors in their experiment and found designs focusing on widespread information sharing led to an increase in cohesion, which the traditional command and control design did not.

Where cohesion *decreased* over time, the reasons can lie in a lack of positive antecedents. Garcia-Calvo et al. (2014) explained the downward trend in cohesion due to the absence of a motivational climate, supporting the importance of such a climate for cohesion found by McLaren et al. (2015). Spending less time together and feeling less included were explanations for the decrease in cohesion in military units returning from a deployment (Jones et al., 2018).

How such variables are more or less present over time can again explain why cohesion might *fluctuate* over time. Bartone and Adler (1999) found that cohesion levels developed in an inverted U-pattern through a military deployment. The medical task force members they

²¹ These papers either report that mean values do not correlate over time without addressing the change itself or discuss the development of cohesion more generally without reporting values.

studied felt more cohesive when they were able to use their skills to help others. However, along with a motivational drop, cohesion fell in the second half of the mission.

In four studies, cohesion increased at first before *stabilizing*. Following students over a semester, Bugen (1977) found cohesion increasing for the first five weeks and no significant change after that. Similar findings were reported by Braun et al. (2020), Mathieu et al. (2015), and Pandhi et al. (2018), despite very different time spans (2.5 hours, 10 weeks, and 12 months, respectively). The reasons discussed for such mid-course changes are teams reaching a steady state at which cohesion levels are “high enough” and different transitions throughout a team’s life span. Moreover, in papers where cohesion *did not change* significantly between measurements, sufficient time for cohesion development is an area of discussion (e.g., Chang & Bordia, 2001).

What Are the Consequences of Changes in Team Cohesion?

How cohesion develops can affect other team phenomena such as conflict (Jehn & Mannix, 2001). In a study on research teams, project-related work conflict decreased over time as cohesion increased (Susskind & Odom-Reed, 2019). Furthermore, the effect cohesion has on other variables might change over time. Despite cohesion remaining stable, Terborg et al. (1976) discovered that attitude similarity and cohesion were not significantly correlated until the fourth (of six) student projects. Thus, with a shorter study period, no relationship would have been observed.

The above variables may be both consequences and antecedents to cohesion. One reason for using longitudinal designs is to test causality between the variables of interest. The issue of causality has been thoroughly studied in the relationship between cohesion and team performance, with 13 papers in this review addressing this relationship. Three found that team performance leads to cohesion, two found that cohesion leads to performance, five found no causal predominance between the two, and three found a correlation but did not address

causality. In their meta-analysis, Mathieu et al. (2015) summarized that cohesion and performance affect each other equally through “a remarkably balanced reciprocal relationship” (p. 718). Braun et al. (2020) support such a reciprocal relationship; however, the degree to which cohesion and team performance predicted each other was weakened the more the teams worked together. Apparently, team performance was less dependent on cohesion as teams developed (Braun et al., 2020).

Team Trust

Trust concerns the willingness to make oneself vulnerable to the actions of others (Mayer et al., 1995) and has been studied at different levels (e.g., group, organization, and society). Team trust, or interpersonal trust within a team, limits the scope to cover only trust in team member relations, which can be cognition-based (calculative and rational) and affect-based (emotional and social; (Kanawattanachai & Yoo, 2002).²² Despite being a heavily studied TES for decades, team trust has been the subject of only a few longitudinal papers addressing its temporal dynamics (Fry et al., 2017). Appendix 2 summarizes the research on temporal dynamics of team trust.

How Does Team Trust Change Over Time?

Twenty-six papers on team trust met the inclusion criteria for this review—24 quantitative papers comprising 26 studies and two qualitative papers. Eighteen reported changes in trust, among which four found an increase in trust, six different or fluctuating patterns, and five a decrease in trust. In the remaining three, trust emerged very differently across teams, or its emergence was discussed from a different perspective than trajectories over time. Thus, like team cohesion, team trust does not appear to follow a readily identifiable trajectory. For example, following teams closely over 15 weeks, Preast (2012) found no

²² In the TES taxonomy by Rapp et al. (2021), these two forms of trust are treated separately, with cognition-based trust placed in the category of cognitive TESs. However, they are combined in this review since many studies measure both, and the relation between them is potentially interesting for understanding team trust development.

universal patterns of trust over time. Rather, teams experienced trust trajectories where trust increased, decreased, remained horizontal, was S-shaped, or was U-shaped. In another case, Kanawattanachai and Yoo (2007) found cognition-based trust to follow an inverted U-pattern. Such a diverse collection of trajectories is supported by the overall impression from the papers included in this review.

Why Does Team Trust Change (or Not)?

The variables identified as predictors of interpersonal trust in cross-sectional studies appear to contribute to an *increase* in trust over time as well. For instance, Jehn and Mannix (2001) found that trust correlated positively with respect, liking, open-conflict norms, and cohesiveness over a student semester. Social communication that complemented rather than substituted for task communication strengthened trust in a study by Jarvenpaa and Leidner (1999). Other variables identified as playing a role in team trust changes are cognitive foundations like the ability to respect deadlines and to meet fixed goals (Daassi et al., 2006), high initial social capital (A. C. Costa et al., 2009), and collaboration facilitation (Cheng et al., 2016a).

Where trust *decreased*, other variables are highlighted as potential explanations. Piccoli and Ives (2003) found that behavioral control had a negative impact on trust development in virtual teams. However, in teams already high in trust, behavior control had no detectable effect on trust. Similarly, lower autonomy may relate to lower team trust and increased team conflict (Jehn & Mannix, 2001; Langfred, 2007).

In several studies, trust was initially high before decreasing—in a sense contrary to the notion of trust growing as people work together more (Jarvenpaa et al., 2004). The reason may lie in different grounds for trust. *Swift trust*—a form of initial trust between team members before they have interacted (Meyerson et al., 1996)—is a depersonalized choice more than an affective or cognitive construct, according to Jarvenpaa et al. (1998). A. C.

Costa et al. (2009) discuss how high initial trust can relate to a propensity to trust, unit-grouping categorization mechanisms, and illusionary mechanisms, followed by a decline in trust over time as teams actually work together. Overly optimistic expectations and trust based on inadequate information are other potential explanations for observed declines in trust (Crisp & Jarvenpaa, 2013; McNab et al., 2012). Based on these findings, team trust may not only emerge over time but also relate to different variables at different time points (McNab et al., 2012; Piccoli & Ives, 2003).

Some studies have found team trust to be relatively stable over time. In virtual student project teams, trust was most likely created via the communication behavior established early in the teams' work (Jarvenpaa & Leidner, 1999). The first messages set the tone for how its members interrelated virtually. Very few teams shifted from a low initial trust condition to a high trust condition, indicating some stability in team trust once it is established. Eight papers showed a non-significant change in team trust, yet few specific variables were identified as reasons for this stability. However, considering the complexity in how relations are formed and developed, the variables pointed out as positively and negatively affecting team trust over time might balance each other out, indicating a certain stability in something that is in fact quite dynamic. Moderating effects and within-team differences such as trust asymmetry not covered by mean values might also explain some of these findings (De Jong & Dirks, 2012).

What Are the Consequences of Changes in Team Trust?

Trust emerging in the early phases of a team's life cycle affects several team processes, such as positively impacting later communication (Jarvenpaa et al., 2004) and negatively predicting later task and relationship conflict (Curşeu & Schreijer, 2010). The most studied relationship in these longitudinal papers, however, is that between team trust and team performance. Both early and later trust have been positively linked to team performance in virtual teams (e.g., Jarvenpaa et al., 1998; Jarvenpaa & Leidner, 1999) and teams that meet

face to face (Jehn & Mannix, 2001). Furthermore, a positive reciprocal relationship between team trust and team performance—similar to that between cohesion and team performance—has been suggested (e.g., Jaakson et al., 2019; Kanawattanachai & Yoo, 2002).

However, not all studies confirm the positive relationship between team trust and team performance. Preast (2012) found no predictive value of trust on team performance during a student semester. Furthermore, Miles (2016) discovered that high trust early in team tenure can be harmful to overall team performance, and low-performing teams were actually more willing to trust each other than high-performing teams. According to Crisp and Jarvenpaa (2013), expected trusting beliefs (i.e., beliefs before any team interaction) may have a negative effect on team performance. In a qualitative paper, Moldjord and Hybertsen (2015) studied a helicopter crew on a military deployment and found that increased familiarity and trust over time led to a gradual improvement in reflections on practice; however, the team experienced setbacks after crew rotations. These results indicate that the picture is more complex than the perhaps intuitive assumption of trust being exclusively positive for performance. Potential reasons for these mixed findings may be contextual (Jarvenpaa et al., 2004), different trust dimensions (Webber, 2008), a dynamic relationship between team trust and team performance (A. C. Costa et al., 2009), and neglecting the importance of within-team dispersion (De Jong & Dirks, 2012).

Team Cognition

Team cognition is “the manner in which knowledge that is important to team functioning is mentally organized, represented, and distributed within the team” (Gevers et al., 2020, p. 136). In the examination of the role of emergent collective cognition in team functioning, numerous cognitive TESs have been studied (DeChurch & Mesmer-Magnus, 2010; Rapp et al., 2021). We use *team cognition* as an umbrella term to cover four TESs for which longitudinal studies have been identified: *team knowledge*, a component of team

cognition that includes constructs such as shared mental models and team situation models (Cooke et al., 2003); *team mental models*, an organized understanding or mental representation of knowledge that is shared by team members (Mathieu et al., 2005); *transactive memory systems*, a combination of the knowledge possessed by each individual and a collective awareness of who knows what (Wegner, 1987); and *team goal orientation*, a pattern in the nature of the goals on which teams collectively choose to focus at a given time and in the context of their current team tasks (Maltarich et al., 2016).²³ Appendix 3 summarizes the research on temporal dynamics of team cognition.

How Does Team Cognition Change Over Time?

Of the 26 longitudinal papers on cognitive TES, 18 of the 24 studies using quantitative methods found that team cognition changed. As with the previously discussed TESs, cognitive states emerged in different ways. Among the 18 studies, eight found an increase (for the whole or parts of the sample), three papers found different or fluctuating patterns, two papers showed a decrease, while five papers reported changes but were not specific as to how.

However, change in team cognition may be somewhat different from other TESs. While most TESs are traditionally measured by averaging individual perceptions, cognitive TESs are mainly measured through *sharedness*—the degree to which team members answer the same way, have the same understanding and knowledge, and so on. Hence, change in team cognition indicates a change in *similarity* in scores: whether team members’ mental models become more or less shared relative to an earlier point in time is what counts, rather than the absolute or mean levels of team cognition.²⁴

²³ Team cognition is both studied as a specific TES and used as an umbrella term for all different cognitive TESs. Two identified papers study team cognition specifically (Gevers et al., 2020; He et al., 2007). These are included under “Team/shared knowledge” in Appendix 3 to avoid confusion.

²⁴ There are, however, some exceptions. For example, Kneisel (2020) measured both task mental model *similarity* and task mental model *quality*, with quality addressing the accuracy of the teams’ reflection. Furthermore, Kneisel (2020) found that these subdimensions of shared mental models develop differently over time (although both increase), highlighting that these dimensions are actually distinct. For transactive memory systems, there are different methods of measuring and different subdimensions, some knowledge-based and others perception-based.

Why Does Team Cognition Change (or Not)?

In the eight studies where team cognition *increased* between measurements, time itself was a factor in the development of cognition. Awareness of expertise location and shared task understanding may develop positively as team members work together (He et al., 2007).

Other variables that positively affect team cognition over time are repeated and regular team reflections (Kneisel, 2020), team-based learning activities (Johnson & Lee, 2008), rotation of roles and breaking out of comfort zones (Olaisen & Revang, 2018), and computer-based training strategies (Smith-Jentsch et al., 2001). Furthermore, as in studies on cohesion where teams initially experienced an increase before it stabilized, Kanawattanachai and Yoo (2007) found transactive memory systems to follow the same pattern. Early and frequent task-oriented communications played a critical role in forming the initial beliefs about one another's specialized knowledge. Once such beliefs set in, they appeared difficult to change (Kanawattanachai & Yoo, 2007).

A common assumption in the studies is that team cognition develops positively (e.g., Levesque et al., 2001), and it certainly seems intuitive that we increase our knowledge and think more alike the more we work together. However, through two studies, Cooke and colleagues (2001; 2003) did not find any change in taskwork knowledge (i.e., the actual shared understanding within teams). They point to possible explanations such as fatigue and boredom to explain their findings (Cooke et al., 2001). In addition, some studies actually report a *decrease* in shared mental models, which become less similar over time (e.g., Toader & Kessler, 2018). Discovering that team members interacted less following high role differentiation, Levesque et al. (2001) suggest that teams with low role differentiation in the early phases might interact more and, through that more intensive contact, develop shared mental models in later phases.

The issue of time appears relevant to explaining team cognition. Nevertheless, the *role* of time is not straightforward. Contrary to studies where time was a predictor of team cognition (e.g., He et al., 2007), Smith-Jentsch et al. (2001) found that time alone was insufficient to develop similar mental models. Similarly, Edwards et al. (2006) proposed that a relatively short time interval could explain the lack of significant increase in similarity and accuracy over time in their study. An important note here is that He et al. (2007) measured over five weeks, while Smith-Jentsch et al. (2001) and Edwards et al. (2006) both measured over only two days. Hence, time may indeed play a part—it is perhaps more a question of *sufficient* time.

Adding to the discussion on the time necessary to develop team cognition, *how* time is spent appears important. Studying a basketball team through the course of a single game, Bourbousson et al. (2011) found that the *degree* of sharedness and the *content* of shared knowledge were both highly dynamic, even over such a short time period. On the contrary, in a strategy competition over five weeks, team mental models did not become more similar (Santos & Passos, 2013). The little available time for interaction was one possible reason. Moreover, Santos and Passos (2013) suggested that the nature of the feedback given could explain the lack of team mental model updates. Teams were only given performance-based feedback. Mathieu et al. (2000) discuss the same aspect—whether the lack of developmental feedback could explain the lack of increase in mental model sharedness—indicating that feedback is a critical antecedent for team cognition to emerge.

What Are the Consequences of Changes in Team Cognition?

A majority of the papers looked at the effect of team cognition on team performance. In general, the expected positive relationship was confirmed across various team tasks and time spans (e.g., Guchait et al., 2014; Johnson & Lee, 2008; Lewis, 2004; Marks et al., 2000; van der Haar et al., 2015; Yang et al., 2016). Interestingly, *how* team cognition develops may

also play an important role. For example, Gevers et al. (2020) [ENREF_28](#) found that an *increase* in shared cognition led to larger benefits for team performance through team potency than the *initial* levels of shared cognition in professional IT teams.

However, although most research points to the positive effect of team cognition on performance, there are some exceptions. Most notably, Toader and Kessler (2018) found that when given an external task intervention, teams with divergent mental models performed better than teams with mental models converging over time. Thus, *sharedness* in itself is not necessarily a sufficient criterion for improved performance—*quality* may matter as well. Moreover, studies have revealed that the relationship between cognition and performance may be dynamic (e.g., Edwards et al., 2006). According to Mohammed et al. (2015), temporal team mental models formed later in a team’s development exerted a stronger effect on team performance than mental models formed earlier. Finally—similar to team cohesion—team cognition was found to have a reciprocal relationship with team performance (Maltarich et al., 2016).

Team Confidence

We identified longitudinal papers for two variants of team confidence: team efficacy and team potency. *Team efficacy* is defined as “a shared belief in a group’s collective capability to organize and execute courses of action required to produce given levels of goal attainment” (Kozlowski & Ilgen, 2006, p. 90), whereas *team potency* is a “collective belief of group members that the group can be effective” (Shea & Guzzo, 1987, p. 26). While the difference between these constructs may not be perfectly clear, Rapp et al. (2021) still separated them into beliefs about *task-specific* team ability (team efficacy) and *general* team ability (team potency). Appendix 4 summarizes the research on temporal dynamics of team confidence.

How Does Team Confidence Change Over Time?

Of the 18 longitudinal papers on team confidence, team confidence changes over time in nine papers. In eight papers, team confidence did not change considerably, whereas one qualitative paper did not measure these dynamics in quantitative terms. Similar to the previously discussed TESs, team confidence emerges quite differently: Four of the nine studies found an increase over time (for the whole or parts of the sample), two found a decrease, two found fluctuating patterns, and one paper reports changes in team confidence, but from a different perspective than trajectories over time.²⁵

Why Does Team Confidence Change (or Not)?

Where team confidence *increased* over time, this was positively related to variables such as performance feedback and engagement in teamwork behaviors from other team members (Tasa et al., 2007), self-regulation and average self-efficacy (Dierdorff & Ellington, 2012), and task engagement and task performance (Rodríguez-Sánchez et al., 2021). However, there are inconsistent findings as to whether time itself has an impact on team confidence. Salanova et al. (2011) found a significant and positive linear trend over time for collective efficacy during a six-week study. However, collective efficacy did not change between two sessions in a later one-week study (Salanova et al., 2014). Arthur Jr et al. (2007) found team members agreeing more on the team's collective efficacy the more they worked together. While the mean level did not necessarily increase, the degree of shared perceptions did grow.

²⁵ It is worth noting when analyzing change over time how these constructs are measured. Self-efficacy is a common construct in psychological research, and efficacy at other levels (such as the group level) has occasionally been measured by aggregating individual self-efficacy (Watson et al., 2001). However, this may be inappropriate since the individual and the team can serve as significantly different references (Bandura, 2000). Furthermore, self-efficacy and team efficacy are not necessarily related (Dierdorff & Ellington, 2012). Arthur et al. (2007) found that the method used may give different trajectories (improved agreement on a team's collective efficacy was observed earlier using a referent-shift measure than using aggregated individual self-efficacies) and provide different conclusions (referent-shift measures showed a stronger relationship with team performance than did aggregated individual self-efficacies).

A *decrease* in collective efficacy throughout a soccer season was explained by increasing conflict levels and decreasing cohesiveness (Leo et al., 2015). In a study on student teams working in a real-life setting, group potency dropped significantly over nine weeks (Lester et al., 2002). Teams with charismatic leadership dropped less in group potency than other teams. Moreover, Gevers et al. (2020) found *fluctuating* patterns of team potency in professional IT project teams. The teams experienced a drop in potency in the first period, but it increased in the second period. Increases in shared cognition over time improved team performance, spurring greater increases in team potency.

Some studies have found team confidence to be more *stable*. In a two-hour experiment, computer-mediated teams reached a certain level of collective efficacy early, and that level did not vary over the rest of this short time period (Capiola et al., 2019). Similarly, despite a significant increase in group efficacy in the second half of a semester, Lee et al. (2002) did not find any change in team potency during the same period. Possible explanations lie in the nature of the tasks given to the teams (unfamiliar and complex) and significantly different projects for teams, with little direct transfer of knowledge or skills required.

What Are the Consequences of Changes in Team Confidence?

Studies of team confidence have demonstrated several positive outcomes when measured over time. Salanova et al. (2011) found that efficacious groups felt more enthusiastic and thus more engaged over time. Comparably, higher team efficacy is related to improved team cooperation quality and more effective strategic decision making, according to Dierdorff and Ellington (2012). Tasa et al. (2007) found early teamwork behavior to be related to subsequent collective efficacy and to final team performance. Other studies have supported this positive relationship between early team potency and later performance (Lester et al., 2002) and between early team efficacy and later performance (Capiola et al., 2019; Collins & Parker, 2010). However, not all studies are as clear on the positive relationship

between team confidence and team performance. In a study following student groups, only group potency had a positive effect on team performance—group efficacy was unrelated to team performance (Lee et al., 2002).

The causal direction between team confidence and team performance can also go the other way. In a study of contemporary teams in a decision-making simulation, team task engagement and past task performance positively predicted future collective efficacy (Rodríguez-Sánchez et al., 2021). Moreover, reciprocal relationships have been found between team potency and team effectiveness (Pearce et al., 2002), collective efficacy and team performance (Myers et al., 2004), and collective efficacy beliefs and collective flow in the form of positive affect (Salanova et al., 2014).

Importantly, *when* confidence is developed may also matter for its impact on other team phenomena. Goncalo et al. (2010) found that collective efficacy was negatively related to process conflict, but only during the early stages of the group project. Teams with a high level of collective efficacy during later stages experienced more process conflict early on and had higher team performance toward the end. Thus, overly high collective efficacy that appears too early might have a negative impact on team performance. A potential explanation is that teams with “premature” efficacy may suppress beneficial forms of conflict and lose out on important discussions (Goncalo et al., 2010).

Other Team Emergent States

In addition to the four categories of TESs discussed above, we found longitudinal studies of the following TESs: team climate, team identification, team psychological safety, and team engagement. We found relatively few papers on these other TESs and therefore discuss each briefly in this section. Appendix 5 summarizes the research on temporal dynamics of these TESs.

Temporal Dynamics of Team Climate

A team climate reflects team members' shared perceptions (Anderson & West, 1998) of the set of norms, attitudes, and expectations operating within the team (Schneider, 1990). It is commonly measured through the *team climate inventory*, which consists of four factors: vision, participative safety, task orientation, and support for innovation (Anderson & West, 1998). In the four papers reviewed here, team climate generally remained fairly stable over time (e.g., Kinnunen et al., 2016; Loo, 2003). Still, these papers reveal some insights into the developmental pattern of a team climate and the conditions for such development. For example, Primus and Jiang (2019) found that creative start-up activities could contribute to a positive team climate in an experimental context. The team climate remained positive in the long run and was higher than in two control groups. Hence, the early phase of teamwork appears to be important to establishing a team climate.

Temporal Dynamics of Team Identification

Team identification refers to “an individual’s identification with the work team she or he is assigned to” (Huettermann et al., 2017, p. 218): more specifically, it refers to people’s sense of commitment to and involvement with their team (Allen & Meyer, 1996). Five studies were relevant for this review. Two of the three quantitative papers found relatively stable identification levels over two measurement time points (Hobman & Bordia, 2006; Johnson & Avolio, 2019), although neither focused particularly on team identification trajectories, instead measuring team identification twice in order to test causal inferences with other variables. Interestingly, team identification lost its potential as a conflict-reducing force over time (Hobman & Bordia, 2006). Apparently, individuals’ differences in values became more salient the more the teams worked together. Other (qualitative) studies have explored how leadership behaviors are relevant for team identification development (Huettermann et al., 2014).

Temporal Dynamics of Team Psychological Safety

Team psychological safety is described as “a shared belief that the team is safe for interpersonal risk taking” (Edmondson, 1999, p. 354), such that team members are able to show and employ their true selves without fear of negative consequences (Kahn, 1990).²⁶ Despite a considerable amount of research on team psychological safety in recent years (Frazier et al., 2017; Newman et al., 2017), studies on its temporal dynamics remain scarce. Only four longitudinal papers met this review’s inclusion criteria. Team psychological safety appeared relatively stable over time in three of those studies (e.g., Johnson & Avolio, 2019). However, as with the point made on team climate, some of the temporal dynamics of psychological safety become visible through its dynamic relationship with other variables over time. For instance, goal clarity only predicted psychological safety in the later stages of a project (Edmondson & Mogelof, 2006). In a further demonstration of its dynamic nature, Schulte et al. (2012) found team psychological safety to decrease over time, while Mohan and Lee (2019) found team psychological safety and collective global leadership to have a reciprocal influence beginning from the middle stages of a team’s life cycle.

Temporal Dynamics of Team Engagement

Team engagement has been studied through somewhat different lenses (e.g., team work engagement and task collective engagement), yet the various constructs appear relatively similar.²⁷ P. L. Costa et al. (2014) defined “team work engagement” as “a shared, positive and fulfilling, motivational emergent state of work-related well-being” (p. 418). As

²⁶ This construct is somewhat similar to one of the elements of team climate, participative safety: “an interpersonal atmosphere of non-threatening trust and support” (Anderson & West, 1998, p. 240).

²⁷ The four included papers all use slightly different terms: team engagement (Guchait, 2016), team work engagement (P. L. Costa et al., 2017), task collective engagement (Salanova et al., 2011), and collective task engagement (Rodríguez-Sánchez et al., 2017). However, all four are connected to the notion of *work engagement*, defined as “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption in the activity” (Schaufeli et al., 2002, p. 72). Summarizing the literature on work engagement, Schaufeli (2012) uses the term “team-level engagement” as the term for the collective version of work engagement. Despite smaller differences within the construct, they appear relatively similar. Moreover, they use the same or similar scales that are variants of the Utrecht Work Engagement Scale.

with the other TESs in this section, the general trend in the four included papers about team engagement is toward a certain stability. However, team engagement was one of several measured constructs in most of these studies, and the temporal dynamics of team engagement was not discussed in detail. However, Guchait (2016) found that team engagement over time mediated the positive relationship between team cognition and team outcomes like performance and satisfaction. Team engagement appeared less stable in the study by P. L. Costa et al. (2017): engagement increased for all six teams in their explorative study, which appeared to be due to both affective interpersonal processes (acceptance and positive engagement) and motivational processes (recursive positive feedback and highlighting the teams' wins).

Discussion

Despite the definition of the dynamic nature of TESs (Marks et al., 2001) and long-time calls for studies on their temporal dynamics (e.g., Delice et al., 2019; McGrath, 1991; Terborg et al., 1976), there remains a scarcity of longitudinal research on the topic (Bradley et al., 2013; Fry et al., 2017; Kneisel, 2020; Mathieu et al., 2015; Waller et al., 2016). The present review offers a comprehensive and integrative overview of 115 longitudinal studies on TESs. Through this, we review what we do know and preview what we need to learn about TESs' temporal dynamics. Below, we summarize our work as four lessons learned and four lessons to be learned. We begin by elaborating on the former (see Table 1).

Table 1. Lessons Learned.

Lessons learned	Main takeaways
<i>The role of time: TESs have no universal pattern</i>	<ul style="list-style-type: none">• We find temporal dynamics of TESs in about two thirds of the included papers. There are as many papers reporting an increase as there are papers reporting a decrease or fluctuation combined.• There are indications that some TESs, such as team cognition, develop more quickly than other TESs.
<i>The role of design: TESs should be measured as emergent</i>	<ul style="list-style-type: none">• Studies with three or more measurement times show dynamics that are not always displayed by two measurement times.• Regardless of time span, a majority of studies disclose temporal dynamics of TESs, which emerge over both shorter and longer time periods.
<i>The nomological net: Why TESs emerge and what the consequences are</i>	<ul style="list-style-type: none">• The most common variables studied in relation to TES temporal dynamics are team performance, conflict, communication, and feedback.• These variables are studied as both antecedents and outcomes, leaving us with a highly complex picture of what determines and follows TES emergence.
<i>The payoff: Why studying the emergent in TESs matters</i>	<ul style="list-style-type: none">• Longitudinal studies add important value to cross-sectional studies, revealing causality and reciprocation and enriching our understanding of the emergence of a given TES.• TESs may relate differently to other variables (both antecedents and outcomes) at different time points.

Four Lessons Learned

1. The Role of Time: Team Emergent States Have No Universal Pattern

Our review shows that TESs emerge over time but display no universal pattern. Table 2 shows the number of studies of the different TESs included in this review, as well as observed trends, length of measurement periods, and number of measurement times. As the table reveals, 74 of 120 of the quantitative studies find that TESs emerge over time. In addition, 10 qualitative studies indicate temporality in TESs. Thus, about two thirds of the included papers show temporal dynamics. For the remaining papers, which indicate stability over time, there may still be temporal dynamics worth noting. In several studies where the

TES appeared stable (i.e., its mean level did not change over time), that state has nevertheless proven dynamic through a changing relationship with other studied variables over time. For example, Susskind and Odom-Reed (2019) did not see a significant increase in cohesion when studying mean levels. However, they did find change in cohesion to correlate negatively with change in conflict and positively with change in individual performance.

With the majority of research confirming the notion of TESs as dynamic—as Marks et al. (2001) suggested—it is worth asking *how* these dynamics develop. In our review, we found no general pattern or trajectory in the temporal dynamics across the various TESs. In the quantitative papers that reveal TES dynamics, 27 indicated an increase, 14 a decrease, 16 a fluctuating pattern, and 17 a dynamic but unclear pattern (see Table 2 for details). In other words, approximately as many papers indicated an increase as a decrease or fluctuation combined. Interestingly, the somewhat common assumption that some TESs, such as team cognition (Levesque et al., 2001) and team trust (Mayer et al., 1995), will increase over time is not supported.

This inconclusive pattern—or rather, lack of pattern—is representative of most TESs. However, there are some exceptions. For the TES appearing most dynamic—team cognition—as much as 75% of the studies indicate change over time. In the Others category, including team climate, team identification, team psychological safety, and team engagement, the TESs are least dynamic, with only 27% of studies indicating temporal dynamics. One interpretation of these differences is that some TESs are more susceptible than others to change over time. More specifically, team cognition seems to develop more quickly than, for example, team engagement. However, there may be other explanations since these TESs also stand out in two other ways: Team cognition is the only TES for which a majority of studies were conducted over a time span shorter than one week, and the TESs in the Others category

Table 2. Number of Studies, Observed Trends, and Measurement Data for TES Categories.

TES	Number of quantitative studies (including mixed methods)	Trend						Length of measurement periods			Number of measurement times		Number of qualitative studies
		Stable	Dynamic	Pattern of dynamics				Shorter than one week	One week to one semester	Longer than one semester	Two	Three or more	
				Increase	Decrease	Fluctuating	Unclear ^a						
Team cohesion	38	13 (34%)	25 (66%)	10	3	5	7	3	24	11	15	23	2
Team trust	26	8 (31%)	18 (69%)	4	5	6	3	1	22	3	11	15	2
Team cognition	24	6 (25%)	18 (75%)	8	2	3	5	12	11	1	9	15	3
Team confidence	17	8 (47%)	9 (53%)	4	2	2	1	1	13	3	8	9	1
Others	15	11 (73%)	4 (27%)	1	2	0	1	0	9	6	10	5	2
Total	120^b	46	74	27	14	16	17	17	79	24	52	68	10^c

^a These papers either report that mean values do not correlate over time without addressing the change itself or discuss the development of cohesion more generally without reporting values.

^b Some quantitative papers include two or more studies and/or TESs, which explains why the total number of studies in this table differs from the number of quantitative papers (106) included in the review.

^c One qualitative paper includes two TESs, which explains why the total number of studies in this table differs from the number of qualitative papers (9) included in the review.

are the only ones where a majority of studies had only two measurement times. In the following lesson learned, we look more closely into these methodological aspects.

2. The Role of Design: Team Emergent States Should Be Measured As Emergent

In order to capture temporal dynamics, a TES must be measured more than once over time. Our review of the 115 papers enables an in-depth analysis of how research design relates to the temporal dynamics observed. Below, we discuss the role of the number of measurement times and study period length.

How many times? Ployhart and Vandenberg (2010) define longitudinal research as “research emphasizing the study of change and containing at minimum three repeated observations [...] on at least one of the substantive constructs of interest” (p. 97). Although designs with two measurement times are commonly referred to as longitudinal (Ployhart & MacKenzie, 2014), two measurement points may not reveal all that much about temporal dynamics (Coultas et al., 2014). According to Ployhart and MacKenzie (2014), such designs do not necessarily offer many more insights than a cross-sectional perspective and are not sufficient to adequately address questions of change.

Table 3 provides an overview of how the number of measurement times relates to the dynamics observed in the papers included in this review. In studies with two measurement times, the TES of interest appears less dynamic (42%) than stable over time, but this changes considerably as the number of measurement times increases: 76% of studies with three or more measurement times find TESs to be dynamic over time. Extending the number of measurements may reveal different patterns. Sixteen of these 68 studies (24%) found the TES of interest to fluctuate between measurement times, with no clear trend discernible. With only two measurement times, such dynamics are simply impossible to detect.

Table 3. Number of Measurement Times and Observed Trends for TESs.

Number of measurement times	Number of quantitative studies	Trend					
		Stable	Dynamic	Pattern of dynamics			
				Increase	Decrease	Fluctuating	Unclear
Two	52	30 (58%)	22 (42%)	9	6	N/A	7
Three or more	68	16 (24%)	52 (76%)	18	8	16	10
Total	120	46	74	27	14	16	17

When scrutinizing the differences between the various TESs, the same pattern is found; that is, the more measurement times, the more dynamic the TESs appear. Figure 2 shows the number of measurement times and the trend observed for each TES. Research designs with three or more measurement times reveal more dynamic TESs than those with two measurement times. However, designs with two measurement times are still able to capture temporal dynamics to some extent. For team cognition in particular, even with two measurement times there are more studies finding a dynamic than a stable trend. Thus, as previously suggested, team cognition may emerge in different—and perhaps more dynamic—ways than the other TESs. Yet, the overall pattern that three or more measurement times reveal more dynamics than two measurement times still holds for all TESs.

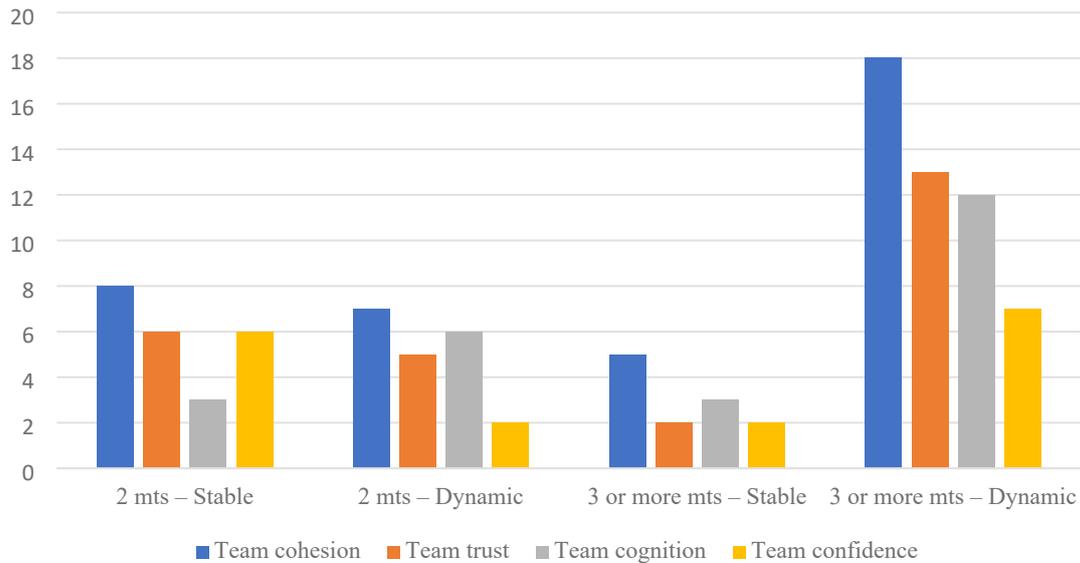


Figure 2. Number of measurement times (mts) and observed trend for various TESs;²⁸ number of papers (absolute values) on the y-axis.

To illustrate the potential deficiency of only two measurement times, the inverted U-pattern for cohesion found by Bartone and Adler (1999) would not have been discovered if cohesion had been measured only at the beginning and end of the military deployment under examination. In fact, cohesion would have (inaccurately) appeared quite stable. Similarly, team confidence has been found to fluctuate (Gevers et al., 2020), decrease (Lester et al., 2002), and increase (Lee et al., 2002). Although these findings seem to conflict, they may merely be consequences of the timing and number of measurements. Lester et al. (2002) and Lee et al. (2002) used two measurement times, while Gevers et al. (2020) used three. Hence, the pattern observed through two measurement times would not necessarily continue if the teams' confidence had been measured even one more time.

Concerning the number of measurement times, we conclude that these “semi-longitudinal” designs with two measurement times may offer a glimpse of the temporal dynamics of TESs; however, three or more measurement times will likely provide a fuller and more nuanced picture. This aligns with the conclusions from Coultas et al. (2014) and

²⁸ The four TESs in the Others category are not included due to the small number of papers on each.

Ployhart and MacKenzie (2014) cited above; however, through our review we provide specific empirical grounds for this assertion.

How long a period? The studies in this review used notably different measurement periods, from short experiments of less than an hour (e.g., Marks et al., 2000) to studies lasting more than a year (e.g., Kinnunen et al., 2016). Thus, our review allowed for a detailed examination of whether there are consistently different findings across various measurement periods. For simplification, we divided the studies into three categories: less than a week (typically lab sessions and short experiments), between one week and 15 weeks or a semester (student samples are common in the included papers), and more than 15 weeks or a semester.

Figure 3 reveals how measurement periods relate to the TES dynamic trends observed. Several interesting patterns emerge: First, for all three categories, a majority of studies indicate that TESs are dynamic. Based on that, it appears that TESs emerge in both the short and long run. Second, the proportion of studies finding TESs to be dynamic decreases as the time period increases (76% for the shortest time period, 62% for the middle, and 54% for the longest). Third, within the dynamic category, the proportion of studies finding an increase in a TES declines over time, whereas we see a broader spectrum of temporal dynamics in the studies with the longest time period, with more decreases and fluctuations.

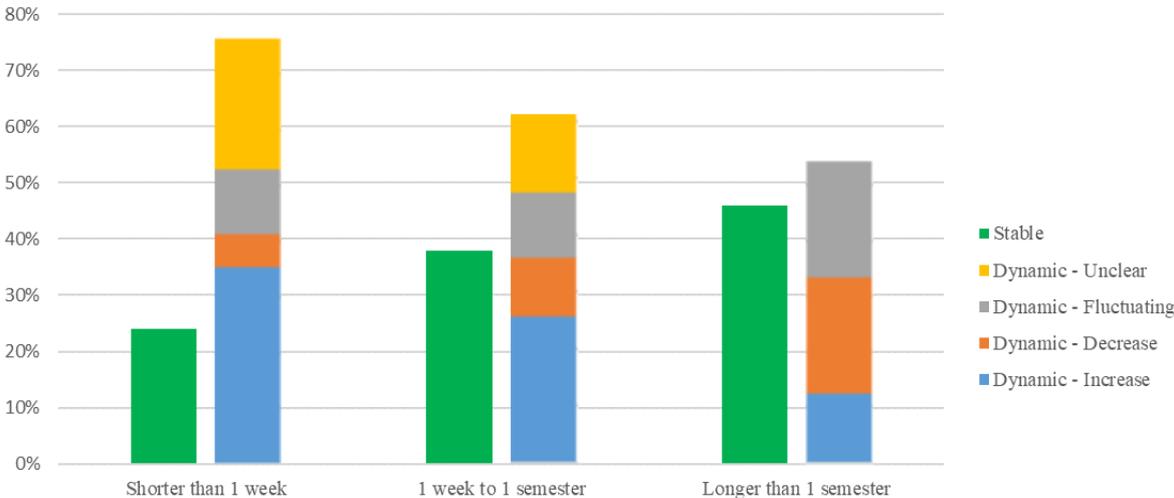


Figure 3. Length of measurement periods and observed trends for TESs.

Notably, the majority of studies included in our review with a time period shorter than one week are studies on team cognition. As noted above, there are indications that team cognition can develop more quickly than other TESs, which may explain why a majority of studies in the shortest time category displays temporal dynamics. There are very few studies shorter than one week on the other TESs, leaving us with thin ground on which to evaluate how they emerge in short time frames (see Table 2). Still, to explore differences across various TESs, we analyzed the dynamic aspect of all TESs across all three time categories. This revealed that the majority of studies display temporal dynamics regardless of time period and type of TES. Thus, all TESs emerge over short, middle, and long time periods.

3. The Nomological Net: Why Team Emergent States Emerge and What the Consequences are

In addition to assessing *how* TESs emerge over time and *how* TESs temporal dynamics can be captured through measurement, we examined *why* TESs emerge and *what* the consequences of changes in the TESs were. In the result section on the various TESs, antecedents and outcomes were treated separately. However, in our analysis integrating findings across the various TESs, we found that there was some overlap between antecedents and outcomes. In fact, the most frequently studied antecedents in the included papers were the same as the most commonly studied outcomes. Hence, a variable may be both an antecedent and outcome of TES temporal dynamics, and distinguishing between which one precedes (let alone causes) the other is not necessarily straightforward. Understanding more of these dynamic relationships may provide richer insights into TES temporal dynamics as such. Thus, we discuss antecedents and outcomes together.

Appendices 1–5 present the antecedents and outcomes of the TESs studied in each of the 115 papers.²⁹ Table 4 gives an overview of antecedents and outcomes that relate to the

²⁹ While some papers connect antecedents to the level of a TES at a certain point in time, others associate antecedents with change in a TES, thus explaining the level of a given TES from one point to another.

temporal dynamics of TESs. The most common variables (in bold in Table 4) involve performance, conflict, communication, and feedback. Importantly, these four variables appear as common antecedents and/or outcomes across most TESs. We see no clear pattern as to which are more important for some TESs than others and discuss these variables across the various TESs below.

Team performance is the most frequently studied variable related to TES temporal dynamics. As many as 64 of the included papers cover team performance as a potential antecedent, outcome, or both. Team performance is a determinant of team cohesion (e.g., Bakeman & Helmreich, 1975), team trust (e.g., Kanawattanachai & Yoo, 2002), team cognition (e.g., Maltarich et al., 2016), and team confidence (e.g., Myers et al., 2004). In turn, the development of team cohesion (e.g., Dorfman & Stephan, 1984), team cognition (e.g., Marks et al., 2000), team confidence (e.g., Capiola et al., 2019), and team engagement (e.g., P. L. Costa et al., 2017) all have a positive effect on team performance. Several studies on team trust also confirm a positive effect on team performance over time (e.g., Jarvenpaa et al., 1998), but others report no or even negative effects of trust on team performance (e.g., A. C. Costa et al., 2009, Miles, 2016; Preat, 2012). Thus, the relationship between time, team trust, and team performance appears to be more complex than one might assume (Preat, 2012). Potential explanations of these mixed findings are different kinds of trust having different effects on performance (Webber, 2008), trust based on expectations more than experience (Crisp & Jarvenpaa, 2013), different effects based on time of measurement (A. C. Costa et al., 2009), and team members not sharing the perception of trust within the team (trust asymmetry; De Jong & Dirks, 2012).

We acknowledge that there may be a distinction between antecedents to TESs and antecedents to their temporal dynamics. The same may apply to TES outcomes and TESs' temporal dynamics. However, with the limited number and very different foci of the studies—with several papers not specifically addressing TES temporal dynamics—we lack sufficient grounds to discuss this matter further in this review.

Table 4. Antecedents and Outcomes of TES Temporal Dynamics (neg. = negative effect; rec. = reciprocal influence).

TES	Examples of antecedents (<i>Why</i> do dynamics occur?)	Examples of outcomes (<i>What</i> are the consequences of dynamics?)
Team cohesion	<ul style="list-style-type: none"> - Feedback (Bowen & Siegel, 1973) - Team-building (DiMeglio et al., 2005) - Motivational climate (McLaren et al., 2015) - Humor in meetings (Ponton et al., 2019) - Unique team challenges (Bartone et al., 2002) - Widespread information (Walker et al., 2012) - Time together (Jones et al., 2018) - Team performance (e.g., Bakeman & Helmreich, 1975) - Attitude similarity (Terborg et al., 1976) - Communication (Bradley et al., 2013) 	<ul style="list-style-type: none"> - Less work conflict (e.g., Susskind & Odom-Reed, 2019) - Team performance (e.g., Dorfman & Stephan, 1984) - More social interaction (Ponton et al., 2019) - Improved communication (e.g., Walker et al., 2012) - Reduced team stress (Hoang et al., 2020)
Team trust	<ul style="list-style-type: none"> - Respect, liking, open-conflict norms and cohesiveness (Jehn & Mannix, 2001) - Social and task communication (Jarvenpaa & Leidner, 1999) - Ability to respect deadlines and meet goals (Daassi et al., 2006) - High initial social capital (A. C. Costa et al., 2009) - Collaboration facilitation (Cheng et al., 2016a) - Team performance (e.g., Kanawattanachai & Yoo, 2002) - Performance feedback (Jaakson et al., 2019) - Behavioral control (neg.) (Piccoli & Ives, 2003) - Increased team conflict and lower autonomy (neg.) (Langfred, 2007) 	<ul style="list-style-type: none"> - Improved communication (e.g., Jarvenpaa et al., 2004) - Less task and relationship conflict (Curşeu & Schruijer, 2010) - Team performance <ul style="list-style-type: none"> o Positive effect (e.g., Jarvenpaa et al., 1998) o No effect (e.g., Preast, 2012) o Negative effect (e.g., Crisp & Jarvenpaa, 2013) - Cohesiveness (Kuo & Yu, 2009) - Increased collaboration (Wohlers & Hertel, 2018)
Team cognition	<ul style="list-style-type: none"> - Awareness of expertise location and shared task understanding (He et al., 2007) - Regular team reflections (Kneisel, 2020) - Team-based learning activities (Johnson & Lee, 2008) - Rotation of team roles (Olaisen & Revang, 2018) - Computer-based training strategies (Smith-Jentsch et al., 2001) 	<ul style="list-style-type: none"> - Team performance (e.g., Edwards et al., 2006) - Individual performance in teams (Johnson & Lee, 2008) - Improved understanding of teamwork (Cooke et al., 2001) - Less relationship conflict and improved effectiveness (Santos & Passos, 2013)

	<ul style="list-style-type: none"> - Early and frequent task-oriented communication (Kanawattanachai & Yoo, 2007) - Performance feedback (e.g., Yang et al., 2007) - Team performance (rec.) (Maltarich et al., 2016) - Fatigue and boredom (neg.) (Cooke et al., 2001) - High role differentiation (neg.) (Levesque et al., 2001) 	
Team confidence	<ul style="list-style-type: none"> - Performance feedback and team engagement (Tasa et al., 2007) - Self-regulation (Dierdorff & Ellington, 2012) - Task engagement and task performance (Rodríguez-Sánchez et al., 2021) - Increasing conflict levels and decreasing cohesiveness (neg.) (Leo et al., 2015) - Early communication, cooperation, and charismatic leadership (Lester et al., 2002) - Shared cognition (Gevers et al., 2020) - Team performance (rec.) (Myers et al., 2004) 	<ul style="list-style-type: none"> - Team engagement (Salanova et al., 2011) - Improved team cooperation quality and more effective strategic decision making (Dierdorff & Ellington, 2012) - Team performance (e.g., Capiola et al., 2019) - Team effectiveness (rec.) (Pearce et al., 2002) - Collective flow (Salanova et al., 2014)
Team climate	<ul style="list-style-type: none"> - Time, intentional strategies, commitment, and learning (Loewen & Loo, 2004) - Design thinking exercises (Primus & Jiang, 2019) 	<ul style="list-style-type: none"> - Authentic leadership (Kinnunen et al., 2016) - Reducing fear of failure and habitual thinking (Primus & Jiang, 2019)
Team identification	<ul style="list-style-type: none"> - Organizational restructuring process (neg.) (Jetten et al., 2002) - Enacting a salient identity, sensemaking about team experience, evaluating collective team outcomes, and converging identity (Huettermann et al., 2017) 	<ul style="list-style-type: none"> - Less relationship conflict in relation to value dissimilarity (Hobman & Bordia, 2006)
Team psychological safety	<ul style="list-style-type: none"> - Goal clarity and positive team interactions (Edmondson & Mogelof, 2006) - Collective global leadership (rec.) (Mohan & Lee, 2019) 	<ul style="list-style-type: none"> - More friendship and advice ties (Schulte et al., 2012) - Team identification (H. H. Johnson & Avolio, 2019)
Team engagement	<ul style="list-style-type: none"> - Collective efficacy (Salanova et al., 2011) - Shared mental models and transactive memory systems (Guchait, 2016) 	<ul style="list-style-type: none"> - Team performance (e.g., P. L. Costa et al., 2017)

Like team performance, *conflict* is studied as both an antecedent and outcome of TES temporal dynamics. Langfred (2007) found increased team conflict to relate to lower team trust, while Curşeu and Schruijer (2010) found that trust emerging in the early stages of team development negatively predicted task and relationship conflict in later stages. Changes in trust and cohesiveness over time were positively associated with open conflict norms and negatively associated with team conflict in the study by Jehn and Mannix (2001). A decrease in collective efficacy was partly explained by increasing conflict levels (Leo et al., 2015), while Santos and Passos (2013) found that teams who developed more similar team mental models experienced less relationship conflict.

Communication is another variable commonly found to act as an antecedent or outcome of TES temporal dynamics. Communication precedes cohesion in time, according to Bradley et al. (2013), while Walker et al. (2012) found that improved communication followed an increase in cohesion. Similarly, Jarvenpaa and Leidner (1999) found that trust in virtual teams is most likely created through communication behavior in the early stages of teamwork, while communication was an outcome of early trust development in another study (Jarvenpaa et al., 2004). Moreover, both the content and type of communication may matter for its relation to TES temporal dynamics. Early and frequent task-oriented communication has a positive impact on team cognition and trust (Kanawattanachai & Yoo, 2007) and team confidence (Lester et al., 2002). Face-to-face communication has been found to be more effective than computer-based communication for the development of both trust (Wilson et al., 2006) and team cognition (transactive memory systems; Lewis, 2004).

In contrast to the three previous variables, *feedback* is only studied as an antecedent of TES temporal dynamics in the studies included in this review. For example, feedback to student teams has been cited as an explanation for why cohesiveness increases (Bowen & Siegel, 1973) and a trigger of the evolution of collective efficacy (Tasa et al., 2007).

Interestingly, the type of feedback may matter more for TES emergence than whether or not it is given. Feedback without a developmental focus has been identified as explaining a lack of team mental model updates in different contexts (Mathieu et al., 2000; Santos & Passos, 2013), while negative feedback on performance has been cited for a decline in team trust in virtual student teams (Jaakson et al., 2019). Yang et al. (2016) found that negative performance feedback triggered the emergence of team mental models more than positive performance feedback; however, performance feedback had different effects on team mental models depending on the referents' past performance and degree of social comparison.

In addition to the four variables found to be associated with TES temporal dynamics, the included studies also show examples of how different TESs are related over time. For example, team engagement and collective efficacy may work together in a gain cycle over time, with one enhancing the other (Salanova et al., 2011). Other examples of related TES temporal dynamics include team engagement and team cohesion (Rodríguez-Sánchez et al., 2017), team psychological safety and team identification (H. H. Johnson & Avolio, 2019), team trust and team cohesion (Kuo & Yu, 2009), and collective efficacy and team cohesion (Leo et al., 2015). Overall, we are left with quite a complex picture of potential inputs, processes, and outputs. This complexity is a sign of how complex teamwork is in practice. Longitudinal studies on TESs have enabled richer insights into team dynamics, something our last lesson learned addresses.

4. The Payoff: Why Studying the Emergent in Team Emergent States Matters

Longitudinal designs are more demanding of time and resources than cross-sectional designs (Arrow et al., 2004). Hence, the extra resources researchers put into such studies must somehow be justified. What have we learned from the longitudinal papers in this review that cross-sectional studies had not already taught us?

The persistent discussion regarding the causal relationship between cohesion and team performance stands out as a good example of how our understanding has evolved by going beyond received wisdom or researcher expectations. Challenging the established assumption of cohesion as an important antecedent for team performance, Bakeman and Helmreich (1975) found causality to run in the opposite direction. Thirteen of the papers in our review address this relationship, and their findings are somewhat mixed. In their meta-analysis, Mathieu et al. (2015) confirmed a reciprocal relationship between cohesion and team performance. Through longitudinal designs, similar reciprocal relationships with team performance have been found for team trust (Kanawattanachai & Yoo, 2002), team mental models (Yang et al., 2016), team goal orientation (Maltarich et al., 2016), and collective efficacy (Myers et al., 2004). These insights may have both theoretical and practical implications and would not have been revealed through cross-sectional designs.

Furthermore, a team phenomenon may have different effects on team outcomes, depending on when it occurs in the team's life cycle. A. C. Costa et al. (2009) found trust to correlate positively with performance at the beginning and end of a project but negatively at its midpoint. Miles (2016) discovered that high early trust can be harmful to team performance. In addition, overly high collective efficacy that appears too early can have a negative impact on team performance (Goncalo et al., 2010). Similarly, Marques-Quinteiro et al. (2019) found that high initial cohesion led to decreasing trajectories of performance and coordination.

Longitudinal designs have not only revealed the temporal dynamics of TESs but also demonstrated in different ways their dynamism relative to both antecedents and outcomes. For example, longitudinal designs can be used to determine causality and offer insights into dynamism, with different variables relating differently to one another at different points in time. In papers like those discussed in this section, the TES level would thus depend on when

it was measured. Hence, the temporal dynamics of these TESs matter for any conclusions that are drawn.

Four Lessons to be Learned

Building on our lessons learned, we provide four suggestions for future research that involve conceptual clarification, theoretical frameworks, more qualitative studies, and clarifying research designs. Table 5 summarizes these four suggestions.

Table 5. Lessons to Be Learned.

Lessons to be learned	Main takeaways
<p><i>What, really, is a TES?</i> <i>The need for conceptual clarification</i></p>	<ul style="list-style-type: none"> • Similar constructs treated as states, processes, or something in between may cause confusion. • Disagreements over what a TES is or is not and how early one can measure it lead to different methodological approaches.
<p><i>What should guide our research?</i> <i>The need for bridging theory and empirical data</i></p>	<ul style="list-style-type: none"> • Loose connection between team development theories and studies on the temporal dynamics of TESs. • A closer connection to established theories may advance our understanding, such as how dynamics relate to stability, along with further developing these theories.
<p><i>How do TESs evolve?</i> <i>The need for qualitative studies</i></p>	<ul style="list-style-type: none"> • Qualitative research is useful for understanding team temporal dynamics since one is able to explore <i>how</i> and <i>why</i> change does or does not occur. • We suggest four topics where qualitative research would be particularly relevant and necessary, such as early versions of TESs.
<p><i>How can we measure TESs?</i> <i>The need for clarifying research designs</i></p>	<ul style="list-style-type: none"> • We provide support from empirical studies as to how lengths of studies and number of measurement times can be appropriate to detect meaningful forms of change. • Within-team dynamics, such as the development of shared perceptions, may offer insights that move beyond mean levels when studying temporal dynamics.

1. What, Really, Is a Team Emergent State? The Need for Conceptual Clarification

Going through the literature on TESs makes it clear that the distinction between states and processes is far from clear. According to Marks et al. (2001), TESs are products of team processes and inputs to subsequent processes. However, in some papers, the TES is treated as a process in itself. For example, team engagement, which is included in Rapp et al.'s (2021) taxonomy of TESs, is studied from a process perspective (e.g., Larson et al., 2020).³⁰ Similarly, Mathieu et al. (2008) describe team transactive memory as something between a TES and a process, whereas Rapp et al. (2021) present it as one of the two most frequently studied cognitive TESs. To avoid confusion when comparing findings across studies, we advise researchers to be clear on which perspective—process or state—they have adopted to study the emergent construct.

Moreover, understanding TESs as products of team processes (Marks et al., 2001) means it would not make sense to measure them before team interaction has begun (Bradley et al., 2013; Carter et al., 2018). On this argument, several studies do not measure the initial levels of a TES; rather, they give it time to emerge as a shared construct (e.g., Porter et al., 2010). Other papers specifically measure early versions of TESs to follow their development over time. The swift development of trust, in particular, has been studied through several longitudinal papers. Comparing these findings with studies that argue against TESs being measured that early and instead waiting for the team to have started its work before trust is measured is not straightforward. Moreover, if team processes are necessary for TESs to emerge, one could argue that swift appearances of trust that are identified before team interaction begins are not truly TESs but rather some other construct, such as expectations (e.g., initial trustworthiness). In support of that possibility, Kanawattanachai and Yoo (2007) did not find a correlation between early and late trust, and Crisp and Jarvenpaa (2013) found

³⁰ Examples of team phenomena that are studied and treated as both states and processes are team conflict, team learning, shared or collective leadership, and behavioral integration.

that expected trusting beliefs had a negative effect on team performance. Hence, researchers' understanding of this matter and choice of research design may have an impact on what they find.

In their review on cohesion, Chiochio and Essiembre (2009) excluded papers in which cohesion was measured sooner than four weeks into the life of the team. In their meta-analysis of the relation between cohesion and team performance, Mullen and Copper (1994) found that cohesion developed after teams had some time to work and perform together. Similarly, P. L. Costa et al. (2016) were unable to use data on engagement and cohesion measured after three weeks, as neither engagement nor cohesion had developed as shared team constructs. Thus, we encourage researchers to be cautious when considering how early TESs can and should be measured and regarding which conclusions can be drawn, based on sample and time period.

Nevertheless, similarly to how swift trust has contributed to our understanding of trust development, we suggest introducing swift versions of cohesion, psychological safety, identification, and so on to understand the dynamics of TESs more fully. For example, team cohesion in an early phase—that is, swift cohesion—may be quite different from team cohesion later in a team's life. How TESs develop in the initial phases of a team's life thus demands further investigation. We see qualitative research as particularly relevant for this matter (see the third lesson to be learned below).

Furthermore, we advise researchers to be vigilant for the appearance of new TESs. Examples are *team-meeting attitudes*, a team construct emerging over time as team members converge their attitudes (O'Neill & Allen, 2012), and *perceived similarity*, which refers to the degree to which team members view themselves as having few differences (Zellmer-Bruhn et

al., 2008).³¹ As teamwork itself changes over time and teams face different challenges today than they did decades ago, it is entirely likely that new TESs may surface.

2. What Should Guide Our Research? The Need for Bridging Theory and Empirical Data

The literature on team development describes how teams can develop over time in various ways: experiencing particular shifts (e.g., Gersick, 1988), going through certain phases (e.g., Tuckman, 1965), or developing more dynamically (e.g., McGrath, 1991). One could assume that research on the temporal dynamics of TESs would be closely connected to these theories, either to provide empirical grounds for the theories or to understand the findings considering these theories. However, only five papers included in this review take this tack.

Four papers build on Gersick's (1988) punctuated equilibrium model (e.g., Bartone et al., 2002; McNab et al., 2012; Miles, 2016). Guchait and Hamilton (2013) expected external deadlines and pressure to have a strong impact on the cognitive processes in teams. The shared mental models did not correlate over time, indicating that the teams did indeed experience a notable turning point in their development. One paper challenges Tuckman's (1965) theory on small group development. Fullagar and Egleston (2008) found performance to predict cohesion and question whether the fourth phase (performing) should be placed before the third phase (norming), since the development of cohesion is associated with the norming phase (Bonebright, 2010). With studies indicating that cohesion can decrease (Garcia-Calvo et al., 2014) or remain stable over time (Chang & Bordia, 2001), this could be viewed as contradictory to a sequential developmental approach. Theories on teams developing more dynamically (e.g., McGrath, 1991) could aid in understanding the complexity of TES emergence. However, as far as what could be identified in this review process, these are not particularly common in the discussions and explanations of findings.

³¹ Despite being defined as TESs by the authors, neither was included in this review since they were not a part of the Rapp et al. (2021) taxonomy.

To enhance our knowledge of TES temporal dynamics, we suggest connecting team development theories and empirical data to a larger extent. As such, our empirical work can be guided by theoretical lenses, and the theories themselves can be further systematically developed. Building on established theoretical models such as Marks et al. (2001) might be fruitful for understanding transitions like the notion of early versions of TES being based on somewhat different grounds than later versions (e.g., expected trustworthiness vs. trust based on experience). Moreover, in several of the papers on cohesion, levels increased in the first phase before stabilizing (Braun et al., 2020; Bugen, 1977; Mathieu et al., 2015; Pandhi et al., 2018). Connecting this research with team development theories (e.g., Gersick, 1988) might enhance our understanding of how *dynamics* and *stability* relate to each other.

3. How Do Team Emergent States Evolve? The Need for Qualitative Studies

More longitudinal studies could increase our knowledge of TES temporal dynamics. However, simply increasing the number of studies will not necessarily bring us closer to identifying common conditions, let alone universal patterns, across contexts and time periods. The papers included in this review clearly teach us that the processes by which TESs appear are complex. Thus, we see the need for more explorative research on the temporal dynamics of TESs. Qualitative research can be particularly useful for understanding team temporal dynamics since it is able to explore *how* and *why* change does or does not occur and describe dynamics in finer detail (Cronin et al., 2011). In addition, qualitative research can provide fruitful ground for developing stronger and more robust team development theories.

Below, we suggest four research topics for the study of dynamic TESs, in which we believe qualitative research is particularly relevant and necessary: First, how do early versions of TESs differ from later versions? The notion of swift trust has become established within research, acknowledging that what builds trust at an early stage is somewhat different from trust in later stages (e.g., built more on expectations than experiences). For other TESs, such

research is limited. We suggest exploring how various TESs play out in initial compared to later phases, perhaps through observation and interviews. If there are different variables explaining the perception of, for example, team psychological safety at an early stage and later stages, relying on existing scales would not necessarily be appropriate, even if measurements begin early in the process. Moreover, we know little about how and at what point an “early version” becomes a “later version”; that is, when experience trumps expectation.

Second, do some TESs develop more quickly than others, and if so, how and why? Based on the lessons learned in our review, team cognition appears to be highly dynamic over short time spans, including those of a week or less. However, the few papers on other TESs conducted over such short time spans also indicate temporal dynamics. Exploring teamwork early in a team’s tenure will enrich our understanding of the pace and nature of TES emergence. After all, and related to the point above on early versions of TESs, the reason for different developmental patterns may not necessarily be that some TESs always or usually develop faster than others; rather, there may be different variables determining the level of TESs at different points in time.

Third, how can teams build a robust TES that lasts over time? Apparently, fluctuations in TESs relate to team outcomes. This is largely exemplified through work on the reciprocity between team cohesion and team performance (e.g., Mathieu et al., 2015) that is also found among other TESs, although to a smaller extent (e.g., collective efficacy; Myers et al., 2004). Thus, building a TES level that enables teams to enter a positive gain cycle (Salanova et al., 2011) seems desirable for achieving team outcomes over time. However, correlations between variables at different time points do not take us much further into understanding how teams can approach this in a practical way. Exploring the underlying processes of how team

cohesion transfers into team performance or the other way around may enrich our knowledge on this matter.

Fourth, how can teams identify and avoid the potential dark sides of the temporal dynamics of TESs? For example, if there is a danger of becoming too confident too early (e.g., Goncalo et al., 2010) or establishing a form of trust that is not beneficial for team outcome (e.g., Crisp & Jarvenpaa, 2013), how do these phenomena differ from TES versions that appear more beneficial and supportive of desirable team outcomes? Exploring teamwork with a temporal approach could offer insights into such matters.

4. How Can We Measure Team Emergent States? The Need for Clarifying Research

Designs

When studying dynamics, our designs should be able to detect “meaningful forms of change,” but using only two measurements will rarely achieve that aim (Ployhart & Vandenberg, 2010, p. 103). The papers in our review reveal that going from two to three (or more) measurement times can have an impact on what is found and reveal dynamics that might otherwise be invisible or overlooked (see Table 3). Researchers are encouraged to keep this in mind when designing and conducting research on temporal dynamics.

Moreover, the large variation in findings across studies may be explained by the different preconditions of their research designs. Whereas some use “shortitudinal” designs in order to capture short-term fluctuations—such as Braun et al.'s (2020) 10 measurement times over only 2.5 hours—others collapse multiple scores into phases to identify long-term trends and increase the robustness of the data (e.g., Edmondson & Mogelof, 2006). Furthermore, when designing studies on team temporal dynamics to reveal meaningful forms of change, one should consider not only whether perceptions of TESs have had *sufficient time* to develop among team members but also whether there is *sufficient time between measurements* (Chang & Bordia, 2001; van der Kleij et al., 2005).

Additionally, the total time span from first to last measurement may have impact on the findings concerning temporal dynamics (cf. the second lesson learned). Thus, to avoid comparing apples and oranges, we encourage researchers to be clear about which approach they have chosen for a given study in terms of time period, number of measurements, and time between measurements. Such a categorization of approach may allow for easier comparison between studies of relevance and more robust knowledge building—relying on comparable studies. Moreover, it may contribute positively by mapping the research field and laying the ground for experimentation on different combinations of time period, number of measurements, and time between measurements.

Furthermore, change over time involves more than mean levels; there is also the degree of sharedness or dispersion within a team. If a TES such as team trust has an effect on an outcome like team performance, this effect is not necessarily realized unless all team members share the perception of trust (De Jong & Dirks, 2012). DeRue et al. (2010) found that team efficacy beliefs followed a pattern of either emerging consensus or growing discord, and these different trajectories could have different impacts on team functioning. Similarly, Jung and Sosik (2003) found that team members' perceptions about collective efficacy could vary at different stages of team development. More specifically, team members' perceptions became more homogenous after receiving feedback and working together over time. Thus, these constructs may develop over time without mean TES values necessarily revealing these dynamics.

Climate strength is an example of how to address the potentially different perceptions within teams. Schneider et al. (2002) operationalized climate strength as the standard deviation of employee perceptions of the service climate. In their recent review of the team climate literature, Perrigino et al. (2021) pointed to our limited knowledge of how climate strength develops and the lack of studies connecting the role of time to the dynamics of

climate strength development. This type of research may advance our understanding of the dynamics of teams by not only considering the team as a whole but also incorporating within-team dynamics over time and their implications for team outcomes.

Lastly, even though longitudinal designs appear necessary to develop our understanding of the temporal dynamics of TESs, there are good reasons for continuing cross-sectional work. Longitudinal work is complex and resource-intensive (Ancona et al., 2001; Arrow et al., 2004; Salas et al., 2015) and, despite their ability to draw inferences that cross-sectional work cannot, longitudinal designs remain vulnerable to short-term fluctuations. Hence, longitudinal work will not always be the answer. However, we encourage future researchers doing cross-sectional work on TESs to look to what we know about the temporal dynamics of TESs, such as the insights summarized in this review, when designing their studies. For example, decisions regarding the timing of measurements should be based on our knowledge of how TESs may relate differently to other TESs or team processes at different points in time. At the same time, if TESs are as dynamic as our review suggests, we clearly need more longitudinal studies before having the “luxury” of using cross-sectional designs at the rate we have seen to date. Thus, as further research delves deeper into the temporal patterns of TESs, we may be able to run less costly (i.e., cross-sectional) designs with greater confidence in the future.

Limitations

We acknowledge certain limitations to our work. First, there are very few identified papers for some TESs, which constricts the conclusions that may be drawn when it comes to individual TESs. We also acknowledge the limitation on drawing conclusions across TESs. Although 115 papers appears to be a reasonable number, it is actually quite low when compared to the total number of papers published on these TESs. Moreover, several TESs from the taxonomy presented by Rapp et al. (2021) have not even been studied longitudinally,

as far as we were able to discern. In addition to highlighting the neglected emergent element of TESs, this limits our possibility of making conclusions on TESs in general. Still, we have attempted to integrate what we see from the temporal dynamics across various TESs—focusing on both differences and commonalities—as such an overview may hopefully benefit and encourage future research on the matter.

Second, in order to study patterns and common conditions and analyze whether lessons may be learned across TESs, we have compared studies on TESs that are quite different by nature, measured over different time spans, and use different methodologies. In doing so, we run the risk of oversimplifying. We have considered two potential challenges in particular: context and experiments. Incongruent results might be due to teams having very different backgrounds and tasks (e.g., Levine & Moreland, 1990; Rodríguez-Sánchez et al., 2021), while contextual factors may have a powerful impact on TES temporal dynamics, such as motivational aspects toward the end of a long military deployment (Bartone & Adler, 1999). Moreover, comparing change in the level of a TES before and after a specific treatment with change in a natural context without any manipulation could be biased. For example, where Zander (1969) found no change in cohesion (specifically, group attractiveness) through a student trimester, Bowen and Siegel (1973) replicated the study and found an increase when adding feedback to the students.³²

Third, several papers included in this review did not specifically address temporal dynamics. Especially for the 52 studies using two measurement times, this is commonly done to control for initial levels or avoid common method bias (Ployhart & Vandenberg, 2010). As these papers may still contribute to our understanding of the emergent nature of TESs, they are therefore included. Still, one is left with interpreting the descriptive data in these papers for the purpose of this review, which typically involves changes in mean levels over time and

³² Context, method, and treatment (where relevant) are pointed out in Appendices 1–5.

the correlations of these levels (e.g., Langfred, 2007). That does not necessarily provide a full picture. For example, in Salanova et al. (2011), collective efficacy levels correlated across all three time points and thus appeared somewhat stable over time. However, through their repeated measures analyses, the authors found a main effect of time on collective efficacy, revealing some of its temporal dynamics. This might also have been revealed in other studies if similar analyses specifically directed at investigating the role of time on TESs had been performed. In other words, in this as in so many other cases, our findings may depend to a greater or lesser extent on the analyses we choose to conduct (Mathieu et al., 2015).

HR Practice Implications

TESs are key to team effectiveness (Mathieu et al., 2019). Since these are “dynamic in nature and vary as a function of team context, inputs, processes, and outcomes” (Marks et al., 2001, p. 357), insight into the temporal dynamics of TESs can be essential for building effective teams. The findings of our review have several implications for HR professionals and others aiming to get the most out of their organizations’ teams.

First, a TES needs attention over time. Contrary to what one might assume—that spending time together will be positive for the development of, say, team cognition (Levesque et al., 2001) or team trust (Mayer et al., 1995)—our review shows that these TESs may emerge in various ways and even decrease over time (e.g., Kanawattanachai & Yoo, 2007; Toader & Kessler, 2018). Thus, we encourage practitioners to consider these temporal dynamics when implementing measures intended to improve the quality of teamwork. More than a result of measures taken in early team phases, such as team-building exercises, the emergence of TESs appears to be result from a much more complex reality that is shaped over time. Teams need to focus actively on these matters to develop and maintain the desired levels of team cohesion, team trust, or similar phenomena.

Second, a TES should be measured systematically. The measuring of TESs is more than a methodological aspect for researchers to consider. Organizations and practitioners focused on evidence-based HR practice (Rousseau & Barends, 2011) should also be interested in mapping how their employees perceive being in their teams, such as their team climate or team engagement. After all, these TESs are not only important for the effectiveness of the teams but also for the satisfaction and well-being of team members (Anderson & West, 1998; P. L. Costa et al., 2017). Revealing the temporal dynamism of TESs, as we have done through our review, highlights the importance of considering when to measure and preferably measuring several times to conduct a mapping with maximal validity. For example, with team cohesion developing in an inverted U-shaped pattern throughout a military deployment (Bartone & Adler, 1999), a researcher would get an inaccurate picture if measuring only once or even twice.

Third, a TES is no guarantee of success. The TES itself is rarely the goal; rather, TESs may enable teams to work more effectively toward their aims (Mathieu et al., 2019). As our review shows, time is an important aspect to consider in assuring that a given TES actually contributes to the desired outcome(s). For example, teams that became too confident too early did not undertake the necessary discussions on team processes in early phases and performed worse over time than those with a more “healthy” level of process conflict early on (Goncalo et al., 2010). Such potential downsides of building TESs, perhaps on the wrong premises, may have undesirable consequences. Thus, it is important for HR practitioners to be aware of this when designing team development programs for their organizations. Moreover, the reciprocity between TESs and team performance, especially as exemplified through the studies on team cohesion and team performance, not only supports the importance of building cohesive teams but also reveals the importance of performing and its effect on consequent team functioning. Thus, we encourage teams to celebrate their own wins and HR practitioners

to facilitate building a culture in which celebrating collective victories is a natural and integral feature.

Conclusion

Teams are the basic building blocks of modern organizations, and understanding the dynamics of teams is arguably key to successful collaboration and performance. We therefore expected the literature on teams to be filled with studies of the temporal dynamics of TESs, not least because any TES is by nature and definition emergent. Surprisingly, however, only a limited number of studies actually address the emergent part of TESs. Moreover, the findings of these studies should ring alarm bells, as most studies adopting a temporal lens *do* find that emergence is important for understanding the trajectory itself and/or how the TESs are linked to other variables (e.g., antecedents and outcomes). However, the dynamics of TESs do not appear to follow any common—let alone universal—pattern, illuminating the need for further in-depth and targeted studies across contexts and time spans.

At its core, this review demonstrates the complexity of team dynamics. This complexity is not likely to fade; indeed, quite the opposite is likely as organizations adapt to an increasingly volatile world. We hope that our review can encourage future research to embrace this complexity and extend our knowledge of team dynamics. It is clear that we must take the “emergent” in team emergent states seriously.

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* These articles are among the 115 included papers in the review, however, only occur in the supplementary tables in Appendices 1–5.

Appendices

Appendix 1

Team Cohesion

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW) ³³	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Zander (1969)	Survey	3	9 weeks	Students in a group dynamics course.	No change in group attractiveness three, six, and nine weeks after formation. ³⁴	—	Two factors highlighted: evaluation of the group's effectiveness and personal involvement among group members.	
Bowen & Siegel (1973)	Survey	5	15 weeks	Students in a group dynamics course.	Group attractiveness increased gradually throughout the trimester, significantly comparing first and last measurement.	/	A replication of Zander (1969), but increasing the number of measurement points and providing feedback to the students.	Perceptions of group effectiveness, personal satisfaction and involvement, and motivation all increase over the trimester.
Bakeman & Helmreich (1975)	Observation (quantified)		182 days	Work teams in an underwater habitat.	Cohesion was on average quite stable, despite early cohesiveness not correlating with late cohesiveness.	—	Early performance was a much stronger determinant of late cohesiveness than early cohesiveness (<i>ns</i>).	Cohesion is not an important factor for performance, but performance does lead to cohesion.
Terborg et al. (1976)	Survey	6	3 months	6 students group projects.	No significant changes in mean cohesion; however, the relationship between cohesion and other	—	Cohesion might be facilitated by attitude similarity; its impact is not immediate but requires time to take effect.	Equivocal relationship between cohesion and performance. Over time, performance can be both

³³ We use five labels for the patterns of emergent state dynamics: 1. Stability or non-significant change: —. 2. Significant change: /, \, or a combination of the two and —. 3. Indication of a specific change with its potential significance not reported: (/) or (\). 4. Change is indicated, but how is unclear: ?. 5. Qualitative studies with no identified pattern: no label.

³⁴ Zander (1969) and Bowen and Siegel (1973) measure “group attractiveness” but treat this construct as cohesiveness in their discussion. Hence, this term is considered an early variant of cohesion and included in this review.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW) ³³	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
					parameters appear highly dynamic.			positively and negatively correlated with cohesion.
Bugen (1977)	Survey	3	15 weeks	Students in a group procedures course.	Cohesion increased the first 5 weeks but then stabilized. The results suggest that most of the development of cohesion was completed midway through the semester.	/ —	Similar cohesion trends for groups with different levels of inclusion and orientation. However, time had an effect on cohesion scores.	
Carron & Ball (1977)	Survey	3	1 season	Hockey teams.	Cohesion correlated from early to mid-season and from mid- to post-season, but not from early to post-season. Overall effect sizes indicate a positive trend.	(/)	Some cohesion parameters correlate throughout the season (friendship, influence, and the value of membership), while others do not (enjoyment, belonging, teamwork, and closeness).	Successful performance results in increased team cohesion, but team cohesion does not lead to higher performance.
Landers et al. (1982)	Survey	3	7 weeks	Basketball teams.	Cohesion did not correlate between early and mid-season but did from mid- to late season. Change is indicated over time, but how is unclear.	?	Friendship, closeness, and teamwork measures contributed most to overall cohesion, with friendship having the strongest effect size over time.	Performance and cohesion were related, with no causal predominance of one over the other.
Williams & Hacker (1982)	Survey	3	12 weeks	Field hockey teams.	Post-season cohesion was not predicted by either early or mid-season cohesion. Change is indicated over time, but how is unclear.	?	No causal predominance between cohesion and performance.	No earlier performance or composite cohesion variables predicted postseason cohesion, and midseason performance was the only significant predictor of postseason performance.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW) ³³	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Dorfman & Stephan (1984)	Survey	2	6 weeks	Student teams in business game.	Cohesion correlated between midpoint (after 6 weeks) and end of game (after 12 weeks).	—		Early cohesion leads to late performance, but early performance does not lead to late cohesion.
Greene (1989)	Survey	2	9 months	Work teams of different types, sizes, and industries.	Cohesion correlated over time.	—		
Slater & Sewell (1994)	Survey	2	4 weeks	Field hockey teams.	Cohesion did not correlate between mid-season and 4 weeks later. Change is indicated over time, but how is unclear.	?	Early cohesion predicted later performance but not later cohesion, and early performance predicted later performance but not later cohesion.	Positive relationship between team cohesion and performance. Socially oriented measures of cohesion were more highly associated with performance than task-oriented measures.
Bartone & Adler (1999)	Survey	3	6 months	Military teams through an international deployment.	Cohesion levels develop in an inverted U-pattern: starting out low, reaching a high point around mid-deployment, and then decreasing again toward the end of the mission.	/ \	Medical task force members developed the highest cohesiveness when most involved in using their skills to help others.	Motivational drop in second half of deployment.
Chang & Bordia (2001)	Survey	2	5 weeks	Student group projects.	No change in either task or social cohesion.	—	The authors discuss whether groups had sufficient time to develop.	
Jehn & Mannix (2001)*	Survey	3	10–14 weeks	Student groups in management course.	Cohesiveness increased slightly over the whole period in terms of mean values; significance not reported.	(/)	Cohesiveness positively correlated with trust, respect, liking, and open conflict norms and negatively correlated with team conflict (relationship, task, and process) and competition.	Cohesiveness correlated positively with group performance.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW) ³³	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Bartone et al. (2002)	Survey	2	1 week	Military teams on an exercise.	Cohesion increased throughout the exercise.	/	The shared experience of stressful military exercises had a greater effect on cohesion than the effect of familiarity.	
Lee et al. (2002)*	Survey	2	8 weeks	Student group project.	Cohesion remained stable from midpoint to end of the semester.	—		Cohesion and norm strength were positively correlated with group potency across time, but not with group efficacy.
Jarvenpaa et al. (2004)*	Survey and experiment	3	8 weeks	Virtual student project teams; socialization intervention.	Through two studies, cohesiveness increased over time in terms of mean values; significance not reported.	(/)	In both studies (with and without intervention), initial trustworthiness had a direct effect on early cohesiveness.	In study 1 (without intervention), early trust negatively moderated the relationship between late communication and late cohesiveness. No interaction effect found in study 2 (with intervention).
Michalisin et al. (2004)	Survey	11	12 weeks	Student groups in computer-assisted simulation.	Cohesion scores over time were not reported; only its correlation with performance. Increasing correlation over time, significant in the second half of the simulation.	?		It takes time for cohesion to influence performance, but once this relationship is established, it remains robust across the rest of the simulation.
DiMeglio et al. (2005)	Experiment	2	1 year	Nurse teams at a hospital; team-building intervention.	Cohesion increased over 1 year in nurse teams after going through a team-building program.	/		
Van der Kleij et al. (2005)	Experiment	2	2 weeks (4 x 1-hour test sessions)	Student teams. Communication intervention.	Cohesion remained stable over time, for both video-mediated teams and face-to-face teams.	—	The time together for these teams did not appear sufficient to develop	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW) ³³	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Fullagar & Egleston (2008)	Survey	12	4 weeks	Student teams in an aviation computer task.	Later cohesion was not predicted by previous cohesion. Change is indicated over time, but how is unclear.	?	cohesion beyond initial cohesion. Group performance was found to predict group cohesiveness but not vice versa.	
Bosselut et al. (2012)	Survey	2	One season	Youth interdependent sports teams.	Cohesion correlating between mid- and late season for a variety of sports teams.	—		
Walker et al. (2012)	Experiment	2	1.5 weeks	Full-time experiment in a lab setting.	Organizational design factors led to different patterns of cohesion over time.	/ and —	A network-enabled capability design focusing on widespread information sharing led to an increase in cohesion, which the traditional command and control design did not.	Improved communication following the increase in cohesion.
Bradley et al. (2013)	Survey	2	4 months	Student project teams.	Cohesion remained quite stable, with a slight decrease that was not significant.	—	Agreeableness affects performance through communication and cohesion, while communication precedes cohesion in time.	Cohesion measured later in a team's development is a better predictor of performance than cohesion measured earlier.
DeOrtentiis et al. (2013)	Survey	2	One semester	Student teams.	Cohesion levels through a student semester did not correlate, indicating the dynamic nature of this construct.	?		Authors found cohesion and satisfaction to mediate the relationship between team trust and team effectiveness.
García-Calvo et al. (2014)	Survey	3	22 weeks	Soccer teams.	Cohesion dropped over a soccer season, explained by the motivational climate of the team.	\	Task-involving motivational climate correlated positively with cohesion. Ego-involving motivational	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW) ³³	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Leo et al. (2015)*	Survey	3	22 weeks	Soccer teams.	Downward trend for cohesion at all three measurement times.	\	climate correlated negatively.	Decreasing cohesion and increasing conflict levels explained a decrease in collective efficacy.
Mathieu et al. (2015)	Survey	3	10 weeks	Student teams in business simulation (two samples).	Sample 1: Cohesion rose from early stages to midpoint. Sample 2: Cohesion rose from midpoint to end.	/ — and — /	Authors discussed midpoint transitions as a potential explanation, but the difference between the two samples remained unanswered.	Both cohesion patterns gave rise to an increasing predictability of subsequent performance over time.
McLaren et al. (2015)	Experiment	3	One season	Youth soccer teams. Coach motivation intervention.	Cohesion (task and social) gradually increased, but it was only significant for the experimental group.	/	A motivational climate program for coaches had a positive effect on social cohesion but not on task cohesion.	
Bourbousson & Fortes-Bourbousson (2017)	Survey	Daily diary study	4 months	One sports team	Task cohesion fluctuated around a stable reference, indicating a stable phenomenon over time.	—		
Rodríguez-Sánchez et al. (2017)*	Survey	3	3 weeks	Teams in an organizational simulation exercise.	Cohesion and engagement remained stable across three different creativity tasks given to teams, formed for the specific study.	—		Team engagement mediated the reciprocal relationship between cohesion and perceived performance.
Jones et al. (2018)	Survey	2	4–6 months	Military units returning from deployment	Cohesion decreased in the months following a deployment, even after an intervention to guide the return to normal working life.	\	Feeling less informed and having fewer people in the unit to go to with a personal problem explained the decrease in cohesion.	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW) ³³	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Pandhi et al. (2018)	Mixed	3 surveys and interview	12 months	Health care teams.	Implementation of a new primary care program increased social bonds between team members from beginning to midpoint before stabilizing.	/ —	A microsystem approach to primary care redesign was implemented. Challenges like a part-time workforce and team instability potentially limited beneficial effects.	
Wohlers & Hertel (2018)*	Interview	3 interviews	2.5 years	Professional teams.	In a relocation process to an activity-based flexible office, maintaining cohesion was reported to be one of the main challenges.		Activity-based flexible office featured fairly hindered collaboration among team partners due to physical distance among partners.	Supervisors needed to spend extra time in organizing and coordinating information sharing within teams and ensuring team cohesion.
Ponton et al. (2019)	Observation	17 hours video	5 months	Professional teams in the construction industry.	Instances of humor do not happen at random but occur at specific times in meetings, helping to form a cohesive team.		Humor aids in building cohesiveness in meetings.	Humor fostering cohesion was associated with more social interaction, higher task-related performance, successful handling of conflicts, and a positive cultural environment.
Susskind & Odom-Reed (2019)	Survey	2	14 months	Research teams.	Team cohesion in research teams increased over the course of a 14-month project.	/	Over time, individuals perceived more cohesion in their groups and less project-related work conflict.	Changes in cohesion from early to late project stages relate positively to changes in team member performance.
Acton et al. (2020)	Survey	6	90 minutes	Interdependent teams in a laboratory simulation.	Different cohesion trajectories explained by team composition. Individual differences of team members uniquely predicted the intercepts and slopes of task and social cohesion in teams.	?	Team personality and team goal orientation predicted cohesion trajectories over time. Personality traits such as agreeableness and performance-prove goal orientation positively associated with cohesion.	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)³³	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Braun et al. (2020)	Experiment	10	2.5 hours	Interdependent teams in a laboratory simulation.	Increase in cohesion over time, however, teams reached a kind of equilibrium or steady state at one point.	/ —		Reciprocal relationship between cohesion and performance. The degree cohesion predicted performance lessened over time.
Hoang et al. (2020)	Survey	3	6 days	Military surgical teams.	Cohesion increased over a 6-day intensive training simulation. Vertical cohesion increased by 7%, and unit cohesion increased by 5%.	/	Longitudinal results showed increases in unit readiness (17%), combat readiness (12%), leadership quality (7%), and team communication (3%).	Physiological biomarkers indicated an adaptive response to the realistic environment and a reduction in overall team stress during performance evaluations.
Van der Voet & Steijn (2020)	Survey	2	1 year	Multidisciplinary neighborhood teams	Cohesion stable over time; early cohesion was the best predictor of late cohesion.	—	Visionary leadership behavior can increase team cohesion over time.	

*Two or more TESs measured, so this study appears in more than one table.

Appendix 2

Team Trust

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Jarvenpaa et al. (1998)	Mixed	2 surveys and communication logs	8 weeks	Virtual student project teams.	Trust remained fairly stable across time, although it was predicted by different factors at different phases.	—	In the early phases of teamwork, team trust was predicted most strongly by perceptions of other team members' integrity and most weakly by perceptions of their benevolence.	High-performing teams appeared to have exhibited swift trust, with team members acting as if trust were present from the start.
Jarvenpaa & Leidner (1999)	Mixed	2 surveys and communication logs	6 weeks	Virtual student project teams.	About two thirds of the teams maintained their trust levels throughout the period. Very few teams shifted from low initial trust to high trust.	—	Trust in virtual teams is most likely created via communication behavior that is established early. The first messages to the team set the tone for how the team interrelated virtually.	Most teams that started with low trust could not overcome that initial barrier, while teams that developed swift trust remained high in trust and performed better.
Jehn & Mannix (2001)*	Survey	3	10–14 weeks	Student groups in management course.	Trust increased slightly in the first period, before it stabilized in the second period (considering mean values; significance not reported).	(/ —)	Trust correlated positively with respect, liking, open conflict norms, and cohesiveness and correlated negatively with team conflict and competition.	Trust correlated positively with group performance.
Kanawattana chai & Yoo (2002)	Survey	3	8 weeks	Students in simulation game.	High-performing teams experienced increased trust in the first period and were able to maintain those high levels of trust. Low-performing teams experienced a decrease in trust in the final weeks.	/ — and —	High-performing teams seemed able to bridge physical and psychological distances through both cognition-based and affective-based trust in this virtual context.	Results indicated a reciprocal relationship between both trust dimensions and team performance. High-trust teams performed better, and team trust was reinforced through team success.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Piccoli & Ives (2003)	Mixed (experiment)	2 experiments and communication logs	One semester	Virtual student project teams; behavior control intervention.	Trust was stable across the semester for the teams in the control group (self-directed teams), while it decreased in the treatment group (behavior control).	— and \	Behavioral control had a negative impact on trust development in virtual teams. However, in teams already high on trust, behavior control had no detectable effect on trust.	The time at which incidents occurred played a part in trust development. When attention to the project was at a peak, renegeing and incongruence had the strongest impact on trust decline.
Jarvenpaa et al. (2004)* (two studies)	Survey / Experiment	3	8 weeks	Virtual student project teams; socialization intervention.	Through two studies, with one involving a socialization intervention, trust affected virtual teams differently in different situations. Trust effects were not necessarily direct and linear.	?	Study 1 (no intervention): Early trust moderated the relationship between team communication and perceptual outcomes, such as cohesiveness, satisfaction, and outcome quality. Study 2 (with intervention): No such relationship.	Early trust may affect the development of later trust, communication, cohesiveness, and performance. However, the role of trust varied with the structure in place (greatest effect in situations with weak structure).
Daassi et al. (2006)	Survey	3	6 weeks	Virtual student project teams.	Cognition-based trust and affect-based trust both increased. Cognition-based trust was higher than affective-based trust throughout the project.	/	Virtual teams built trust on cognitive foundations, such as the ability to respect deadlines and to meet fixed goals, more than on affective elements.	
Wilson et al. (2006)	Experiment	3	3 weeks	Student teams; virtual and face to face intervention.	Cognitive trust increased over time. Different development patterns for the different experimental groups, but all groups ended up at similar trust levels, regardless of computer-mediated and face-to-face combinations.	/	There was a significant interaction effect of media and time on the increase in cognitive trust. In particular, switching from computer-mediated to face-to-face communication resulted in an increase in cognitive trust.	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Kanawattana chai & Yoo (2007)*	Survey	3	8 weeks	Student teams in simulation game.	Early cognition-based trust did not correlate with trust later in the simulation. Trust increased for the first period before it decreased, unlike transactive memory system (TMS), which remained stable once it developed.	/\	Cognition-based trust was measured as a dimension of TMS. The hypothesis of task-oriented communication positively affecting cognition-based trust over time was marginally supported only at the first measurement.	
Langfred (2007)	Survey	2	4 months	Self-managing student teams.	Trust remained quite stable, with a slight decrease that was not significant.	—	Increased team conflict and lower autonomy related to lower team trust; there was no relationship between trust and task interdependence.	
Bijlsma-Frankema et al. (2008)	Survey	2	8 weeks	Student project teams.	Trust between team members remained stable over a student semester.	—		Heedful interrelating of team members and trust in supervisors promoted team performance.
Webber (2008)	Survey	2	5 weeks	Student project teams.	Trust emerged from one-to two-dimensional (cognitive and affective) throughout the project. Neither cognitive nor affective later trust correlated with early trust, with the same items used.	?	Familiarity among team members related significantly and positively with early trust (three weeks later). Cognitive and affective trust emerged as separate components over time.	Affective trust had a stronger positive relationship with team performance than cognitive trust.
A. C. Costa et al. (2009)	Survey	3	15 weeks	Student project teams.	Teams high in initial social capital experienced higher team trust than those low in initial social capital. However, both groups experienced a decrease in trust over time.	\	High initial trust may relate to a propensity to trust, unit-grouping categorization mechanisms, and illusionary mechanisms, followed by a decline in trust when teams worked together.	Trust correlated positively with performance at the beginning and end of the project but negatively at the midpoint.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Kuo & Yu (2009)	Observation (quantified)		18 weeks	Virtual student project teams.	Calculus-based trust was high and stable in the beginning but decreased during the final weeks. Knowledge-based trust peaked in the middle and decreased in later weeks. Identification-based trust remained constant.	— \ and / \ and —	Team members swiftly imported their prior experience to assess the outcomes and costs of maintaining a team relationship and relied on their prior knowledge to determine other members' competencies.	Initial trust may correlate to both later communication and later cohesiveness.
Curşeu & Schruijer (2010)	Survey	2	7 weeks	Student project teams.	A marginal but not significant increase in mean levels of trust over time.	—	Trust emerging at the beginning of a team life fostered the emergence of trust later on.	Trust emerging in the first stages of team development negatively predicts both task and relationship conflict in later stages.
De Jong & Dirks (2012)	Survey	3	9 months	Student association board members.	Mean level intra-team trust was quite stable; however, the effect of trust on performance was more dynamic due to within-team dispersion.	—	“Trust asymmetry” and “monitoring dissensus” were critical within-team dispersion properties of trust, moderating the relationships between mean monitoring, mean trust, and team performance.	Trust asymmetry weakens the positive relationship between intra-team trust and team performance. When asymmetry is high, mean levels of trust might have no relationship with team performance.
McNab et al. (2012)	Mixed	2 surveys and communication logs	One semester	Virtual student project teams.	Trust decreased significantly through a student semester, where teams worked distributed across cultures. Authors observed dramatically different levels of cognitive trust at time 1 and time 2.	\	Decrease in trust explained by a punctuated trust evolution; this transition happened around the midpoint of the project. Different factors affected trust levels at different project development stages.	
Prest (2012)	Mixed	15	15 weeks	Students in a veterinary course.	No universal patterns of team trust over time; there were different trends,	?	The results reflected a complex relationship	No predictive value of trust on team performance over the semester.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
					including curves that increased, decreased, remained horizontal, were S-shaped, or were U-shaped.		between time, team trust, and team performance.	
Crisp & Jarvenpaa (2013)	Experiment	2	8 weeks	Virtual student teams; normative action intervention.	A marginal decrease in mean levels of trust over time (<i>ns</i>); early trusting beliefs had a positive effect on late trusting beliefs.	—	Early trusting beliefs indirectly affected late trusting beliefs through normative actions (monitoring team performance norms) as the mediator.	Expected trusting beliefs (beliefs before any team interaction) had a negative effect on team performance.
Moldjord & Hybertsen (2015)	Interview	1 interview	6 months	Helicopter crew.	A qualitative study of team trust based on retrospective interviews after a military deployment.		A holistic reflection program after critical incidents, repeated interactions and time spent together had a positive impact on team trust.	Increased familiarity and trust over time led to a gradual improvement in reflections on practice, but the team experienced a setback after crew rotations.
Cheng, Fu, & Druckenmiller (2016)	Mixed (experiment)	3 experiments and 1 interview	9 weeks	Virtual student teams; process control intervention.	Collaboration engineering in online teams showed no improvement in trust over time. However, trust in the control group decreased.	— and \	Facilitated collaboration contributed to successful trust improvement over time. Trust was related to leadership, communication, cultural difference, time zone difference, and task accomplishment.	
Cheng, Yin, et al. (2016) (two studies)	Mixed	7 / 9	7 and 9 weeks	Hybrid student project teams (face to face and virtual).	Sample 1 (China): Trust increased continually over the initial two stages before showing some smaller fluctuation. Sample 2 (Netherlands): Trust decreased in the first stage, increased in the	/ — and \\ \	Trust primarily established early in the project (form a team, set expectations, and make plans). Team composition, start-up activities, and joint coordination are highlighted as possible explanations.	Culture can determine what trust factors affect overall trust perception and which are more stable and thus perhaps more fundamental values in the team.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Miles (2016)	Survey	5	12 weeks	Student teams in human resources course.	second stage, and decreased sharply again toward the end. Trust had a small positive trend over time but did not change from a positive to a negative slope at different time periods. Aggregated trust was relatively stable over time.	—	Low-performing teams were more willing to trust one another, building higher levels of trust in the team over time. Trust propensity and demographic similarity mattered more for post-performance trust than the performance itself.	Trust after the initial performance episode was negatively related to overall team performance, indicating that high trust early in team tenure can be harmful to overall team performance.
Carter et al. (2018)* (two studies)	Experiment / Survey	2 / 3	2 x 40 minutes / 8 weeks	Student teams in simulation game / Student project	Study 1: Team trust increased over time. Study 2: Affect-based team trust and cognitive-based team trust increased over time (considering mean values, with significance not reported; the test-retest correlations were significant).	(/)	Team-level factory loadings increased over time as team members became more accurate in their ratings. Construct observability has implications for the speed with which team phenomena will emerge as recognizable team properties.	
Wohlers & Hertel (2018)*	Interview	3 interviews	2.5 years	Professional teams	In a relocation process to an activity-based flexible office, trust among team partners was not affected, despite challenges concerning communication and collaboration.		Trust within teams did not change, possibly due to already established interpersonal trust. Meanwhile, trust between teams increased as employees established more trusting relationships outside the team.	Although interviewees reported a benefit for inter-team collaboration regarding contact, communication, and trust, very few reported an increase of joint project work across existing teams.
Jaakson et al. (2019)	Survey	2	4 weeks	Virtual student teams in business	Relatively high levels of initial trust did not change over the period of the	— and \	Trust did not change when feedback on performance was in the positive range but	Trust had a mediating effect on group performances over time, meaning that past

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
				strategy case work.	teams' projects in general, but trust declined in teams where feedback on performance was negative.		did decline when feedback indicated poor performance.	performance had an impact on trust, which in turn impacted the teams' next performance.

*Two or more TESs measured, so this study appears in more than one table.

Appendix 3

Team Cognition

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Team/shared knowledge								
Cooke et al. (2001)	Survey	3	10 missions over 8 weeks	Air force cadets in flight simulation missions.	Improvement in teamwork knowledge (how knowledge is passed on) over time. Taskwork knowledge (actual shared understanding) did not improve.	/ and —	Fatigue and boredom may have contributed to increased noise and lack of reliability in taskwork knowledge measures, masking any knowledge acquisition that was present.	Team performance and team situation model asymptote appear to be paralleled by not only team process improvements but also by an improved understanding of teamwork aspects.
Cooke et al. (2003)	Experiment	2	4 hours	Student teams in simulation task; training and mission interventions.	The teamwork knowledge measure revealed improvement in team knowledge accuracy over time, but the taskwork knowledge measure showed no change over the two sessions.	/ and —	Teamwork knowledge develops with task experience and thus may suffer from premature attempts at cross training but appears to be facilitated by prior cross training in taskwork knowledge.	Taskwork knowledge, especially that which is specialized by individual role, is more predictive of performance than teamwork knowledge.
He et al. (2007)	Survey	4	5 weeks	Student project developing a database system.	Team cognition (awareness of expertise location and shared task understanding) increased over time as team members worked together.	/	Time, high initial familiarity, and gender diversity all predicted team cognition.	The positive effect of initial familiarity on team cognition decreased over time; working together compensated for a lack of familiarity.
Bourbousson et al. (2011)	Observation and interview		One game	Basketball players and their coach.	The degree of sharedness within a team and the content of shared knowledge were both highly dynamic throughout a basketball game.		Individual reconstructions of team activities led to changes in shared knowledge, underlining the dynamic character of the common ground at the scale of a match.	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Olaisen & Revang (2018)	Interview	3 interviews and meetings	30 months	Manufacturing teams.	Individual tacit knowledge may be transformed into collective explicit knowledge by rotating professional roles within a team.		Knowledge building relates positively with rotation of roles and breaking out of comfort zones and takes place as a result of a tacit socialization process.	
Gevers et al. (2020)*	Survey	3	Minimum of 2 months	Professional IT project teams.	Fluctuating patterns of shared task cognition and shared temporal cognition.	\ and \ /	Initial levels and increases in shared temporal cognition over time both improved performance by spurring higher levels and greater increases in team potency.	Changes in shared cognition had greater benefits for team performance (through team potency) than those of initial levels of shared cognition.
Team/shared mental model (TMM/SMM)								
Marks et al. (2000)	Experiment	3	3 x 20 minutes	Students in simulation game; training intervention.	Mental model similarity increased from time point 1 to time point 2 and dropped from time point 2 to time point 3. The mental model accuracy were stable across all three time points.	/ \ and —	Leader briefings and team-interaction training manipulations both had an influence on team members' mental model similarity and accuracy.	Mental model similarity and mental model accuracy had a direct influence on team performance.
Mathieu et al. (2000)	Experiment	3	6 missions / 2.5 hours	Students in simulation game; training intervention.	Neither task mental model nor TMM convergence changed. Time alone was not sufficient for team learning.	—	A potential reason for the lack of increase in mental model sharedness, despite improved team processes and team performance, was that no developmental feedback was given.	TMM sharedness related to team performance, fully mediated by team processes. Task mental model sharedness did not correlate with team performance but had an indirect effect through team processes.
Levesque et al. (2001)	Survey	3	3.5 months	Student project on software development.	SMMs in teams became less similar over time, contrary to the authors'	\	As teams became more role differentiated, they interacted less, and their SMMs were reduced.	Teams with low role differentiation early in a project might interact more

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
					expectations and previous predictions.			and develop more SMMs in the later phases.
Smith-Jentsch et al. (2001)	Experiment	2	2 days	Governmental teams. Training intervention.	Computer-based training strategy had a positive effect on teamwork mental models.	/ and —	Time alone does not appear sufficient in developing similar mental models.	
Mathieu et al. (2005)	Experiment	3	6 missions / 2.5 hours	Students in simulation game. Training intervention.	Neither task mental model nor TMM convergence showed any differences over time, very similar to the pattern of results found by Mathieu et al. (2000).	—	Team and task shared mental models did not correlate; neither did team and task quality of teammates' mental models. Two types of mental models are tapping different underlying constructs.	Team performance was higher among teams sharing higher-quality TMMs than among teams evidencing less sharedness or quality. Team processes partially mediated these relationships.
Edwards et al. (2006)	Survey	2	2 days	Students in simulation game.	No change in TMMs over time.	—	Relatively short time interval can explain the lack of increase in similarity and accuracy over time. Nevertheless, the similarity and accuracy of TMMs were related.	Similarity and accuracy of TMMs early in team training were equally predictive of early team performance, while the accuracy of TMMs predicted subsequent team performance.
T. E. Johnson & Lee (2008)	Survey	4	4 months	Student online project teams.	SMM similarity increased over time and consistently over the four months measured.	/	Team-based learning activities contributed positively to the development of SMMs.	SMMs strongly correlate with team and individual performance.
Guchait & Hamilton (2013)**	Survey	2	8 weeks	Student teams preparing and serving meals to the public.	Neither teamwork SMMs nor taskwork SMMs correlated over time from week 6 to week 14 in the teams' lifespan. This indicates change over time.	?	Early team learning behaviors positively predicted late SMMs, whereas early SMMs did not have a significant impact on late team learning behaviors.	Taskwork SMMs and team learning behaviors had a positive effect on team performance.
Guiette & Vandenberg (2013)	Interview			Teams in a global professional	A qualitative case study of the dynamic nature of team		Five sensemaking determinants identified, influencing their team	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Santos & Passos (2013)	Survey	2	5 weeks	service organization. Teams in a strategy and management competition.	mental models development. TMMs did not become more similar over time.	—	mental model updating. Three task-related and two-team related determinants. Little available time for interaction and the nature of feedback given (only financial reports, no developmental feedback) were possible explanations for lack of TMM updates.	Teams with more similar TMMs experienced less relationship conflict, which in turn improved team effectiveness.
Mohammed et al. (2015)	Survey	2	2 scenarios / 2.5 hours	Student teams in simulation game.	The dynamic nature of TMMs led to a shifting effect on team performance over time.	?	Mechanisms underlying the development of TMMs depend on the timeframe under consideration.	Temporal TMMs formed later in a team's development exerted a stronger effect on team performance than temporal TMMs formed earlier.
Van der Haar et al. (2015)	Survey	3-4	1 exercise	On-scene-command-teams on emergency exercise.	The changing process of mental models itself was important for team effectiveness and more beneficial than a stable mental model pattern.	?	Teams where members' situation models became more dissimilar performed better than teams with a stable pattern. Stable SMMs may indicate sharing of already known information.	Early SMM development was important for team effectiveness. Studying mental model development in teams should account for both how and when the development occurs.
Yang et al. (2016)	Experiment	3	6 games	Student teams in simulation game; feedback intervention.	A reciprocal relationship between TMMs and performance. Negative performance feedback triggered the learning process more than positive performance feedback.	?	Performance feedback had different effects on TMMs depending on the referents (past performance or social comparison).	Significant direct impacts of both TMM complexity and centrality on a team's relative performance.
Toader & Kessler (2018)	Experiment	4	2–3 days	Student teams in case studies; task	Mental models in teams decreased, regardless of manipulation.	\		Teams with divergent mental models performed

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Kneisel (2020)	Experiment	6	2 days	variation intervention. Student project teams. Reflection intervention.	TMM increased for the test group but not for the control group. TMM similarity and quality developed differently over time.	/ and —	Repeated and regular team reflections had positive temporal and dynamic effects on TMM similarity and quality.	better than teams with mental models converging. Through team reflections leading to improvements in TMM similarity and quality, team performance increased.
Transactive memory systems (TMS) / Team transactive memory (TTM)								
Lewis (2004)	Survey	2	8 weeks	Student project teams.	TMS scores increased between the planning and implementation phases.	/	Initially distributed expertise was positively related to TMS emergence at the end of the planning period. Frequent face-to-face communication was positively related to TMS emergence, while non-face-to-face communication did not have an effect.	TMS were positively related to ratings of performance and viability.
Kanawattana chai & Yoo (2007)*	Survey	3	8 weeks	Student teams in simulation game.	TMS—measured through expertise location, task-knowledge coordination, and cognition-based trust—took several weeks to develop in virtual teams but remained stable once developed.	/ —	Early and frequent task oriented communications played a critical role in forming the initial beliefs and trust of team members about one another's specialized knowledge. Once such beliefs and trust set in, they appeared robust.	When TMS is established, it stabilizes and predicts team performance over time. The volume and frequency of task-oriented communication is a determinant of team performance in the initial phase of the project.
Guchait et al. (2014)***	Survey	2	8 weeks	Student teams preparing and serving meals to the public.	TMS quite stable over 8 weeks. Personality traits relate differently to team cognitions based on the	—	Conscientiousness was most important for initial emergence of TMS in teams, whereas agreeableness was	TMS significantly related to team performance and team satisfaction. Team taskwork understanding (similar to

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Carter et al. (2018)* (two studies)	Experiment / Survey	2 / 3	2 x 40 minutes / 8 weeks	Student teams in simulation game / Student project	developmental stage of team cognition. Study 1: TMS specialization and TMS credibility increased. Study 2: TMS credibility, TMS specialization, and TMS coordination remained quite stable in terms of mean values; significance not reported.	/ and —	more important later in the team's tenure. Team-level factory loadings increased over time as team members became more accurate in their ratings. Construct observability has implications for the speed with which team phenomena will emerge as recognizable team properties.	SMM) related to team cohesion.
Team goal orientation								
Maltarich et al. (2016)	Survey	3	10 weeks	Student teams in simulation game	Team-level goal orientation emerged dynamically, having different causal origins at different stages of team development.	?	Team-level goal orientation related to the composition of the team, but more in the beginning than in later stages. Over time it was influenced by how the team interacted and performed.	Team-level goal orientation operated reciprocally with team performance over the course of the team's task.

*Two or more TESs measured, so this study appears in more than one table.

**Guchait et al. (2014) and Guchait (2016) appear to build on the same dataset and are not included in the TMM/SMM table.

***Guchait (2016) appears to build on the same dataset and is not included in the TMS/TTM table.

Appendix 4

Team Confidence

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Team efficacy								
Myers et al. (2004)	Survey	8	8 games / 8 weeks	University football teams.	Collective efficacy remained quite stable across the 8 weeks measured.	—	Previous and subsequent collective efficacy influenced each other throughout the period.	There was a reciprocal relationship between collective efficacy and team performance.
Arthur et al. (2007)	Survey	3	10 days	Dyadic student teams in a simulation game.	Agreement in collective efficacy among team members increased between measurements (more similar perceptions over time); it is unclear whether the level changed.	?	Team members agreed more on the team's collective efficacy the more they worked together. Using a referent-shift consensus operationalization, this improved agreement was seen at an earlier stage.	Referent-shift measures showed a stronger relationship with team performance than aggregated individual self-efficacies. Aggregating self-efficacy has clear limitations and may not be appropriate.
Ronglan (2007)	Observation and interview		1 year	National handball team.	Three basic dimensions of team efficacy development identified: production (before the game), activation (during the game), and evaluation (after the game).		Production of collective efficacy brought about by perceptions of previous performances, interpretations of team history, preparations, rituals, and persuasive actions.	
Tasa et al. (2007)	Survey	2	5 weeks	Student teams in a simulation task.	Collective efficacy at the first measurement time predicted subsequent collective efficacy.	—	Collective efficacy evolved at the inter-individual level, as team members monitor performance feedback and the extent to which other members engage in teamwork.	Aggregated teamwork behavior was related to subsequent collective efficacy, which was significantly related to final team performance.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Goncalo et al. (2010) (preliminary and main study)	Survey	2 / 5	7 weeks / 6 weeks	Student project teams.	Collective efficacy remained quite stable in both the preliminary and main studies in terms of mean values. By contrast, changing appear dynamic in relation to conflict and team performance.	—	Collective efficacy was negatively related to process conflict during early stages. Teams with a high level of collective efficacy during later stages of the project experienced more process conflict early on.	Early collective efficacy had detrimental effects on team performance, whereas late collective efficacy led to better team performance.
Salanova et al. (2011)* (one of two studies)	Survey	3	6 weeks	Student project teams in a laboratory task.	A linear trend for collective efficacy over time, at both levels of analysis (individual perceptions and collective levels).	/	High levels of efficacy beliefs enhance engagement via positive affect through a kind of gain cycle and a tentative gain spiral that operates over time.	Efficacy beliefs had a positive direct impact on engagement and an indirect impact via positive affect (enthusiasm).
Dierdorff & Ellington (2012)	Survey	4	5 weeks	Student teams in a simulation game.	Team efficacy remained quite stable over time.	—	The average level of self-regulation and average self-efficacy among team members over time was positively associated with team efficacy.	High team efficacy led to improved team cooperation quality and more effective strategic decision making.
Salanova et al. (2014)	Survey	2	1 week	Student project teams in a laboratory task.	Collective efficacy did not change between two sessions, even when controlling for time.	—	Positive experience of collective flow at time point 1 was positively related to collective efficacy at time point 2.	There was a reciprocal relationship between collective efficacy beliefs and collective flow.
Leo et al. (2015)*	Survey	3	22 weeks	Soccer teams.	Downward trend for collective efficacy through all three measurement times.	\	Decrease in collective efficacy throughout the season explained by increasing conflict levels and decreasing cohesion.	
Carter et al. (2018)*	Survey	3	8 weeks	Student project teams.	Collective efficacy increased over time in	(/)	Team-level factory loadings increased over time as team	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Capiola et al. (2019)	Experiment	2	2 sessions/ 2.5 hours	Computer-mediated teams; novel task intervention.	terms of mean values, significance not reported. Collective efficacy was high across both prepared tasks (session 1) and novel tasks (session 2). Teams reached a certain level of collective efficacy early, and the level did not vary.	—	members became more accurate in their ratings. The relationship between trustworthiness and collective efficacy grew stronger over time in a context with limited social information.	Collective efficacy was a significant predictor of team-based performance and mediated the trustworthiness-performance relationship.
Rodríguez-Sánchez et al. (2021)	Survey	3	3 weeks	Contemporary teams in decision-making simulation.	Collective efficacy positively emerging over time.	/	Team task engagement and past task performance positively predicted future collective efficacy.	Both sources of efficacy beliefs (collective engagement and past task performance) positively impacted future collective efficacy over time. Effects were stronger from time point 2 to time point 3 than from time point 1 to time point 2.
Team potency								
Lester et al. (2002)	Survey	2	9 weeks	Student team working in real-life setting.	Group potency decreased from baseline to 9 weeks, significantly when regressing on time.	\	Early communication and cooperation were positively related to changes in group potency. Teams with charismatic leadership dropped less in group potency than the others.	Group potency, controlling for preexisting potency at baseline, was positively related to subsequent group satisfaction, work group effort, and final performance ratings.
Pearce et al. (2002)	Survey	2	6 months	Change management teams.	Team potency remained quite stable in terms of mean values.	—		Results indicated that team effectiveness and team potency are reciprocally and longitudinally related.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Gevers et al. (2020)*	Survey	3	Minimum 2 months	Professional IT project teams.	Fluctuating patterns of team potency. The mean level decreased in the first period and increased in the second period, with first and last measurements not correlating.	\ /	Initial levels and increases in shared temporal cognition over time both improved time-related performance by spurring higher initial levels and greater increases in team potency.	Initial levels and change in team potency operated as an explanatory mechanism for the relationship between shared cognition and team performance.
Team efficacy and team potency								
Lee et al. (2002)*	Survey	2	8 weeks	Student group project.	Group efficacy increased from the midpoint to the end of the semester. Team potency (and cohesion) remained stable during the same period.	/ and —	Cohesion and norm strength (group norms) were both positively correlated with group potency across time, but not with group efficacy at any point in time.	Late group potency had a positive effect on late team performance. Group efficacy, on the other hand, was unrelated to team performance.
Jung & Sosik (2003)	Survey	2	6 weeks	Student work groups.	Collective efficacy and group potency remained quite stable from the midpoint to the end of the semester in terms of mean values.	—	Members' perceptions of collective efficacy, group potency, and effectiveness became more homogenous after receiving feedback and working together over time.	
Collins & Parker (2010)	Survey	4	30 weeks	Study teams (managers in part-time executive program).	Change trajectories ranged from positive change (team process efficacy) to small random fluctuations (team potency) to potentially quadratic trends (team outcome efficacy).	/ and — and — \ —	Team outcome efficacy, team process efficacy, and team potency found to be empirically distinct dimensions.	Team outcome efficacy was the strongest predictor of objective team performance, whereas team process efficacy was the best predictor of citizenship behaviors.

*Two or more TESs measured, so this study appears in more than one table.

Appendix 5

Other Team Emergent States

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Team climate								
Loo (2003)	Mixed	2	9 weeks	Student project teams.	No overall change in team climate. Changes in some subscales of the team climate inventory: interaction frequency and clarity increased, while attainability decreased.	—	A positive team climate was promoted through reinforcing those actions that were working well and effective and timely interventions to address problems.	
Loewen & Loo (2004)	Mixed	2	9 weeks	Student project teams.	A replication of Loo (2003) with twice as many teams and similar findings. Qualitative data analysis revealed 11 themes that complement the quantitative results as to how a positive team climate develops.	—	Themes explaining team climate development: conditions for team climate (e.g., time), strategies (e.g., intentional and tacit), interactions (e.g., commitment), and consequences of team climate (e.g., learning).	
Kinnunen et al. (2016)	Survey	3	22 months	Professional teams in the public sector.	Both team climate and authentic leadership were stable across time in terms of mean values.	—	In forming a team climate, employees are active agents and not passive targets.	A positive team climate promoted authentic leadership across eight months, but not longer.
Primus & Jiang (2019)	Mixed (experiment)	2 experiments and reflections	4–16 months	Student teams; boot camp and simulation intervention.	Creative methods in team start-up activities contributed to a positive team climate. The team climate remained positive in the long run and higher than the control groups.	/ — and —	Design thinking exercises (model building and storytelling) had a positive effect on developing a positive team climate, but a business simulation game	Creative methods benefit team initiation by, e.g., raising participative confidence and friendly competition and by reducing fear of failure and habitual thinking.

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Team identification								
Jetten et al. (2002)	Survey	2	10 weeks	Governmental work teams.	Work-team identification dropped after an organizational restructure.	\	High work-team identification led to more negative feelings for the upcoming restructuring and was not related to organizational identification. High organizational identification led to fewer negative feelings.	Post-restructuring levels of work-team identification, organizational identification, job satisfaction, and perceived work-team performance were lower when compared with pre-restructuring levels.
Hobman & Bordia (2006)	Survey	2	12 weeks	Student in a team effectiveness course.	Team identification was stable across the semester, but with different moderation effects at the beginning and end.	—	Team identification moderated several relationships, e.g., value dissimilarity and relationship conflict, and different relationships at different times.	Over time and with more group-based assignment work, individuals' differences in values might have become more salient, and team identification lost its efficacy as a cohesive, conflict-reducing force.
Huettermann et al. (2014)	Interview	1 interview		UN peacebuilding teams.	A qualitative study taking on the followers' perspective for inductively deriving leadership behaviors that pertain to the development of team identification.		Leadership behaviors relevant for developing team identification: providing guidance, encouraging involvement, role modeling, and administering teamwork.	
Huettermann et al. (2017)	Interview	1 interview		UN peacebuilding teams.	A qualitative study aiming to scrutinize the psychological processes that occur in individuals when developing		Four different processes that occur as individuals develop team identification: enacting a salient identity, sensemaking about team	

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
H. H. Johnson & Avolio (2019)*	Survey	2	9 months	Student project teams.	identification with a highly diverse team. Early perceptions of team identification strongly predicted later team identification, with no observed change in terms of mean values.	—	experience, evaluating collective team outcomes, and converging identity. At high levels of initial team psychological safety, an increasing trajectory of relationship conflict had a negative effect on late team identification.	The interaction between initial team psychological safety and the increasing trajectory of team relationship conflict had a negative effect on team satisfaction because of its effect on team identification.
Team psychological safety								
Edmondson & Mogelof (2006)	Survey	Daily	6 weeks to 10 months	Innovation teams	Psychological safety remained relatively stable in teams across time. Despite this consistency, factors predicting psychological safety at the middle and end of a team project differed.	—	Goal clarity predicted psychological safety but only at later project stages. Positive team interactions predicted psychological safety both earlier and later in a project team.	
Schulte et al. (2012)	Survey	3	10 months	National service teams	Psychological safety decreased. Low to moderate autocorrelations of psychological safety suggest that team members tended to shift their perceptions of safety over time.	\	Team members' social network ties and psychological safety coevolve as a function of reciprocal and co-occurring processes, such as prospective action and retrospective sensemaking.	Team members with high psychological safety created more friendship and advice ties, which in turn fostered the convergence of team members' positive perceptions of the team's psychological safety.
H. H. Johnson &	Survey	2	9 months	Student project teams	Psychological safety remained stable throughout	—	An increasing trajectory of relationship conflict was related to lower levels of	High levels of team psychological safety initially followed by an

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
Avolio (2019)*					the project, considering the average level of all teams.		individuals' team identification, while higher initial perceptions of team psychological safety were positively related to team identification.	increasing trajectory of relationship conflict within the team led to a decrease in individuals' team identification and lower satisfaction with their team.
Mohan & Lee (2019)	Survey	2	9 months	Students in multinational teams.	Early psychological safety strongly predicted later psychological safety. There was a dynamic relationship between psychological safety and collective global leadership, where effects only existed in the later stages of team lifecycle.	—	Team psychological safety and collective global leadership (in terms of density and centralization) had a reciprocal influence on each other. The connection started to take shape in the middle stage and persisted through the final stages.	The relationship between initial and final collective global leadership patterns was mediated through team psychological safety in the middle stage.
Team engagement								
Salanova et al. (2011)* (one of two studies)	Survey	3	6 weeks	Student project teams in a laboratory task.	Task collective engagement (measured through vigor, dedication, and absorption) remained stable over time.	—	Time did not have the positive effect on team engagement that it had for collective efficacy and positive affect.	High levels of efficacy beliefs enhance engagement via positive affect through a kind of gain cycle and a tentative gain spiral that operates over time.
Guchait (2016)*	Survey	2	8 weeks	Student teams preparing and serving meals to the public.	Team engagement remained unchanged before and after a performance episode.	—	Teams with high team shared mental models and transactive memory systems were more likely to collectively engage, perform well, and be more satisfied with the team experience.	Team engagement mediated the positive relationship between team cognition (TMMs and TMS) and team outcomes (team performance and team satisfaction).
P. L. Costa et al. (2017)	Mixed	2 and video	1 semester	Executive students in a	Team work engagement increased for all 6 teams.	/	Overall, teams had an initial increase of activation	High-performing teams showed higher activation

Article	Method	Measurement times	Time span	Sample	Emergent state dynamics	Pattern (HOW)	Antecedents (WHY dynamics do or do not occur)	Outcomes (WHAT are the consequences of dynamics?)
			/ 30 minutes	business simulation game.	The study allowed for an exploratory description of the relationship between task work engagement and team performance.		followed by irregular ups and downs in activation and a U-shaped temporal evolution of their emotional valence.	levels in the second half of the teams' tasks and higher levels of affective processes than motivational ones.
Rodríguez-Sánchez et al. (2017)*	Survey	3	3 weeks	Teams in an organizational simulation exercise.	Collective task engagement and cohesion remained stable across three different creativity tasks given to teams that were specifically formed for the study.	—		Team engagement mediated the relationship between cohesion and perceived performance, and there was a reciprocal relationship between perceived performance and cohesion.

*Two or more TESs measured, so this study appears in more than one table.

PAPER 2

The Emergence and Development of Team Psychological Safety: A Team Practice Lens

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Abstract

Research finds team psychological safety to be an important ingredient for high-performing teams. However, there is scarce research on how team psychological safety emerges and develops over time. Drawing on the literature from climate emergence and team development, I designed two mixed method studies in two different contexts and studied the temporal dynamics of team psychological safety in both short- and long-term project teams. Interestingly, most teams start out at somewhat similar levels of team psychological safety. However, from there, team psychological safety appears to be a perishable good that can decrease as well as increase over time. These dynamics appear to be explained by *connecting*, *clarifying*, *supporting*, and *performing* team practices. Thus, I find team psychological safety to be a result of active choices rather than a passive consequence of simply spending time together. In fact, time itself is neither sufficient nor necessarily positive for team psychological safety—it is *how* this time is spent that matters. I discuss the theoretical and practical implications of my findings and suggest directions for future research.

Keywords: team psychological safety, temporal dynamics, team practices

Many organizations rely on the use of teams to solve tasks (Burke et al., 2006). However, the interpersonal risk associated with teamwork that can keep team members from sharing their ideas or contributing wholeheartedly may prevent teams from achieving the shared outcomes toward which they work (Edmondson, 2018). Thus, a fundamental factor for high-performing teams is team psychological safety—“a shared belief held by members of a team that the team is safe for interpersonal risk taking” (Edmondson, 1999, p. 350). Team psychological safety has positive effects on areas like innovation (Agarwal & Farndale, 2017; Soleas, 2021), team effectiveness (Yoo et al., 2022), knowledge sharing (Collins & Smith, 2006), and willingness to speak up when necessary (Liang et al., 2012). People are more likely to offer ideas, admit mistakes, ask for help, and provide feedback if they feel it is safe to do so (Edmondson & Lei, 2014).

However, despite an increased interest in the topic, the element of *time* is still overlooked in most research on team psychological safety (Frazier et al., 2017; Newman et al., 2017). Despite being categorized as a team emergent state (Rapp et al., 2021)—“properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes, and outcomes” (Marks et al., 2001, p. 357)—most studies on team psychological safety do not take its dynamic nature into account (Fyhn et al., 2023). Time is an essential brick in our understanding of team dynamics, and ignoring time leaves us with an incomplete understanding (Cohen & Bailey, 1997; Ilgen et al., 2005). Indeed, team emergent states may evolve in various ways (Fyhn et al., 2023), and with limited studies on the temporal dynamics of team psychological safety, we know little of *how* and *why* team psychological safety emerges and develops over time (Edmondson & Lei, 2014; Frazier et al., 2017; Newman et al., 2017).

To better understand the temporal dynamics of team psychological safety, I draw on the literature from climate emergence and team development. Team psychological safety

“describes a team climate... in which people are comfortable being themselves” (Edmondson, 1999, p. 354). However, this climate does not necessarily emerge naturally (Edmondson & Lei, 2014). According to Schneider and Reichers (1983), climates emerge “out of the interactions that members of a work group have with each other” (p. 30), and the practices of a given work environment are key to understanding this emergence. Thus, in the present paper, I explore *team practices*—the activities within a team that shape and are shaped by team member behavior and characterize how team members interact.³⁵ Moreover, most theories on team development agree that what happens early in a team’s life influences later team functioning (Feldman, 1984; Gersick & Hackman, 1990; Mathieu & Rapp, 2009). Thus, to study the emergence and ensuing development of a team climate, we need to study teams from the very beginning of their lives (Cohen & Bailey, 1997).³⁶

In the present paper, I ask: *How does team psychological safety emerge and develop over time, and how can we understand these temporal dynamics through the practices of the team?* To answer this research question, I designed and carried out two studies. In the first study, I explored the temporal dynamics of team psychological safety in short-term projects by following six project teams in a humanitarian aid organization from the day they were formed until they finished their work 11 days later. This was a highly suitable context in which to study the emergence of team psychological safety since these teams consisted of people new to one another who were dependent on functioning as a team from the very beginning, due to time pressure. In the second study, I followed three interdisciplinary project teams in public administration from their startup until nine months later. I explored how team psychological safety emerged in an early phase and further developed over a longer time

³⁵ This is my own definition; see the Theoretical Background section (p. 206–209) for elaboration.

³⁶ *Team climate* may both refer to a team emergent state in itself and function as an umbrella term for different team emergent states, such as *team psychological safety climate* (Rapp et al., 2021). As “team climates reflect individuals’ shared perceptions about various aspects of the organization (e.g., safety, justice, diversity)” (Perrigino et al., 2021, p. 151), team climate is a much broader term than team psychological safety climate. In this paper, I focus on a team psychological safety climate when studying climate emergence and development.

horizon. Both studies make use of a convergent parallel design (Creswell, 2014) in which quantitative data are used for descriptive purposes and categorization, and qualitative data are used for interpretation and exploration. This kind of mixed methods approach makes room for triangulation and is especially encouraged to capture team dynamics (Cronin et al., 2011b; Piccoli & Ives, 2003; Primus & Jiang, 2019).

I contribute to the research field on team psychological safety in two key ways. First, I extend the literature on team psychological safety by incorporating time into our understanding of this team phenomena. Through my iterative approach—exploring team psychological safety in both short-term and long-term project teams—I identify some of the temporal dynamism of team psychological safety, thus answering calls from Edmondson (1999) and from literature reviews (Edmondson & Lei, 2014; Frazier et al., 2017; Newman et al., 2017) on the dynamics of team psychological safety. Considering that team psychological safety has positive effects on team learning behavior (Creon & Schermuly, 2019) and voice behavior (Detert & Burris, 2007), such behaviors may be reduced in periods of low team psychological safety and negatively affect the team. As high-performance teams would be dependent on not only *building* team psychological safety but also *sustaining* this safety throughout their upcoming challenges, a simplified static approach to a dynamic process is insufficient. In their review of effective teamwork, O’Neill and Salas (2018) specifically call for research on the emergence and maintenance of team psychological safety.

Second, to my knowledge, the present paper is the first to address how teams can develop team psychological safety from the time they are formed. Thus, I extend the literature on team psychological safety by identifying which team practices are key for developing team psychological safety—*connecting*, *clarifying*, *supporting*, and *performing* practices—both in an early phase and over time. Through this extension, I answer the call by H. H. Johnson and Avolio (2019) to study and identify activities that may aid team members to perceive enough

psychological safety early on to fully engage in teamwork. This resonates with the previous call by Cohen and Bailey (1997) for team dynamics research in general, highlighting the necessity of studying time and the impact of activities in teams' early phases. This insight into other team emergent states has revealed important implications for team functioning (Fyhn et al., 2023), but it is an insight currently lacking for team psychological safety. Importantly, early team psychological safety may contribute positively to subsequent communication and team processes (H. H. Johnson & Avolio, 2019). By knowing more about team practices that foster team psychological safety, teams may make use of the team's full potential as early as possible, making the team more effective from the start.

Theoretical Background

Team Development Theory and Team Psychological Safety

The literature on team development describes how teams can develop over time in various ways: experiencing particular shifts (e.g., Gersick, 1988), going through certain stages (e.g., Tuckman, 1965), or developing more dynamically (e.g., McGrath, 1991). According to Gersick and Hackman (1990), patterns of behavior in teams may emerge through importation (e.g., based on previous common experience), creation (e.g., when team members are new to one another), or evolve over time as a more gradual learning process. This shows that it is important to consider temporal dynamics when studying team development. Moreover, conceptual research by Gersick and Hackman (1990) and Feldman (1984) demonstrates the impact that early team processes have on later teamwork, highlighting the need to study teams from their very beginning (Cohen & Bailey, 1997). Later empirical work supports these earlier studies (e.g., Ericksen & Dyer, 2004; Zijlstra et al., 2012). Indeed, most theories on team development have in common that early team phases may set the stage for later phases (Mathieu & Rapp, 2009).

According to Marks et al. (2001), teams typically start out in a transition phase characterized by evaluation and planning activities to guide goal accomplishment. What teams do early on may shape the later phases when teams work more specifically toward goal accomplishment (action phases; Marks et al., 2001).³⁷ For team psychological safety specifically, Edmondson (2003) found in a study of hospital teams that team preparation with a focus on speaking up and experimenting with ideas and possibilities made it easier to speak up in later settings. Hence, early activities may determine the perception of team psychological safety among team members, and their perception of team psychological safety may shape which activities they engage in and how they engage in them. Still, the speed or pattern with which this happens remains an under-researched phenomenon. Teams may develop in complex ways (Marks et al., 2001). Thus, a snapshot of team psychological safety and its relationship with a specific antecedent or outcome may not offer a sufficiently rich picture of its true nature (Fyhn et al., 2023). Indeed, time is a condition for team climates, such as a team psychological safety climate, to develop (Loewen & Loo, 2004). Accordingly, to understand the temporal dynamics of team psychological safety more fully, we need to study the emergence of team psychological safety from the moment teams are established, along with its development over time.

Early Team Psychological Safety

To my knowledge, only one study has focused specifically on team psychological safety in an early team phase. H. H. Johnson and Avolio (2019) investigated *initial* team psychological safety, referring to team members' perceptions of "whether the team will have an environment/climate that allows for mistakes and risk-taking based on impressions they develop early in the team's time together" (p. 849). Hence, initial team psychological safety

³⁷ Marks et al. (2001) use the term *teamwork processes* to describe "interdependent team activities that orchestrate taskwork in employees' pursuit of goals. Teamwork processes are the vehicles that transform team inputs to both proximal and longer-term outcomes" (p. 358).

represents expectations more than actual experiences. However, H. H. Johnson and Avolio (2019) measured team psychological safety “several weeks into the first year of the program during which teams were being formed” (p. 853)—allowing for some experience to affect the perception of team psychological safety—and not from the very first time the teams met. Furthermore, H. H. Johnson and Avolio (2019) did not study the emergence of team psychological safety but how it was related to team identification. More specifically, the interaction between initial team psychological safety and team conflict trajectory had a negative effect on team satisfaction, as mediated by team identification. Hence, to build team psychological safety early on appears to be important to reduce feelings of uncertainty among team members and for fruitful team processes to ensue (Nienaber et al., 2015).

With little research on team psychological safety from the very start of a team’s life, we may look to a related team emergent state—*team trust*³⁸—for which team development theory is incorporated to a greater extent within the literature. Studying virtual teams, Jarvenpaa and Leidner (1999) found that teams that established trusting relationships early on exchanged more information and socialized more, while teams low on initial trust experienced less initiative and more non-responsive team members. Most of the teams low on initial trust never overcame this barrier and performed worse than teams high on initial trust. In their early work on swift trust, Meyerson et al. (1996) note how “initial trusting behavior can set off a familiar cycle in which trust becomes mutual and reinforcing” (p. 188). H. H. Johnson and Avolio (2019) suggest a similar reinforcing cycle between initial team psychological safety and team identification over time.

³⁸ Fulmer and Gelfand (2012) define team trust as “a shared psychological state among team members comprising willingness to accept vulnerability based on positive expectations of a specific other or others” (p. 1174).

Team Psychological Safety Development over Time

In the most frequently cited paper on psychological safety, Edmondson (1999) acknowledges that a cross-sectional snapshot of team psychological safety “provides an incomplete picture” (p. 379). Indeed, team psychological safety may take time to develop (Bradley et al., 2012; Edmondson, 1999). In their literature review, Edmondson and Lei (2014) point to the lack of literature on how team psychological safety builds and unfolds over time. A more recent review confirms the lack of studies on the temporal dynamics of team psychological safety (Fyhn et al., 2023).

However, there are some longitudinal papers where team psychological safety is measured twice or more—to avoid common method bias or discuss causality, for instance—that give some indication of its temporal dynamism. In studies where team psychological safety is measured twice, team psychological safety has appeared relatively stable (i.e., the first measurement correlates with the second) (Coutifaris & Grant, 2022; H. H. Johnson & Avolio, 2019; Mohan & Lee, 2019; Takai & Bittorf, 2020). Still, Liang et al. (2012) reported that perceptions of psychological safety at the individual level collected just six weeks apart were only moderately correlated. In studies where team psychological safety is measured three times, team psychological safety has appeared more temporally dynamic. Schulte et al. (2012) found team psychological safety to *decrease* in national service teams over 10 months, whereas Dusenberry and Robinson (2020) found team psychological safety to *fluctuate* throughout a student semester. In a study on psychological safety at the individual level, Ahmed et al. (2021) found psychological safety to *increase* considerably among nurses in a hospital over three months during the outbreak of Covid-19. Furthermore, longitudinal studies on other team emergent states have revealed that they do develop over time—potentially increasing, decreasing, or fluctuating (Fyhn et al., 2023)—and thus reveal some of their dynamic nature, as described in the definition of these states by Marks et al. (2001).

The only study I have identified in which team psychological safety is measured both early in a team's life and over time is Edmondson and Mogelof (2006). The authors examined team psychological safety in project teams and included measures from each project's beginning. However, since the project horizon for the teams differed, Edmondson and Mogelof (2006) collapsed scores into phases, and initial scores were only used as a reference value for later team psychological safety measures. Based on these scores, team psychological safety appeared relatively stable. However, the development of team psychological safety was not specifically discussed. Nevertheless, an interesting finding by Edmondson and Mogelof (2006) was how factors predicting team psychological safety differed at the middle and end of a team project. More specifically, their results indicated that a clear sense of team goals was important for late team psychological safety—toward a project deadline—but not earlier. Team interactions, on the other hand, were an important predictor of team psychological safety throughout a project, which supports the importance of studying within-team interactions to understand the origins of team emergent states (Wiese & Burke, 2019) and the climate of a team (Schneider & Reichers, 1983).

Climate Emergence, Team Practices, and Team Psychological Safety

A climate emerges out of the interactions between the people comprising that climate (Schneider & Reichers, 1983). According to Kinnunen et al. (2016), members of a team are “active agents and not passive targets” (p. 342) in forming the team climate. Interactions that shape a climate of team psychological safety—where team members “are comfortable being themselves” (Edmondson, 1999, p. 354)—may, for instance, be to engage in interpersonal risk taking (e.g., admitting shortcomings and asking for help) or experience that it is acceptable to make mistakes in front of other team members (Perrigino et al., 2021). Even though team psychological safety refers to a belief that the team is safe for interpersonal risk taking (Edmondson, 1999), risk-taking behavior by team members may be necessary to develop

team psychological safety in the first place (Edmondson, 2004). In other words, a member or members must take the first step to create the room for team psychological safety to emerge. Moreover, though team leaders may have a specific impact on perceptions of team psychological safety, a team climate of psychological safety is affected by the behavior of all team members (Gerlach & Gockel, 2018; Kinnunen et al., 2016; Remtulla et al., 2021). This necessitates studying what team members *do* in order to understand more of *how* team psychological safety emerges and develops over time.

Team practices are adapted by team members through their interactions and shape their subsequent participation (Gibbs et al., 2021). Practices are a key element in organizational climates (Schneider & Reichers, 1983), building on the logic of our individual perceptions being shaped by the practices around us (such as whether it is acceptable to ask for help without fear of being looked down on), and it is these more or less shared perceptions that constitute a team climate (Perrigino et al., 2021). Indeed, Edmondson (2004) argues that team members—based on facing similar experiences concerning risk-taking behaviors—will develop somewhat similar perceptions and that psychological safety is thus primarily a group-level construct.

Though the term *team practices* is widely used (e.g., Baiden et al., 2006; Dietze & Kahrens, 2022; Gibbs et al., 2021; Lynn et al., 1999; Scott-Young & Samson, 2009), a clear definition of this term has not emerged. To seek to define it, I found inspiration in strategy, a different field of organizational research: “Strategy-as-practice research focuses on the micro-level social activities, processes and practices that characterize organizational strategy and strategizing” (Golsorkhi et al., 2015, p. 1). The field of strategy research follows a generally increased focus on practice perspectives within social sciences (Rouse, 2007) and emphasizes what actually takes place when *doing* strategy (G. Johnson et al., 2007): “taking social practices seriously” (Vaara & Whittington, 2012, p. 1). Through an activity-based view,

research on practices attempts both to reach out to practitioners and to emphasize human action to understand organizational phenomena (G. Johnson et al., 2007). Key to research on practices is examining situated activity; that is, “the way activity both shapes and is shaped by the society within which it occurs” (Jarzabkowski, 2005, p. 30). Based on climate emergence theory and this related field of study, I understand team practices as *activities within a team that shape and are shaped by team member behavior and characterize how team members interact*.

Importantly, emphasizing team practices opens the way to a more dynamic exploration and understanding of team phenomena. Whereas some research on organizational climate takes a structural approach (e.g., emphasizing team composition) to explain how climates come about, such approaches tend “to treat climate as a relatively static phenomenon, changing very slowly, if at all” (Schneider & Reichers, 1983, p. 37). There is a vast amount of research on antecedents to team psychological safety, summarized in the most recent meta-analysis and literature review (Frazier et al., 2017; Newman et al., 2017).³⁹ Even though these studies add important insights into what can determine team psychological safety, studies on these antecedents have generally not considered temporal dynamics and are not necessarily transferable to practices. Considering the dynamic nature of team emergent states (Marks et al., 2001), team psychological safety perceptions can potentially change over time. Thus, it appears fruitful to explore these temporal dynamics through a dynamic lens, such as practices within teams.

There are a few studies on team psychological safety that address team practices.

Reviewing literature on interventions (e.g., simulation exercises) aimed at building team

³⁹ The latest meta-analysis on team psychological safety categorizes antecedents into supportive work context, positive leader relations, work design characteristics, and learning orientation (Frazier et al., 2017). The latest literature review conducted by Newman et al. (2017) summarizes team psychological safety antecedents into somewhat similar categories: supportive organizational practices, supportive leadership behaviors, relationship networks, team characteristics, and individual and team differences.

psychological safety, O'Donovan and McAuliffe (2020) found inconclusive results as to what works, potentially explained by a lack of involvement of team members in some interventions and the limited ability of some interventions to change already established practices like speaking-up behaviors. Similarly, in a study on student teams, spending time together appeared more important for building team psychological safety than targeted training interventions (Dusenberry & Robinson, 2020). Thus, what is done *by* the team appears to be more important than what is done *to* the team. With more knowledge of which practices are important for the emergence and development of team psychological safety, we can design better interventions to facilitate and support these practices.

Team practices have also been studied in relation to other team phenomena. For example, Lynn et al. (1999) found that team practices such as reviewing information, setting clear goals, and having a structured process were important for learning and the success of product development teams. Furthermore, team practices may explain the development of team integration (Baiden et al., 2006), team learning, and team engagement (Gibbs et al., 2021). These studies exemplify how activities within teams can foster subsequent team emergent states (Marks et al., 2001) and the importance of studying team practices to understand how teams develop (Cohen & Bailey, 1997). Though teams may start out at similar levels of team psychological safety, they may end up with quite different team psychological safety later on, depending on their team practices. In the present paper, I explore how team psychological safety can emerge and develop over time through a team practice lens.

Study 1 Method

Research Setting

To explore how team psychological safety emerges and develops through team practices, I conducted a case study in a humanitarian aid organization that is part of a business

school student association. Case studies are suitable for understanding the complexity of team phenomena (Yin, 2015). The organization consisted of students who applied for their positions. In the two first weeks of a semester, they worked intensively together in teams in their different areas of responsibility (marketing, external events, internal events, etc.).

I considered this setting well suited for studying team psychological safety temporal dynamics for several reasons. First, the teamwork took place within a limited period during which I as a researcher was able to follow the teams from formation until project end. Second, team members were selected based on their own motivation and worked closely together on this project for several hours a day throughout the 11-day period. Third, in contrast to student teams in teaching settings, these people worked together in real-world project teams that raised a considerable amount of money for a specific charity (1 million NOK annually, on average, equivalent to 100 000 USD), driven solely by the students themselves, who had collective responsibility for their work. Fourth, based on the uncertainty the participants encountered (not knowing their specific tasks in advance, new teams and unfamiliar team members, short time frame, etc.), there was a need for quick adaption and learning: thus, it was a context particularly dependent on team psychological safety (Edmondson & Lei, 2014).

Research Design

I conducted a pilot study prior to the main data collection based on interviews with six team leaders from the same organization one year earlier. The pilot proved useful in designing the full study for several reasons. First, I was able to test and refine the interview guide based on respondent feedback. Second, I gained insights into how the teams were likely to work throughout the project, when to start and end data collection, and when during the day it was most appropriate to send out surveys. Third, a common topic in the pilot interviews was how their perceptions of team psychological safety had changed throughout the project period. Thus, it appeared beneficial to measure team psychological safety quantitatively so as not to

rely solely on retrospective interviews; it also seemed best to measure over several days to increase the robustness of the quantitative measurements. Fourth, I tested different team psychological safety scales on the pilot informants, all six of whom recommended the scale by van Ginkel and van Knippenberg (2008) because they found those items easiest to understand and most relevant for this context.

Based on the pilot study, I designed an explorative case study (Yin, 2015) making use of a convergent parallel design in which quantitative and qualitative data were collected in parallel, analyzed independently, and then interpreted together (Creswell, 2014). Relying on one source of data is not necessarily sufficient to gain the in-depth understanding one aims for in a good qualitative case study (Creswell, 2014). Using different types of data collection can provide unique insights and help check for inconsistencies between different data types (Miles et al., 2013). In my study, quantitative data were used for descriptive purposes and categorization, and qualitative data were used for interpretation and exploration (Sieber, 1973). More specifically, through daily measurements, I could capture team psychological safety as it unfolded, enabling me to increase the robustness of the team psychological safety measure by not relying only on a cross-sectional snapshot and to be open to investigating the temporal dynamics of team psychological safety without considering solely retrospective sentiments (Pratt et al., 2020). Through the comments given in the surveys and semi-structured interviews, I obtained deeper insights into how team members experienced their team psychological safety throughout this period and what could explain differences between teams. Such a mixed methods approach aids with triangulation and is especially encouraged to capture team dynamics (Cronin et al., 2011b; H. H. Johnson & Avolio, 2019; Primus & Jiang, 2019). In sum, I could explore more of both *how*—through quantitative methods—and *why*—through qualitative methods.

Data Collection

Quantitative

The data collection started with a kickoff meeting for all newly hired workers in the humanitarian aid organization, where I as a researcher could inform about the research project and invite the workers to participate. 41 of the 48 workers gave written consent to voluntarily participate in the project. Participants ranged from 18 to 23 years (average, 20.2 years); 63% were female and 37% male. For 11 consecutive days, a daily survey was sent out by SMS to all participants at the same time every evening, following their daily meetings (see Figure 1). This survey contained a team psychological safety scale (van Ginkel & van Knippenberg, 2008), and participants were asked to focus on the most recent day of teamwork when answering. All 41 participants, who represented seven teams, answered one or more of the daily surveys. However, on one of the teams, only one participant responded somewhat regularly. Thus, this team was excluded from subsequent data analysis. Other participants answered seldomly or stopped answering during the data collection period. In sum, 35 participants representing six teams answered more than 50% of the surveys and were included in the data analysis.

Qualitative

Qualitative data were collected using two approaches. First, in the daily surveys, participants were asked to describe whether there had been special incidents during the most recent day that impacted their teamwork. However, the extent to which participants made use of this option varied. A total of 53 qualitative descriptions were given. Second, semi-structured interviews were conducted the week after the teamwork had ended. Not all participants volunteered to be interviewed. Thus, a total of 22 interviews were conducted with a minimum of three participants representing each of the six teams, one of them being the

leader. The interviews, which lasted between 30 and 45 minutes, were all conducted in person, recorded, and manually transcribed.

Gioia et al. (2013) consider the semi-structured interview to be the heart of good qualitative research and useful for obtaining both retrospective and real-time accounts. When preparing the interview guide, I followed their guidance on how to ensure thorough and focused interviews without leading the participant into the researcher's pre-conceived understandings (Gioia et al., 2013). Thus, in the first part of the semi-structured interviews, the participants talked about their role in the team, how the team was organized, and the team's tasks. The interviews then moved on to the more subjective experience of being a part of the team and describing their activities, such as whether they had spent time on establishing the team before beginning their project-related tasks. In the second part of each interview, the focus was directed toward team psychological safety, where the participant was introduced to the definition by Edmondson (1999), along with examples of what this kind of safety might look like in a team: that members might appreciate discussion, wish to hear what others have to say, allow for mistakes without holding it against one another, ask others for help, and so on. Based on this, the participant was asked open-ended questions about how their psychological safety was perceived in the team. They were specifically asked to reflect on how the activities within the team and how team members interacted with one another related to their own perceptions of psychological safety. During each interview, the participant was asked to sketch a curve indicating how his or her perception of psychological safety in the team rose and/or fell throughout the teamwork period. This was used as grounds for reflection on the temporal dynamics of team psychological safety and to gain a deeper understanding of whether—and if so, how and why—the perception of team psychological safety had changed throughout the period.

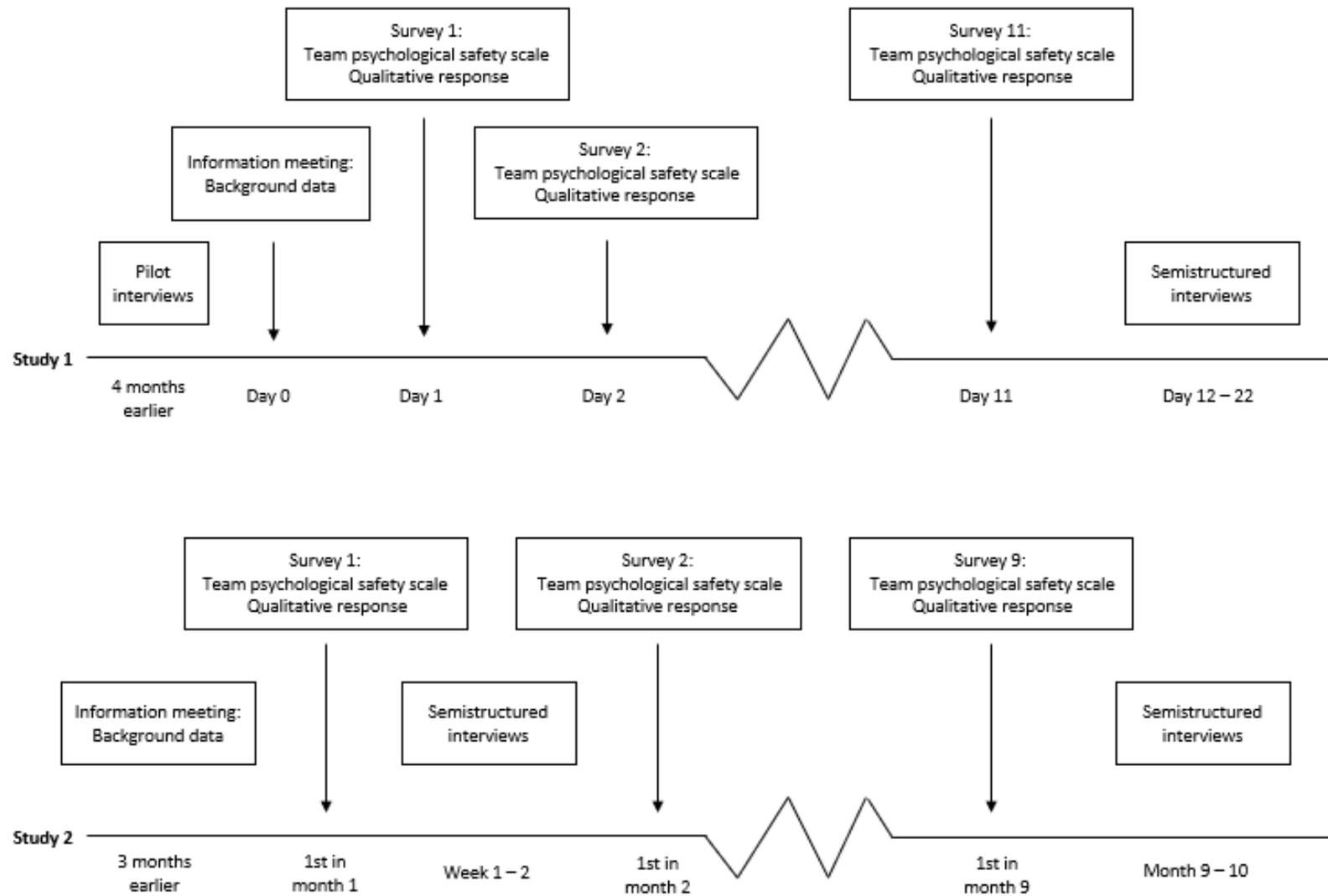


Figure 1. Overview of the data collection for Study 1 and Study 2.

Data Analysis

Quantitative

The primary objective of the quantitative data was to obtain a measure of team psychological safety for description and categorization, such that teams could be compared based on certain criteria (Miles et al., 2013). The quantitative data from the daily surveys were analyzed using Microsoft Excel. The team psychological safety score of every participant throughout the 11 days was calculated to create a personal psychological safety development curve for each participant. Moreover, since the study focus was on psychological safety within teams, team-level scores were also calculated, and a team-level development curve was drawn for each team.

Next, team psychological safety scores were collapsed into three phases: *early* (days 1–3), *mid* (days 4–7), and *late* (days 8–11). I considered this appropriate because it allowed for easier interpretation of the temporal dynamics and increased the robustness of the data (Edmondson & Mogelof, 2006). Moreover, this build-up in phases described how the teams worked together in general: an early phase dominated by planning and preparation, a mid-project phase dominated by work on their respective responsibility areas, and a late phase also dominated by such work, but under greater pressure due to the approaching project deadline. Figure 2 shows the development of team psychological safety for the three phases.

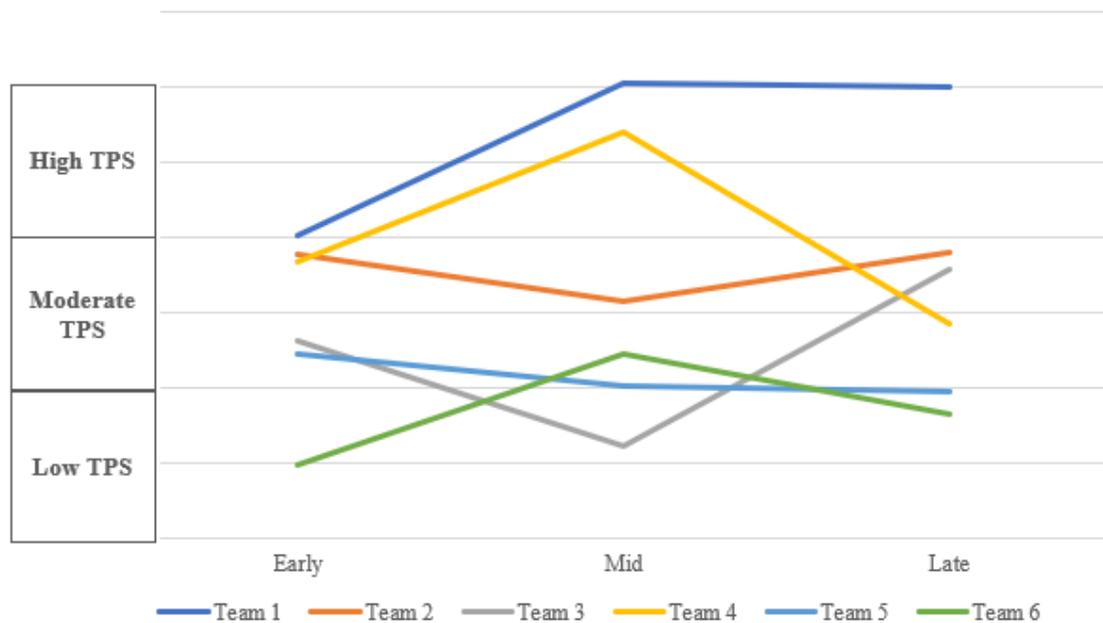


Figure 2. Team psychological safety levels over time for teams in Study 1.⁴⁰

Qualitative

The fact that there is so little research on team psychological safety temporal dynamics and related team practices upon which to build could justify, or even necessitate, a purely inductive approach (Glaser & Strauss, 1965). However, there is a vast amount of research on antecedents to team psychological safety that can relate to team practices. Thus, following the recommendation by Alvesson and Sköldbberg (2017), viewing data as a resource and inspiration for extending existing theory, I considered an abductive approach most beneficial. I created a codebook to more accurately analyze traces of team psychological safety antecedents in the data. Moreover, I saw it as important to remain open to emerging themes not covered in the existing literature but specifically focused on practices within teams. An abductive approach—working iteratively and triangulating between the data, previous

⁴⁰ Values are mean centered around the overall mean for team psychological safety in the sample ($M = 5.76$). The x-axis refers to standard deviations ($SD = 0.27$) above or below the overall mean. Low team psychological safety (Low TPS) reflects a team psychological safety level one standard deviation or more below the overall mean, moderate TPS reflects a team psychological safety level between one standard deviation below and one standard deviation above the overall mean, and high TPS reflects a team psychological safety level one standard deviation or more above the overall mean.

research, and emerging theory—was also appropriate considering my mixed methods design, with quantitative and qualitative data collected and analyzed in parallel (Creswell, 2014).

The analysis started at the individual level and was conducted following the guidance of Braun and Clarke (2006) and using their thematic analysis approach. First, the interview transcriptions and qualitative comments from the surveys were imported into the NVivo 12 software package and organized based on each participant's unique ID. Second, six preset etic codes based on established terms and concepts (Belk et al., 2013) from the codebook of team psychological safety antecedents were entered: support from organization, support from leader, support from peers, work design characteristics, personal traits, and differences among team members. Third, all qualitative material was analyzed using these preset codes, along with emerging emic codes based directly on the participants' language (Belk et al., 2013). A total of 90 first-order codes (empirical themes) emerged as a result this process. Fourth, data were reduced by collapsing codes with somewhat similar meanings and connecting related codes (Miles et al., 2013). In this process, I emphasized the practices (i.e., activities, behavior, and interactions) that the participants had reflected upon when considering how and why their perception of team psychological safety had evolved. Fifth, a data structure table was created (Table 1), consisting of the practices that the participants most frequently referred to (empirical themes), eight second-order themes (conceptual categories) and three third-order themes (aggregate dimensions). Sixth, a representative data table was organized using the same categories, consisting of the original quote (in Norwegian), the translation (into English), and the phase of the comment (early, mid, or late). Moreover, each quote or comment was categorized as positive (i.e., an activity indicating that a certain team practice was present), neutral (i.e., both present and not present), or negative (i.e., not present). Seventh, the qualitative material was merged with the quantitative data, creating a comprehensive data file for each participant containing descriptive survey data (team

psychological safety measures over time), quotes from interviews and qualitative questions in the survey, and my own interpretations and notes.

The analysis continued at the team level. A file for each team was created, consisting of the same content as the individual files. Through this, I was able to conduct within-case analyses (Miles et al., 2013) aiming to explore how and why team psychological safety emerged and developed within each team. Moreover, to understand more of these dynamics and increase potential transferability and relevance, I conducted cross-case analyses comparing and looking for variance across teams (Miles et al., 2013). In combination with my longitudinal mixed methods design—mapping team psychological safety temporal dynamics quantitatively and emphasizing team members' own interpretations qualitatively—this could increase the trustworthiness of the findings (Pratt et al., 2020). Based on the quotes and comments and their categorization into positive, neutral, and negative, a descriptive indicator for each aggregate dimension was assigned to each team based on the degree of presence of the various team practices. For example, if there were more positive quotes and comments than neutral or negative ones, the respective team practice was considered descriptive of the team climate and thus given a green (i.e., high) indicator. Table 2 summarizes the level of team psychological safety (cf. Figure 2) and team practices for the six teams. Example quotes descriptive of the various team practices for each team are presented in Appendix 1.

Unfortunately, I was unable to indicate the degree of team practices for each phase (as was done in Study 2) due to the limited amount of qualitative data and time horizon in the current study. Thus, teams were given indicators of the level of team psychological safety for each of the three phases (based on quantitative data, related to the mean of the sample) and one indicator of the degree of team practices for the entire project period (based on qualitative data).

Table 1. Team Practices Related to Team Psychological Safety Emergence and Development in Short-Term Project Teams (Study 1).

Empirical themes	Conceptual categories	Aggregate dimensions
Spending time together during teamwork, sitting together when doing individual work	Socializing	Connecting
Spending time together outside teamwork at events like joint breakfasts and parties		
Building friendships, getting to know one another on a personal level	Relationships	
Establishing a warm and relaxed atmosphere, keeping an informal tone		
Connecting with everyone in the team, avoiding splitting up unintentionally	Avoid subgrouping	
Planning, distributing responsibilities	Structure	Clarifying
Setting team rules, talking about how they should work together		
Sharing expectations	Shared understanding	
Meeting regularly, updating one another		
Coordinating, setting direction	Predictability	
Communicating clearly, addressing misunderstandings		
Motivating, showing empathy and respect	Support from team members	Supporting
Helping, contributing to one another's work		
Learning and adjusting to one another's preferences		
Showing commitment, building a sense of equality and fairness		
Creating room for mistakes, laughing together, actively using humor		
Delegating, showing trust	Support from team leader	
Following up with everyone, listening		
Encouraging, inviting opinions and ideas		

Table 2. Level of Team Psychological Safety and Team Practices for Teams in Study 1.

Team	1			2			3			4			5			6		
Phase	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late
Team psychological safety	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Green	Yellow	Yellow	Red	Red	Red	Yellow	Red
Team practices																		
Connecting	Green			Green			Yellow			Red			Yellow			Yellow		
Clarifying	Green			Yellow			Yellow			Yellow			Red			Red		
Supporting	Green			Yellow			Yellow			Red			Yellow			Yellow		

Note: Teams are given a team number based on their level of team psychological safety in the last period (i.e., Team 1 had the highest level, Team 6 had the lowest level). The different colors in the upper part of the table indicate the level of team psychological safety for each phase for the respective team.

Red = Low; team psychological safety one standard deviation or more below the overall mean.

Yellow = Moderate; team psychological safety between one standard deviation below and one standard deviation above the overall mean.

Green = High; team psychological safety one standard deviation or more above the overall mean.

The different colors in the lower part of the table indicate the degrees to which respective team practices were descriptive of the team climate, based on the number of quotes and comments and their categorization (positive, neutral, and negative).

Red = Low; more negative quotes and comments than neutral or positive ones.

Yellow = Moderate; mostly neutral quotes and comments and/or equal numbers of negative and positive quotes and comments.

Green = High; more positive quotes and comments than neutral or negative ones.

Study 1 Results

Below, I present the results in two parts. First, I describe how team psychological safety emerged and then developed in these short-term project teams. Second, I show how team practices related to these temporal dynamics.

How Team Psychological Safety Emerges and Develops over Time

The level of team psychological safety was quite similar for all six teams from the beginning. Five of six started out at a moderate level. The first days were described by several participants as a phase in which all members were new to one another and had somewhat similar expectations as to what the teamwork would bring. For the team that started out with the lowest team psychological safety, Team 6, not knowing where one was relative to the others in the team clearly affected one team member's psychological safety:

Then there is a slightly higher threshold for taking on that task. And then you become more uncertain, and if it turns out that people go for the easiest thing and do not really want to be involved in something that is a little more uncertain, then first of all, it becomes more uncertain when you don't know where you have each other.

As the teams worked more together, their perceptions of team psychological safety spread in different directions. As Figure 2 shows, Teams 1, 4, and 6 experienced an increase, while Teams 2, 3, and 5 experienced an overall decrease, though to various degrees. For one member of Team 5, the experience of her teammates did not necessarily meet her expectations, resulting in lower team psychological safety:

When I had received the slightly half-cold comment one day, then I felt a bit like... "oh, maybe I interpreted him wrong as a person." What I mean is that when you get to know your team better and the people who are there, you also know how to relate to them. But after this I felt more unsafe.

For the last phase, team psychological safety appeared to stabilize somewhat for some teams, while others still experienced shifts in team psychological safety—especially Team 4 (decrease) and Team 3 (increase). In Team 4, members perceived the team leader to be more controlling as the project deadline approached, leading to less safety:

It seemed that she didn't think I did anything, or that I didn't have much control. She was always like, "Yes, are you sure? Can you make it?" I gradually felt that it was a bit like she didn't think I could do it... like she was much higher up, and then I was a bit like, "No, I can't do anything; help me with everything." It was a bit of a strange feeling, and I only got it toward the end.

For Team 3, the increased time pressure resulted in the emergence of a subgroup. After struggling with including the whole team in the teamwork, the team leader and some team members eventually gave up trying and instead ran their own show to get the job done. That led to increased safety for those involved, and their team psychological safety rose in the last part of the project for the team as a whole, even though not all team members took part in that increase. One team member noted, "we kind of became a small group in the end of 3–4 people who did most of the work. It has gone well, but the cooperation has been poor."

Taking all six teams together, no general pattern was revealed as to how team psychological safety develops in such a short-term project. Rather, there was a mix of trajectories. Thus, time itself is not sufficient for developing team psychological safety; what team members *do* in this time appears to matter more.

How Team Practices Relate to Team Psychological Safety Temporal Dynamics

Through my analysis, three team practices were revealed as important for team psychological safety emergence and development: connecting, clarifying, and supporting. Connecting practices involved getting to know one another and building relationships. Teams with a high degree of this practice typically arranged specific events like parties or

implemented social routines like having breakfast together before starting their tasks. Notably, an element of connecting practices was that team members connected with everyone in the team, thus avoiding subgroups. Clarifying practices involved planning activities with a focus on structuring the task work. Some teams emphasized team rules by discussing up front how they should work together before they turned to specific tasks. Moreover, clarifying practices involved building a shared understanding by sharing expectations and keeping one another updated, as well as creating predictability through coordination and clear communication. Supporting practices involved being bolstered by other team members through motivation, showing interest, and directly helping one another. Moreover, support from the team leader appeared important, both in the form of showing trust through delegation and in encouraging and following up with all team members (see the General Discussion section for more detail on the relationship between team practices and team leader practices).

The degree to which the six teams emphasized these team practices related to the level of team psychological safety that members reported (see Table 2 for how they relate and Appendix 1 for example quotes). Team 1, which had the highest team psychological safety throughout the project, stood out from the others in terms of connecting, clarifying, and supporting practices. Its team leader focused on communicating a clear direction and a shared understanding, not only in the beginning but also throughout the project. If team members were lacking information, the team took responsibility to keep them updated: “There were a number of things I had not understood at the start, but the others were very good at explaining things to me.” Thus, team psychological safety was something all team members contributed to instead of relying on individual members like the team leader. Moreover, Team 1 emphasized building relationships and getting to know one another early on: “Then we had a day where we all met at [X]’s house, and we had some tasks to work on together. Then I think the safety actually increased. One felt a little of that togetherness.”

Team 2 also emphasized connecting, such as by having breakfast together every morning. This helped them build relations where they felt it was easy to ask for help and discuss matters. Yet, this was not followed up to the same degree in terms of clarifying and supporting practices. The team leader had a clear vision and goal with regard to the team's work, but she was not able to communicate it sufficiently to the team members, and the members of Team 2 did not take the same responsibility—or sense the space for—clarifying and supportive practices that were observed by the members of Team 1: “We were told that everything should go through her [the team leader]. But she has probably spent two days now without coming up with any new information. It is a bit frustrating.”

At the other end of the scale concerning levels of team psychological safety, Teams 5 and 6 emphasized these practices to a much lesser extent, focusing more on getting the work done instead of connecting with others, building a shared understanding, or establishing a structure for the teamwork. Contrasting Teams 1 and 2 with Teams 5 and 6 supports the view that there is a close link between certain team practices and psychological safety as perceived by team members. However, there are also certain discrepancies. For example, Team 3 also had little focus on connecting in their early phase. As noted above, this resulted in subgrouping. Whereas those among the in-group experienced an increase in psychological safety, not all team members were given access to that safety: “Right away, we had some social events. That was the only thing. I do not know the others in the team, really.”

Team 4 was the team with the least focus on team practices that fostered team psychological safety. They did not particularly practice connecting or supporting. Still, their team psychological safety was somewhat higher than was found in Teams 5 and 6. When looking more closely into Team 4, two aspects stood out. First, the perception of team psychological safety in Team 4 was not shared among all team members. Some reported a high level of safety, while others reported a low level. Second, Team 4 was the team with the

largest decrease in team psychological safety toward the end of the project. That could indicate that it was the least prepared for the increased pressure of the effort's final days and that team psychological safety could have continued to fall if the time horizon had been longer.

Study 1 Discussion

By studying six teams in a humanitarian aid organization, I have identified three team practices—connecting, clarifying, and supporting—that impact team psychological safety emergence and development in a short-term (11-day) project. Still, my results reveal at least three key aspects that should be considered for further studies.

First, one should expect contextual differences. For example, the focus on socializing in these teams may differ from settings where the motivation to invest in relationships with other team members are different and perhaps lower. Most participants had a strong motivation to build friendships since they were all new students at the same school and would continue to be part of the student environment after their engagement in this humanitarian aid organization had ended. Additionally, the members in these teams were generally new to one another. Thus, their early team psychological safety was based on expectations more than experience. For other teams, previous knowledge and relationships may affect how team psychological safety emerges in the earliest phases.

Second, I saw variation over time in levels of team psychological safety, with no consistent pattern emerging. The reason for such temporal dynamics may be short-term fluctuations due to an approaching project deadline and/or the varying maturity among teams (Carter et al., 2018). Over a longer period, the pattern of emergence may look different. For example, it would be of interest to study whether team psychological safety stabilizes to some extent over time when measures are not especially vulnerable to short-term fluctuations. Moreover, as one could limit early team psychological safety to only the first days of

teamwork, one could argue from a longer-term perspective that the 11 days of this project was itself an early phase that did not allow for a clear distinction between early and later team psychological safety; that would require a longer time frame. Thus, we need to study different time horizons in order to learn more about the temporal dynamics of team psychological safety.

Third, the emphasis in Study 1 was on psychological safety at the team level. Though that is both natural and unavoidable when studying teams, we may lose some of the dynamics of team psychological safety when not focusing on or even completely overlooking differences between individual team members. For example, although Team 4 had less attention on team practices identified as fostering team psychological safety—it was low in two of the three practices—than Teams 5 and 6, which were low in one of three, their level of team psychological safety was higher. However, Team 4 was the team with the greatest dispersion of team psychological safety among team members' perceptions. That is, some felt very safe, while others felt considerably less so.⁴¹ Though studies on team practices fostering team psychological safety will focus to a large extent on the team level, a greater emphasis on potential individual differences within teams could enrich our understanding of the dynamics of team psychological safety. Indeed, different individual experiences of team-level phenomena might themselves be one explanation of team-level dynamics (Kozlowski, 2015).

The three aspects detailed above necessitated—and motivated—my second study.

Study 2 Method

Research Setting

With the aim of exploring team psychological safety emergence and development in long-term project teams, I studied three interdisciplinary teams from the public administration

⁴¹ Through supplementary analyses I saw that in fact half the team members in this team perceived their team psychological safety as more than one standard deviation either below or above the team's average psychological safety level.

in a major Norwegian city. The teams were part of a new project to improve cross-department cooperation and learning; each consisted of six or seven members with varied professional backgrounds. These teams were followed from when they were established until nine months had elapsed. At that time, the teams were to deliver a result based on their work. For some teams that meant a specific product (e.g., an economic report), while other teams were to assess their work as a team compared to how these responsibility areas had been handled *before* they worked using a team-based approach. The teams could continue to work as teams, based on a final evaluation of whether this way of organizing was appropriate for handling their tasks.

This setting differed from Study 1 in several respects. First, these teams worked together for a much longer time. Second, being part of these teams was only part of the team members' workloads; they still had responsibilities in their job descriptions outside the team. Third, the motivations of team members to be part of these teams were highly diverse. While some people saw more team-based work as an exciting and necessary way to go for the organization, others saw it as an unnecessary extra task they were given on top of everything else. Fourth, whereas team members in Study 1 were new to one another, many of the team members in this study were familiar with their teammates since they had worked in this organization for several years. Fifth, team members were more diverse in this study in terms of both age (range 36–65, average 47.4) and background. Nevertheless, these differences do not make this setting less suitable for studying team psychological safety. On the contrary, as many organizations would find such input factors both realistic and comparable to their own staff profiles, knowledge of how team psychological safety emerges and develops in such a setting is important. Moreover, settings like this—as the motivation for implementing these teams was to increase cooperation and learning across departments—are considered especially suitable for studying team psychological safety (Sanner & Bunderson, 2015).

Additionally, the teams did not have a designated team leader, which was an attempt to share responsibility across all team members. Thus, the setting is appropriate to study practices within teams in which all team members take part, not only designated members.⁴²

Research Design

As in Study 1, this explorative case study (Yin, 2015) is based on a convergent parallel design where quantitative and qualitative data were collected in parallel (Creswell, 2014). However, there are several important design differences from Study 1, due to the different context and based on experiences in data collection for Study 1. First, the extended time horizon necessitated longer intervals between measurements. In an intense environment focused on efficiency, daily measures are suitable, whereas in a setting where fewer affective events are expected, intervals of a month or even longer may be more appropriate (Becker et al., 2013). Thus, the quantitative data in the current study are based on monthly surveys. Second, two rounds of interviews were conducted: the first during the first weeks of teamwork and the second after the survey process had ended (see Figure 1). This enabled a deeper and more nuanced exploration of team practices in the early phase of teamwork that could relate to the emergence of team psychological safety and following up on these leads when conducting the final round of interviews. Additionally, as in Study 1, comments in the surveys enabled me to study the development of team psychological safety from a qualitative perspective between the two interview rounds.

Data Collection

Quantitative

The data collection began with an information meeting on the upcoming research project to which all potential participants were invited, followed by an invitation to

⁴² However, all teams had a team *coordinator*, responsible for coordinating with the rest of the organization. For some team members, the distinction between this role and a team leader role was blurry. See the General Discussion section for more on this matter.

participate. Almost all (19 of 20) team members in the three teams consented to participate, resulting in six or seven participants per team. The data collection period lasted nine months, with surveys sent out by e-mail on the first day of each month. The survey contained a team psychological safety scale (van Ginkel & van Knippenberg, 2008), and participants were asked to focus on the most recent month of teamwork when answering. As this kind of longitudinal data collection is vulnerable to dropouts that could challenge a study's validity, several measures were taken to ensure study compliance: information on the progress of the project was emphasized to keep up motivation during the study period, electronic questionnaires were offered for convenience, and the surveys were kept short to ensure focus and limit the "cost" of participating. The average survey was estimated to take 2–3 minutes to complete. Of the 19 participants, 16 answered the surveys regularly (i.e., more than 50% of the surveys). In total, the 19 participants answered 139 surveys during the nine-month study period, for an average of 7.3 surveys per respondent.

Qualitative

Qualitative data were collected through both surveys and interviews. In the surveys, participants were asked to describe whether there had been particular incidents in the team in the most recent month. They were also asked to what extent such incident(s) had affected their own motivation, the team's cooperation, and their feeling of safety. In total, 59 qualitative comments containing data were included for subsequent analysis, with extremely short comments containing only answers like "no" excluded. Having access to these data allowed for a closer examination of how and why team psychological safety evolved, such as team practices when team psychological safety was measured.

The first round of interviews was conducted during the first weeks of teamwork; all 19 participants were interviewed. Semi-structured interviews addressed their initial experience of being part of their respective teams, how the teams spent time together in this startup phase,

and their expectations for the upcoming teamwork. For the second part of the interview, the focus was directed toward psychological safety specifically, where the participant was introduced to the definition by Edmondson (1999). Based on the examples provided to show what this kind of safety could look like in a team, the participant was asked open-ended questions on how they perceived their psychological safety in the team and further asked to reflect upon what had influenced their perception of psychological safety.

The second round of interviews was conducted after the last survey and concluded the data collection process. These interviews started broadly, addressing team challenges in general throughout the period and encouraging reflection on participants' experience of being part of this team. Then, analyses of the quantitative data collection were brought into the interview. Participants could see how their own psychological safety had evolved throughout the period to improve their ability to reflect upon their experiences as long as nine months back in time and reduce the potential attribution bias associated with retrospective sensemaking (Reis & Gable, 2000). This was useful to focus the interviews on team practices of relevance for participants' perceptions of team psychological safety and how they may have changed over time. Moreover, this procedure served as member-checking, giving the participant the opportunity to confirm or correct my preliminary analyses. The final part of the interviews addressed specific challenges to team psychological safety that had been brought up through the qualitative responses in the surveys and opened for further elaboration. All interviews lasted between 30 and 60 minutes; they were audio-recorded and later transcribed.

Data Analysis

Quantitative

As in Study 1, the primary objective of the quantitative data was to obtain a measure of team psychological safety for description and categorization at the team level. However, as noted above, the quantitative data at the individual level were also used as grounds for

reflection in the final interviews. Thus, using Microsoft Excel, the team psychological safety score of every participant throughout all nine months was calculated, and a personal team psychological safety development curve was created for each individual. Team-level scores were also calculated, and a team-level development curve drawn for each team. For increased robustness of the measures, the ability to see general trends, and easier comparison between teams, the scores were collapsed into three phases: *early* (month 1), *mid* (months 2–7), and *late* (months 8–9). These phases were chosen based on how the participants described the type of work: a startup phase, a longer phase in which the focus was on tasks, and a third phase where the focus more on delivering—and demonstrating—the results of their teamwork. Figure 3 shows how the level of team psychological safety evolved through these phases for each of the three teams. Moreover, building on the experience from Study 1—where perceptions of team psychological safety could differ substantially between members of the same team, and team development curves did not fully explain the actual internal dynamics of the team—individual development curves for all team members were drawn (see Figure 4).

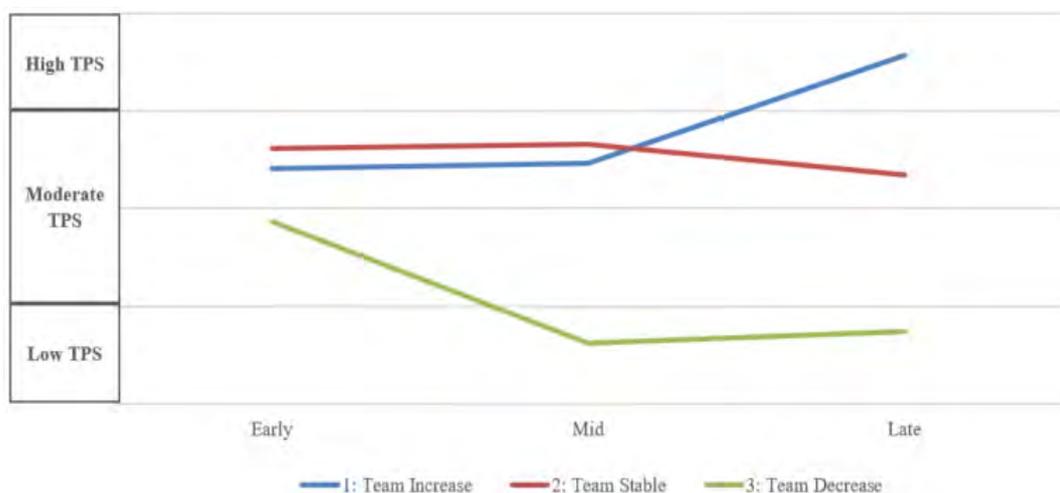


Figure 3. Team psychological safety levels over time for teams in Study 2.⁴³

⁴³ Early: T1, Mid: T2–T7, Late: T8–T9. Values are mean centered around the overall mean for team psychological safety (TPS) in the sample ($M = 5.40$). The horizontal axis refers to standard deviations ($SD = 0.49$) above or below the overall mean. Low TPS reflects a team psychological safety level one standard deviation or more below the overall mean, moderate TPS reflects a team psychological safety level between one standard deviation below and one standard deviation above the overall mean, and high TPS reflects a team psychological safety level one standard deviation or more above the overall mean.

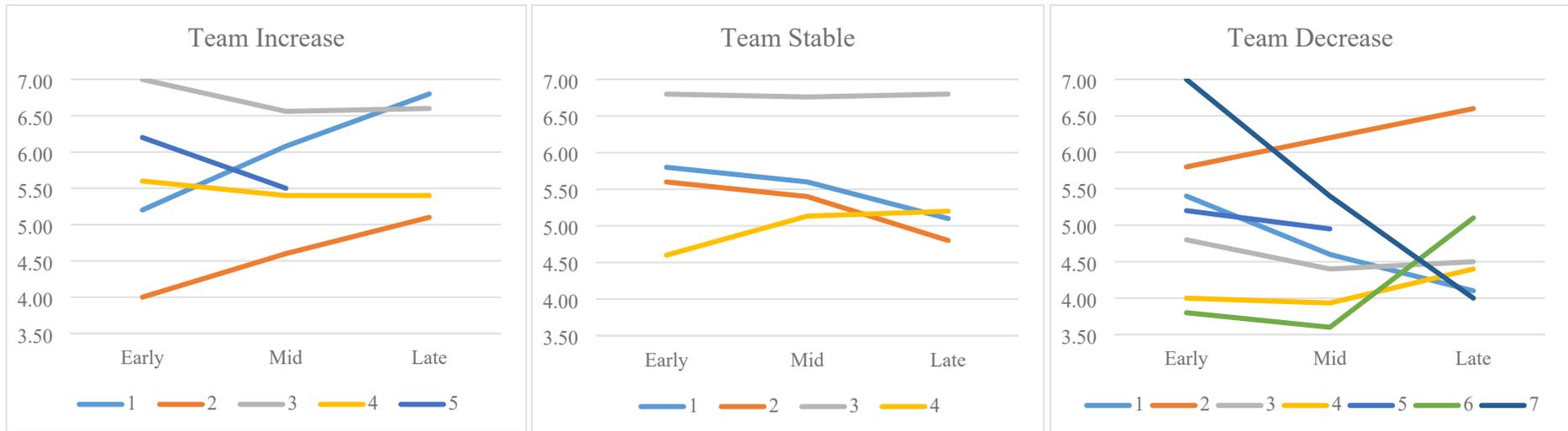


Figure 4. Individual responses on perceived team psychological safety for each team in Study 2.⁴⁴

⁴⁴ Each number represents one team member; team members are given a random number within each team.

Qualitative

The qualitative data analysis followed a similar approach as in Study 1, using the NVivo 12 software package. However, with more empirical grounds on which to build, I viewed it as beneficial to continue where the data analysis in Study 1 left off and thus follow the principles of informed induction (Hackman, 2012) by drawing on all available information considered relevant. Thus, I retained the codes that had emerged in Study 1—such as activities, behavior, and interactions between team members brought up and connected to team psychological safety by participants—while remaining open to new codes being revealed. In fact, about 70 additional first-order codes emerged during the analyses, for a total of approximately 160 codes between the two studies. The considerable number of codes was partly explained by the use of emic codes—authentic words and terms used by the participants (Belk et al., 2013). This was important to more fully explore the participants’ understanding and capture their meanings (Langley & Abdallah, 2016). The precise terminology of course differed between contexts but could still reflect similar team practices. The new codes in Study 2 did indeed reveal the presence of another type of team practices, as I discuss in the Study 2 Results section.

In the thematic analysis presented below (Braun & Clarke, 2006), I went back and forth between reducing data through collapsing codes with somewhat similar meanings, connecting related codes, and structuring the material at three levels. As in Study 1, I emphasized team practices that the participants had reflected upon associated with the development of their own psychological safety perceptions. Through this process, I developed a data structure table consisting of the practices that the participants most frequently referred to (empirical themes), 13 second-order themes (conceptual categories) and four third-order themes (aggregate dimensions) (see Table 3). I followed up in the same way as in Study 1, creating a representative data table and merging the quantitative and qualitative data to create

a file for each participant and for each team. Notably, as I had access to more qualitative data over a longer time horizon in Study 2 than in Study 1, I was able to identify team practices for each team for most of the phases. Thus, based on the categorization (positive, neutral, or negative) and timing of the quotes and comments, a descriptive indicator for each aggregate dimension was assigned to each team based on the degree of presence of the various team practices within each phase. This allowed for a closer analysis on the connection between team practices and team psychological safety development over time. Finally, to look for variations across teams, I conducted cross-case analyses (Miles et al., 2013) with an emphasis on similarities and differences between teams. Table 4 summarizes the team psychological safety levels and team practices for the three teams in each of the three phases.

Table 3. Team Practices Related to Team Psychological Safety Emergence and Development in Long-Term Project Teams (Study 2).

Empirical themes	Conceptual categories	Aggregate dimensions
Socializing outside of teamwork	Socializing	Connecting
Seeing one another during work hours, being physically co-located		
Getting to know one another on a personal level	Building relationships	
Connecting professionally, building further on previous cooperation	Avoid subgrouping	
Connecting with everyone in the team, avoiding polarization and alliances		
Sharing expectations, aligning agendas and focus	Shared understanding	Clarifying
Meeting regularly, updating one another	Direction	
Ensuring clarity, setting goals and direction, planning (what)		
Building a sense of purpose (why)	Guidance	
Making a team charter, setting team rules, discussing routines (how)		
Discussing and deciding on the team mandate, establishing room to act	Team coordinator role	
Balancing team members' contributions, making use of everyone's knowledge	Contributing	Supporting
Helping across competence barriers, building common terminology	Encouraging	
Inviting opinions and ideas, listening		
Wishing one another well, giving feedback, ensuring a constructive dialogue	Including	
Seeing the individual, making room for different preferences and perspectives		
Showing empathy and interest in others		
Including one another across background, organizational tenure, and hierarchical position		
Focusing on performance versus learning	Learning orientation	Performing
Seeing specific results, achieving more as a team than through individual work	Synergy	
Delivering as a team, standing together	Collective performance	
Celebrating wins		

Table 4. Level of Team Psychological Safety and Team Practices for Teams in Study 2.

Team	Team Increase			Team Stable			Team Decrease		
Phase	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late
Team psychological safety	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Red	Red
Team practices									
Connecting	Yellow	Blank	Yellow	Yellow	Yellow	Yellow	Red	Red	Yellow
Clarifying	Yellow	Yellow	Green	Green	Yellow	Yellow	Yellow	Red	Yellow
Supporting	Green	Green	Green	Green	Yellow	Yellow	Yellow	Red	Red
Performing	Blank	Yellow	Green	Blank	Green	Yellow	Yellow	Blank	Yellow

Note: The different colors in the upper part of the table indicate the level of team psychological safety for each phase for the respective team.

Red = Low; team psychological safety one standard deviation or more below the overall mean.

Yellow = Moderate; team psychological safety between one standard deviation below and one standard deviation above the overall mean.

Green = High; team psychological safety one standard deviation or more above the overall mean.

The different colors in the lower part of the table indicate the degree to which respective team practices were descriptive of the team climate, based on the number and timing of quotes and comments (early, mid, or late phases) and their categorization (positive, neutral, or negative).

Red = Low; more negative quotes and comments than neutral or positive ones.

Yellow = Moderate; mostly neutral quotes and comments and/or equal numbers of negative and positive quotes and comments.

Green = High; more positive quotes and comments than neutral or negative ones.

Blank = Undefined; thin grounds for analyzing team practices due to limited number of responses in this phase.

Study 2 Results

The three teams in this study started out at similar levels of team psychological safety. However, over time, their team psychological safety developed quite differently and varied substantially by the time nine months had passed. Through my study, I have identified key team practices related to the temporal dynamics of team psychological safety in long-term project teams. Below, I present the team practices and “stories” of each team—that is, how their team psychological safety developed over time, and how we can understand those developments in light of their team practices. Moreover, building on the experience from Study 1 with potentially very different individual perceptions of psychological safety within the same team, in Study 2 I teased out individual differences between team members to better understand the dynamics of team psychological safety. Examples of representative quotes are presented in Appendix 2.

Team Practices Fostering Team Psychological Safety in Long-term Projects

The present study confirms the importance of connecting, clarifying, and supporting practices for the emergence and further development of team psychological safety. Thus, the team practices found important for team psychological safety in short-term project teams of the kind examined in Study 1 appear to be similarly significant in long-term project teams. However, there were some differences between these practices in Study 2; see the General Discussion section for details.

In exploring how team psychological safety developed over time, a fourth team practice surfaced: performing. Though that may not immediately seem like a practice but a team outcome, a common theme in the current study was the need for performing to perceive team psychological safety, which was expressed in different ways. Several reported that they felt safer when they saw the concrete results of their work. This was important from both an individual and a team perspective. When people saw that their contributions led to better

results for the team, this increased their psychological safety, which also grew when they performed together as a team. This led to a greater unity and feeling of standing together, which was enhanced if the team emphasized specifically what they had achieved together. It gave them not only motivation to continue contributing to the teams' tasks but also a belief that their contributions mattered to the team's success. As one participant described it, "it gives such an inner strength, right, when we feel that the 'we' is something good, that we get something more out than just the sum of us." This perception was associated with higher team psychological safety by several participants.

Three Stories of Team Psychological Safety Emergence and Development

Team Increase

Team Increase experienced an increase in team psychological safety over time. However, the level of team psychological safety they established at the beginning remained relatively stable before rising notably in the last part of the study period. Some team members had previously worked together, while others were new to one another. Thus, in their first meeting, they emphasized building relationships by presenting themselves—"our strengths and weaknesses and what we have worked on before"—and by sharing their expectations for the upcoming teamwork. The team did not have any social events outside of work, but the team members did not seem to miss this either. Their general focus on connecting made team members feel safer around one another, as one team member put it: [you] "should not underestimate the importance of getting to know one another outside of the work context as well. That you strike up a conversation in the hallway; it increases the safety in the work context as well."

After getting to know one another, the members of Team Increase followed up by creating a team charter and discussing the team's mandate. These clarifying practices were also important for team psychological safety. The tasks of the team were not as clear to

everyone in the beginning. Thus, getting everybody on the same page was crucial for the psychological safety of all team members. In fact, as all three teams discussed their mandate as a team, Team Increase was the only team where all members agreed on its mandate in the first months of teamwork.

Moreover, team members had a supporting practice of inclusion that all team members referred to in the interviews. Several compared themselves with the other teams, since they knew the members of these teams and noted how their team had no sign of “a top-down attitude.” On the contrary, they were to “find our way together.” Notably, *equality* was a central value in this team. The team coordinator not only played a coordinating role but also a supporting role that had a positive impact on the team members: “She creates a sense of safety. I think that there is room for me to say these things that I have said to you [i.e., the interviewer], which I might not want to say to the section manager, to put it that way.”

With the presence of these team practices fostering team psychological safety, one might imagine that safety would increase over the entire period. However, the team faced some challenges that were not attributable to their own practices. As time went by, the team coordinator struggled with understanding her role and lacked clear guidelines from the top management team. Several team members felt that top management had forgotten them, as they did not show up for meetings when invited and did not respond to requests for clarification. These aspects were associated with a lower level of psychological safety by several of the team members. The positive team practices of connecting, clarifying, and supporting could balance these less positive organizational practices and equalize the level of team psychological safety. As a result, the team psychological safety that was initially built was maintained at roughly the same level through a large portion of the study period.

What, then, could explain why this team increased its level of team psychological safety in the last months of the study period? The team started performing. After a longer

period working on their task without enjoying any external recognition, some team members began to question whether there was any point in doing their work. They needed to move things along and did so by arranging educational lunches for the whole organization. This had not been done previously and was a success from the outset. Suddenly, the team went from feeling forgotten to delivering specific results and achieving recognition and positive feedback from those around them. One team member described it as follows: “It was something we decided on to show that we were a team... and we have done it as a team. It has been a very positive thing.” This started a virtuous cycle in which those who had been less motivated to carry out teamwork became more engaged in team processes, strengthening their clarifying and supporting practices and bolstering the team psychological safety as perceived by *all* team members.

Notably, based on the qualitative data, this sense of sharedness seemed descriptive of this team. Somewhat contrary to the other two teams, no members of this team mentioned subgroups or inequality of any kind in the final interviews. However, their individual psychological safety scores ranged from 4.00 to 7.00 (on a seven-point Likert scale) in the early phase. Thus, there was dispersion in team psychological safety perceptions from the outset. This appeared to be due to different degrees of previous relationships—some team members were new to the others, while others had worked together. Interestingly, three aspects were revealed by studying the development of the individual scores throughout the study period (see Figure 4). First, there was a general increase in team psychological safety scores. This increase followed a growing exercise of clarifying, supporting, and performing practices. Thus, these results support the positive association between these team practices and the emergence and development of team psychological safety. Second, the individual perceptions became more similar over time (ranging from 5.10 to 6.80 in the late phase). Still, and third, despite more similar perceptions, some team members did *not* perceive more

psychological safety over time. This exemplifies how we may miss out on individual differences when only considering average scores (see the the section on limitations below).

Team Stable

Team Stable had a relatively stable level of team psychological safety throughout the entire nine-month period. When they started out as a team, some were new to one another, while others had previously worked together. They spent the first three meetings getting acquainted, sharing expectations, and drafting a team charter. They supported one another in the form of “talking together,” “paying attention to each other and bring out what others think,” and “breaking down walls,” as different team members described it. Their focus on connecting, clarifying, and supporting practices in the early phase appeared to influence team members’ psychological safety: “We are much safer around each other now, really. I think the first two rounds, when we went into creating that team charter, were quite important to establish that safety.”

With this early emphasis on these practices, one might expect team psychological safety to be bolstered. However, the team’s focus on these team practices changed as time passed, and their ambitions did not appear sustainable in the face of the challenges that they encountered. One team member put it as follows:

Early on, we managed to land on such a “we” feeling. But then, when we had to start working on specific tasks and it started to become a bit more difficult professionally and people perhaps did not quite understand the terminology and the field, it became a bit more awkward at the meetings.

As time elapsed, some felt afraid to ask questions for fear of feeling stupid, since some of the team members had more experience in the field than others. Thus, it became clear that living out the team charter was not as easy as creating it, and several of the team members experienced this as a challenge to their psychological safety. Notably, the team appeared to

avoid making uncomfortable decisions. For example, when they disagreed on the name of the team, they referred the decision to the top management team, which was “silly” according to some team members or the result of a “power battle” according to others. Moreover, there did not appear to be a shared understanding of the role of team coordinator. Despite consciously avoiding the term “team leader,” some team members, including the coordinator, still expected him to take charge. Others did not appreciate his way of attempting to lead the team and saw it as a threat to the equality principle that they had expected. Thus, some team members “felt passivated,” while others saw the need for “positioning” and “building alliances” rather than gaining anyone’s perception of safety. Both clarifying and supporting activities appeared to decrease over time in Team Stable.

What contributed positively to team psychological safety later, thus balancing out the potential negative impact of the lack of these other team practices, was team members’ experience of performing. Though this did not take the form of delivering on specific performance indicators, their performance became clear through the synergy that many team members perceived as a core element of the team. Some emphasized the increased joint learning and value of obtaining different perspectives on matters that they felt they had been struggling with on their own. When they felt the importance of their own and their team’s work, it boosted their team psychological safety. However, as with other aspects of the team, there were different views as to whether the team was actually performing. While one participant saw the improved quality of their delivery as a team as “obvious,” another described it as a “waste of time.” This wide gap between perceptions also applied to their team psychological safety.

Whereas one team member perceived high psychological safety in this team, others did not. Though individual psychological safety scores did not range anymore widely than those in Team Increase in the early phase (4.60 to 6.80 on a seven-point Likert scale), these

perceptions neither increased nor became particularly more similar over time (4.80 to 6.80 in the late phase; see Figure 4). The team member with the highest perception of team psychological safety explained perceiving high, stable psychological safety in the following way: “I am a robust person. I have argued a bit outside the meetings because I disagree vehemently from time to time. I have to give some resistance, but some of the others do not like that very much. However, I am rarely afraid to confront other people.” Thus, there appeared to be differences between team members concerning both personal traits and preferences for communication. The team addressed these differences to some extent in their team charter but did not follow up and adjust their way of working together as a result. Hence, those in favor of difficult discussions continued using that approach without it having negative consequences for their own psychological safety, while others felt less listened to and that such confrontations could limit their safety and subsequent contributions. One team member described the following practice in the mid phase, followed by a low team psychological safety score: “Too many of the tasks are managed by the coordinator and certain team members, and others are then reduced to advisers and become passive.” Thus, due to a lower emphasis on both clarifying and supporting practices over time, different perceptions of team psychological safety were maintained instead of converging, as might have resulted in a team where more emphasis was placed on balancing team members’ contributions and making use of everyone’s knowledge.

Team Decrease

Team Decrease started out with a team psychological safety similar to the other two teams. However, from that point, its level of team psychological safety decreased. The team consisted of members from several departments who were physically located in various facilities around the city. Thus, their need for connecting with one another was significant; at the same time, their room to do so was small. Though they built somewhat closer

relationships throughout the study period, this was especially challenging for the team in the beginning and led to a rough start:

You do not see the other people. You do not pick up on those little signals that he has had a sick child who has not slept for two nights and is dead tired. So yeah... you just have to call in to the meeting, and then it has been two weeks since you last saw them.

In the first period, the team emphasized clarifying and supporting practices. Unlike the other two teams, they did not create a team charter, although they did spend some time discussing their mandate and how they should work on their tasks. Most team members felt that there was room for discussion and an interest in listening to one another. The team coordinator intentionally took a passive role within the team to avoid becoming “the leader” but adopted a more active role with other stakeholders so that team members received the information and clarifications they needed. However, it did not take long until those team practices were challenged on several accounts. First, there were differing motivations for being part of this team and various beliefs concerning whether a team was even the proper way of organizing their work. The mandate they intended to clarify was never really settled. This led to less engagement and ownership among some team members, which was associated with less team psychological safety among others, who felt discouraged by the team’s lack of shared understanding.

Second, a majority of team members were explicitly focused on results rather than the process of attaining them. Thus, the level of impatience quickly rose. As the team coordinator put it, “we kind of cannot wait to do the work for all that basic stuff to be in place.” Though performing may be beneficial for team psychological safety, this exemplifies how too much emphasis on producing results may give short shrift to important, even crucial, team processes. In retrospect, several team members wished that they had spent more time on clarifying practices and making sure everyone was on the same page: “I believe we could

have benefitted from sitting down, taking a break and putting ‘a finger in the air,’ reflecting on where we are and where we are going.”

Third, there was a general lack of connecting practices in the team, with subgrouping an issue that was noted in particular. Several team members pointed this out as a primary challenge for cooperation in general and for team psychological safety in particular. This again led to a vicious circle that saw fewer supporting practices. There was both the element of feeling stupid for not being familiar with the terminology and thus being reserved about contributing and someone feeling like an outsider because of a different background and a lack of familiarity with how things “are normally done around here.” For those who felt like insiders, however, safety was further strengthened:

Well, I am quite used to this department. I went to the [name of school] and my boss, who has been my boss for all these years, also went to the [name of the same school]. So, we think very much alike.... And it is a bit like that in this department, when we make a decision, almost 98% of the time it is simply supported.

Exploring the individual perceptions of psychological safety in the team revealed several interesting aspects. First, despite the fact that the average level of team psychological safety was somewhat similar across the three teams from the beginning, individual perceptions within Team Decrease were already quite different in the early phase, ranging from 3.80 to 7.00 (on a seven-point Likert scale; see Figure 4). Second, these perceptions evolved in quite different ways in the course of the study period. Though some team members experienced a decrease in psychological safety, others perceived an increase. Interestingly, perceptions of safety converged to some extent toward the late phase: six of seven team members perceived their psychological safety to be between 4.00 and 5.10, which is quite low compared to how respondents in general responded in this study (Mean = 5.40). Thus, team members appeared to agree that Team Decrease was not very safe. Notably, team member 2

perceived a psychological safety level of 6.60 in the late phase, explaining that he “needed some time to find his place in this team.” However, for most team members, that feeling never arose. As one noted, “I think we have had a very strong subgroup who have thought very similarly, and then we might not have had much else.”

Due to the challenges above, the potential strength and initial goal of putting together this team—to make use of diverse backgrounds and perspectives—became in one sense its biggest problem. Instead of uniting as a team, team members acted as repelling magnets. Several unresolved tensions among team members arose; some kept searching for what they were “supposed to contribute with,” while others “felt alone” in a “polarized” team. In other words, a decrease in team psychological safety over time was related to a lack of connecting, clarifying, and supporting practices. Time in itself was clearly not enough to build psychological safety in this team, as exemplified the remarks of one member after nine months of being on the team:

Well, we manage to have a good tone, but with certain team members I probably still have that feeling.... Well, you know, when people laugh at what you say. That touch of ridicule.... So yeah, there are probably people I have become less safe around after being in this team.

General Discussion

In the present paper, I ask: *How does team psychological safety emerge and develop over time, and how can we understand these temporal dynamics through the practices of the team?* In both short- and long-term projects, teams started out at relatively similar levels of team psychological safety. However, that safety developed very differently over time. Four team practices were revealed as important for the emergence and further development of team psychological safety: connecting, clarifying, supporting, and performing. Below, I discuss the

impact of time on the development of team psychological safety and how the four team practices relate to the temporal dynamics of team psychological safety.

Time and Team Psychological Safety

One participant said that “it is only about spending time together” when reflecting on what it would take to build a safe team. That is not an uncommon assumption. However, neither of my studies supports a general positive association between time and team psychological safety. Exploring the temporal dynamics of team psychological safety in two different contexts and over markedly different time horizons revealed that team psychological safety may change in various ways: increasing, decreasing, or fluctuating. Indeed, some teams had a lower level of team psychological safety when the study ended than when they were established. Thus, team psychological safety appears to be a perishable good. Still, surprisingly few studies take this into account and examine team psychological safety as an emerging and evolving phenomenon (Fyhn et al., 2023).

However, since some teams do experience an increase in team psychological safety, associating time positively with team psychological safety is not necessarily wrong. Indeed, Dusenberry and Robinson (2020) found when following student teams that spending time together was more important for building team psychological safety than targeted training interventions. Still, my studies show that time in itself is not *sufficient* for team psychological safety to grow. Rather than being the focal construct driving team psychological safety, time appears to be the medium through which team psychological safety emerges; see Shipp and Cole (2015) for more on this conceptual difference. Thus, beyond considering the amount of time a team needs to build psychological safety, a more fruitful question is perhaps how this time is used. That several participants explained their perceptions of psychological safety with how much time they spent together may very well reflect the practices that were exercised in their team during that time.

In both my studies, teams started out with relatively similar levels of team psychological safety, suggesting that in an early phase, safety may relate more to expectations than to interactions (H. H. Johnson & Avolio, 2019). Such expectations may depend on elements not related to team dynamics, such as personal relationships or the broader organizational culture. However, as we have seen, as soon as interactions begin taking place, team psychological safety can move in different directions. Thus, the variation between teams in levels of team psychological safety is greater in later than in earlier phases. Specifically, I find that connecting, clarifying, supporting, and performing team practices shape the emergence and development of team psychological safety. Emphasizing these practices early on may lay the foundation for team psychological safety. However, that safety may not last. Indeed, for team psychological safety to grow—or at least to remain steady—teams need to continue undertaking these practices.

Connecting and Team Psychological Safety

Team practices in the connecting category involve aspects like socializing and building relationships among members. In both studies, this appeared to be important for the emergence and growth or consolidation of team psychological safety. Previous research has linked psychological safety positively to familiarity, interpersonal relationships, and social capital (Carmeli, 2007; Edmondson, 2004; Kahn, 1990; Remtulla et al., 2021; Roberto, 2002). Thus, a positive association between connecting practices and team psychological safety is hardly unexpected. However, the studies reported here add several insights to the importance of knowing one another for the emergence of psychological safety.

First, since I consider the element of time, I find that familiarity is not necessarily positive for team psychological safety in an early phase. On the contrary, several team members in Study 1 valued the equality that resulted from not knowing one another and thus starting on common ground. Hence, for early team psychological safety, it may be a

misleading simplification to assume that familiarity per se is positive. The potential challenge of familiarity in an early phase was confirmed in Study 2, especially in the form of subgrouping. For example, the psychological safety in Team Decrease was challenged by familiarity among some team members, while others did not know anyone. This provided the basis for perceived subgroups in which those most familiar to certain other team members associated that prior acquaintance positively in their perceptions of psychological safety, while those who were outside these subgroups experienced it as detrimental for their psychological safety. These findings confirm previous research on the negative relationship between perceived subgroups and psychological safety (Creon & Schermuly, 2019; Schulte et al., 2012) and on how subgrouping may evolve over time and harm relationships among team members (Cronin et al., 2011a). Moreover, it highlights the importance of not only considering the team as a whole when studying team psychological safety but also considering the perceptions of individual team members, which can differ widely. In teams where participants talked about subgroups and some members not feeling included, this was consistently connected to low perceptions of team psychological safety among the excluded individuals. Hence, familiarity may contribute positively to team psychological safety, as Roberto (2002) suggests; however, it may also challenge the emergence of team psychological safety when one or more members feel excluded from a familiar subgroup.

Second, by studying the practice of connecting, we may learn more about how team members go about building relationships. In Study 1, most teams emphasized socializing and spending time together outside work tasks, such as having joint breakfasts and parties. Indeed, their choice to spend time socializing may explain why they had positive associations between time and psychological safety, even though time in itself did not relate positively to psychological safety. However, in Study 2, socializing was not prioritized. To some extent,

this may reflect a contextual difference due to factors like age differences.⁴⁵ Still, several Study 2 participants reflected on how they missed building closer relationships with their colleagues, how this was challenging when they were not physically co-located and only saw one another in their team meetings, and how they wished they had spent more time socializing. In the only team in Study 2 that did arrange a social event through the study period—Team Stable had a joint dinner—several participants brought this up as positive for their team psychological safety. Thus, despite some contextual differences, socializing appears to be a fruitful connecting practice for building team psychological safety in both studies, one that was particularly missed when team members worked in different physical locations from one another. Similarly, Lechner and Mortlock (2022) highlight the need to build relationships to foster team psychological safety when cooperating digitally.

Third, people need to know one another, but to what extent? In both studies, the teams with the highest levels of team psychological safety were generally more focused on getting to know one another than the teams that placed less emphasis on connecting practices. However, the *content* of the relationships appeared to differ. Study 1 revealed the importance of building friendships. Indeed, most participants in Study 1 referred actively to building friendships as one of the most important practices for their team psychological safety. Previous studies have positively linked friendship and psychological safety (Cao & Zhang, 2020; Schulte et al., 2012; Soares & Lopes, 2014). It is thus somewhat surprising that only one participant in Study 2 mentioned friendship. Still, most participants in Study 2 talked about the need to build relationships to perceive their team as psychologically safe. Thus, though connecting practices appear to be important across contexts, there are also contextual differences as to the kinds of relationships that are important for team psychological safety to emerge and continue to develop (e.g., teams comprised of students vs. teams in a larger public

⁴⁵ Team members in Study 1 were an average age of 20.2 years old, while the average age in Study 2 was 47.4 years.

organization). Notably, Sanner and Bunderson (2015) encourage paying more attention to context when studying psychological safety.

Clarifying and Team Psychological Safety

In addition to connecting team practices, clarifying practices like setting team rules, sharing expectations, and coordinating were revealed in these studies as important for building team psychological safety. Team members felt the need for clear direction and a shared understanding of *what* they were doing, *why* they were doing it, and *how* they were supposed to do it. When knowing what was expected and feeling as if one has the room to share one's expectations and preferences for cooperation with others, participants noted that they perceived greater psychological safety, which again enabled them to engage more freely in discussions and raise questions. Though such practices may relate to structural antecedents to psychological safety—like team structures (Edmondson, 1999) and work design characteristics (Frazier et al., 2017)—to my knowledge, no previous studies have adopted a dynamic perspective on clarifying practices. Moreover, although Frazier et al. (2017) found role clarity to be positively associated with psychological safety, in Diabes et al.'s (2021) study on intensive care units, role clarity was not associated with psychological safety when analyses were adjusted for leader inclusiveness and job strain. These diverging findings on the role of clarity and the lack of research into how to build sufficient clarity highlight the need to explore clarifying practices in greater depth.

The results of Study 1 highlighted the importance of emphasizing clarity at the beginning of teamwork so that team members, even early on, would have a shared understanding and a sense of predictability regarding their work (Lechner & Mortlock, 2022). Several teams did not prioritize structuring their work during the first days, choosing instead to jump immediately into their tasks. This lack of clarifying practices was associated with low levels of psychological safety. However, this was not only important at the very beginning.

Just as crucial as *establishing* a shared understanding was *maintaining* that shared understanding over time. Teams where members met regularly, focused on updating one another, and coordinated their work were able to positively connect these practices with their perceptions of team psychological safety. Hence, team structure—as static as it might appear—was actually highly dynamic over time and important for building and sustaining team psychological safety. In fact, in Study 1, one could distinguish the two teams with the lowest team psychological safety (Teams 5 and 6) from the others based on whether they kept one another informed, structured their work, and ensured a shared understanding throughout the project. By contrast, Team 1, which had the highest level of team psychological safety throughout the project, began every day by updating one another on what had been done and what needed to be done. As a result, several team members reported that they clearly knew what was expected of them and thus perceived greater team psychological safety.

The importance and dynamic element of clarifying practices was confirmed in the long-term project teams in Study 2. In fact, that element surfaced as one of the biggest challenges for several participants when it came to their perceptions of team psychological safety. Team Stable and Team Increase made use of team charters, with all team members included in discussing and determining the team's rules and routines. This appeared to have a positive impact on early team psychological safety, as members felt included and heard, and on the predictability and shared understanding as time passed. Still, such charters did not necessarily have a lasting impact on team psychological safety. For Team Stable in particular, there was a mismatch over time between what was agreed to in the team charter and the actual team practices. Their lack of clarifying practices throughout the period appeared to have resulted in less team psychological safety for several team members.

Moreover, Study 2 showed how different kinds of clarifying practices can relate to one another. For example, clarity was positively associated with *ownership*: when team members

felt predictability and guidance, they felt more closely connected to the team's tasks, something they also related to their perceptions of team psychological safety. Moreover, working autonomously, which Frazier et al. (2017) reported as positively related to team psychological safety was only considered positive for team psychological safety as long as it came with clarity. Thus, giving room to make autonomous decisions had a positive impact on psychological safety when accompanied by boundaries and predictability. The most common theme in Study 2 when it came to the combination of autonomy and clarity in relation to psychological safety was the *mandate* of the teams. The teams were given room to decide their own mandates, but this room for autonomy from the organization's top management team did not work as intended. On the contrary, it led to unresolved disagreements and persistent confusion, especially in Team Decrease and Team Stable. Though several participants understood the good intentions behind letting the teams and their members decide on their own mandate, for their own psychological safety they preferred to have something firm—a structure—to relate to, along with a shared understanding among team members.

Supporting and Team Psychological Safety

In both studies, the teams with the highest levels of team psychological safety emphasized supporting practices: contributing to one another's work, encouraging one another, and including everyone. Moreover, the need for supporting practices and their positive relation to team psychological safety were clear throughout the whole study period. In their meta-analysis, Frazier et al. (2017) found peer support to be the antecedent most positively correlated with team psychological safety: examples include support from team members (Schepers et al., 2008) and a climate of knowledge-sharing (Zhang et al., 2010). As such, the positive association between supporting team practices and team psychological safety is to be expected. Still, the exploration of supporting practices in Studies 1 and 2 allows for a closer look at different types of supporting practices, what may happen when teams lack

such supporting practices, who practices support, and how supporting practices relate to clarifying practices.

Supporting practices may take different forms. In both studies, participants used terms like “encourage,” “show interest,” and “help” when describing what they needed from their teammates to perceive psychological safety. Moreover, a common theme in Study 1 was the use of humor. For example, Team 1 built an atmosphere in which humor was a natural part of their communication, which helped them reduce tension, laugh at their mistakes, and relax when facing challenging tasks. As a supportive practice, humor contributed to reducing the perceived interpersonal risk of contributing. Several team members associated this way of communicating with higher team psychological safety, as long as they took part in the humor. Humor where not everyone felt included was actually negative for psychological safety. In Study 2, humor was not specifically mentioned in relation to psychological safety. However, a topic concerning inclusion that several participants in Study 2 did discuss was the importance of having a common terminology. In their setting—interdisciplinary teams aimed at ensuring collaboration across departments and consisting of members with diverse backgrounds—there was a particular need for using terminology that everyone understood so that everyone could contribute. This may also associate with clarifying practices, however, key to reach a shared understanding was the supportive behavior of team members through paying attention to one another and helping out. Team Increase was focused on this point and emphasized showing consideration and getting everybody on board in team discussions.

The importance of supporting practices also became clear through the *lack* of supporting practices in some teams and the detrimental impact it had on team psychological safety. In Team Decrease in Study 2, there was a consistent challenge with the use of professional language that others did not understand and with team members talking “above each other’s heads.” Whereas those most familiar with the terminology did not give enough

consideration to those new to the field, those least familiar did not perceive enough safety to admit that they had missed out on discussions and entered a vicious circle for their psychological safety that was difficult to escape. This exemplifies some of the potential challenges with diversity in teams. On the one hand, the potential of putting people together in a team lies in their being different in terms of competence, background, ways of thinking, and so on. In teams where members made those differences a good thing, members reported an increase in team psychological safety. Supportive diversity practices may relate positively to psychological safety in organizations, again leading to desirable team outcomes (Newman et al., 2017). However, in this diversity and potential for increased team performance lies a risk of challenges detrimental to team psychological safety. This was clearly exemplified in my studies: when team members did not feel that their different background or ways of thinking were appreciated, their team psychological safety sank, and their contribution to team processes declined. Related to the challenge of inclusive practices was subgrouping, as detailed in the Connecting and Team Psychological Safety section. What was inclusive for some led to the exclusion of others. For those who felt that they were on the outside, this was detrimental for their perceptions of team psychological safety. In fact, some participants felt the need to build alliances to have their voices heard; while the notion of “alliances” is not a term one naturally relates to building a genuine team, this insight does make clear how deeply rooted the need for support is for the psychological safety of team members.

Through supporting practices, some teams in my studies managed to build an atmosphere characterized by motivation, guidance, and encouragement. Still, in Study 1, a central theme considering supporting practices was the team leader. Thus, in addition to supportive behavior that involves everybody, precisely *who* contributes support may matter. Though one could argue that leadership practices and team practices could be two distinct aspects of a supportive atmosphere, they may also be closely linked. The practices of a leader

can directly affect team members, whether directly by building a feeling of autonomy (Kovjanic et al., 2012) or indirectly by serving as a role model (Newman et al., 2017). Moreover, team leadership can be regarded as an activity that everyone in the team can practice rather than something only a designated person is expected—or allowed—to fulfil (Hackman, 2002). Thus, supportive leadership practices may foster supportive team practices. In Study 1, there was a clear expectation that team leaders would practice support more than anything else, and controlling behaviors were not taken well. For example, in Team 4, the control exerted by the team leader, without being accompanied by encouragement or showing trust, left team members less safe. In Study 2, the teams did not have a designated team leader, although a designated person in each team was assigned a coordinating role. Still, the need for leadership did not disappear by removing the formal leader role. On the contrary, a common theme expressed by many participants was that they expected supportive behavior by the team coordinator; their psychological safety was challenged when such support was lacking.

Both my studies show how supporting and clarifying practices can depend on one another. In Study 2, a lack of clarity about the role of team coordinators challenged their psychological safety and the safety of other team members. All three team coordinators sensed a lack of support from their surroundings that made it difficult for them to know their role and meet others' expectations. Meanwhile, by not seeing themselves as leaders, the team coordinators did not necessarily take any extra responsibility for the supporting practices of the team. This left a kind of vacuum of support, especially in Team Decrease, where several team members felt a lack of support. Thus, their expectations of and preferences for teamwork were not sufficiently addressed, leaving them without a shared understanding and a feeling of support. In Study 1, supporting and clarifying practices were related in a different way and not necessarily connected to any specific role. Whereas most team members were focused on

supporting one another, this did not necessarily result in team psychological safety. For example, the two teams with the lowest levels of team psychological safety, Teams 5 and 6, had moderate levels of supporting practices but low levels of clarifying practices. Thus, despite some positive supporting practices, their lack of structure, shared understanding, and predictability appeared to dominate their members' perceptions of team psychological safety. As one member of Team 5 explained, "I did not always know what I could sign up for, what I could do to help... clear goals and intentions were lacking." Hence, clarifying practices depend on support in the form of team members showing empathy and encouragement, while supporting practices depend on clarity regarding what to support.

Performing and Team Psychological Safety

Team psychological safety has been positively linked to team performance (Frazier et al., 2017; Newman et al., 2017). Whereas team performance is commonly studied as an outcome of team psychological safety (Edmondson & Lei, 2014), no studies to my knowledge have yet examined whether team psychological safety can also be an outcome of team performance. Based on Study 2, performing was indeed important for team psychological safety to emerge. In some teams, this took the form of a more subjective feeling of synergy—that they had achieved something more than they could have done by themselves and that their own contributions were important—while for others it was more important to deliver specific results when performing together as a team.

Several aspects of the relationship between performing and team psychological safety merit a closer look. First, whether team psychological safety is important for team performance, whether team performance is important for team psychological safety, or both, need to be studied over time. Through my longitudinal design that measured how team psychological safety developed and explored the team practices that ran accompanied this development, I found that some teams (e.g., Team Increase) that performed experienced an

increase in team psychological safety. Nevertheless, the fact that the causal arrow may go from performing to psychological safety does not preclude the possibility that it could also go from psychological safety to performing. Indeed, a *reciprocal* relationship has been found for several other team emergent states and team performance, such as team cohesion (Mathieu et al., 2015), team trust (Kanawattanachai & Yoo, 2002), and collective efficacy (Myers et al., 2004), and there may also be a similar reciprocity between team psychological safety and team performance.

Second, performing and its impact on team psychological safety relate dynamically with other team practices over time. In Team Stable, they talked early on about the importance of celebrating wins along the way, and for some time, several team members felt that they had indeed achieved more as a team than what they had done previously when working on their own. Still, with less emphasis on connecting, clarifying, and supporting practices, their level of psychological safety did not increase. In the late phase, several team members questioned whether they were actually performing as a team. In Team Increase, the educational lunches they arranged toward the end of the study period gave them simple but valuable opportunities to achieve small wins. In addition to contributing to perceptions of psychological safety, seeing the specific results of their work motivated several team members to take more responsibility for the team and contributed to a shared understanding of their purpose and how they depended on everyone to perform. Thus, performing practices contributed to a virtuous circle that aided both supporting and clarifying practices and further bolstered team psychological safety.

Third, performing was not associated with team psychological safety to the same extent in Study 1 as in Study 2. Though some participants in Study 1 did connect the feeling of performing as a team with increased team psychological safety, other team practices appeared to be more important. Possible explanations could be that the motivation among

these participants was already high (they had applied for these positions) and that they worked intensively on fundraising over a very short time frame. Thus, it may have been easier to see the results of their work than for the teams in Study 2, in which team members had mixed motivation and dedication as to being part of the team; their goals were not always easy to define, and they worked together over a much longer period. Under those conditions, it appears that performing was even more important for building and maintaining team psychological safety.

Fourth, although performing as a team practice appeared to be important for team psychological safety to emerge, performing as a *motivation* was not necessarily constructive for team psychological safety if it came at the expense of learning. This became especially clear in Team Decrease, where the explicit focus on performance made people jump straight to tasks instead of spending time clarifying. Ironically, as several team members expressed early on the need to perform in order to perceive safety, their impatience actually resulted in a downward trend for team psychological safety. When the focus was so heavily directed toward results over processes and learning, the lack of results was associated with a lack of team psychological safety. This exemplifies how performing practices can relate to clarifying practices, as well as relate to a learning orientation (Dweck, 1986; Wilkens & London, 2006). A learning orientation in a team may foster team psychological safety (Harvey et al., 2019), and this motivation to learn, or not, may help explain the impact of performing practices on team psychological safety emergence and development.

Limitations and Future Research

To explore the emergence and development of team psychological safety over time, I have built this paper on two studies in different contexts and integrated qualitative and quantitative data. In doing so, I have revealed some of the dynamic elements of team psychological safety and the team practices that can impact these dynamics. However, with

little research on the temporal dynamics of team psychological safety to rely on and an explorative approach based on a limited number of teams, I do not draw causal links. Rather, I encourage researchers to explore these matters in greater depth. In doing so, the limitations of my findings may be worth considering.

First, to obtain valid data, one should avoid priming respondents. Though that was not my intention, being measured regularly on team psychological safety might increase participants' awareness of the topic. This was reported by some Study 1 participants as a factor that may have contributed positively to their team psychological safety, as some became more focused on their own behavior and how that affected other team members when responding to daily surveys. None of the participants in Study 2, who responded monthly, saw this as a challenge when the topic was raised in the final interviews. Nevertheless, repetitive measures may shape cognition and perhaps behavior. Another matter regarding priming respondents arose in Study 2, in which participants were given a presentation on teamwork by me as a researcher before the study began, as a gesture for participating in the study. One of the topics in this presentation was team charters, which two of the teams made use of. Interestingly, the teams approached the notion of a charter in quite different ways; as discussed above, the impact of the charter on the development of team psychological safety differed considerably. Indeed, the practices of the team over time appeared to be more important for team psychological safety than creating a team charter in the early days. I encourage scholars to investigate the relationship between team tools—such as a team charter—and team psychological safety and the impact such tools may have over time.

Second, though I consider my data to be rich—as it is longitudinal and consists of different types—my samples are relatively small. Hence, my analyses are vulnerable to dropouts, and some phases in Study 2 have thin grounds for analyzing team practices (see the blank cells in Table 4). To ensure study compliance during the Study 2 quantitative data

collection, I focused on keeping participants informed and used short electronic questionnaires. These measures may have limited the number of dropouts to some extent, but some participants did not answer throughout the entire data collection period. Thus, fluctuations that were registered on the team level may have been due to a single team member not answering, especially if the dropout had previously reported perceptions of team psychological safety different from the mean. To reduce the potential of this biasing my analyses, I collapsed the study periods into early, mid, and late. Though this came at the cost of some richness of data and observing short-term dynamics, that approach likely increased the overall robustness of the data (Edmondson & Mogelof, 2006). Nevertheless, our knowledge of the temporal dynamics of team psychological safety may benefit from studies making use of different designs, time periods, and analytical approaches.

The third limitation is another challenge with longitudinal studies: the natural changes some teams experience, including changes in team membership. In the two studies presented here, one team had a member who quit his job, and another had a new member join during the study period. Changes in team composition may affect team members' perceptions of psychological safety and explain some of the fluctuations found through longitudinal analyses. I encourage future research that examines the impact of changes in team composition on team psychological safety. Moreover, concerning studying team psychological safety over time, a potential paradox surfaced through these data. Though many respondents associated time positively with their perceptions of psychological safety, one participant noted how time could have the opposite effect. According to this respondent, the longer one had been in a team, the higher the threshold for asking questions, which was associated with beliefs like "you are supposed to know this by now" and "do not question the way we are working." Potential paradoxes associated with team psychological safety over time could be an interesting and important aspect to investigate in further research.

Fourth, just as the data were simplified to some extent by collapsing survey results over time, I have simplified in another way when analyzing data primarily at the team level. Study 1 revealed that the perception of team psychological safety could differ substantially between members of the same team. Building on this experience, I emphasized individual differences to a greater extent in the Study 2 data analysis. The primary analysis was still on the team level since I was focusing on team practices, however, considering individual differences to a greater extent enabled me to understand team dynamics more deeply and with greater nuance. For example, the element of subgrouping and team members feeling on the outside even while still “on” the team was key to understanding the psychological safety of those individuals and of the team as a whole. Indeed, when going deeper than simply averaging the levels of all team members’ psychological safety, in nearly all teams in both studies, a picture of diverse perceptions of team psychological safety surfaced (see Appendix 3 for examples). This diversity became even more apparent when the development of team members’ perceptions over the entire study period was examined. Thus, an analysis of the same data at the individual level could have given different insights into the dynamics of psychological safety. Moreover, this may be of importance when studying how team practices relate to team psychological safety. Though psychological safety is most commonly studied at the team level and primarily resides within a team (Edmondson & Lei, 2014), I encourage future researchers to take individual differences into account to understand the dynamics of team psychological safety more fully.

Fifth, though my attention has been on team practices, team psychological safety does not emerge or develop in a vacuum. On the contrary, the psychological safety of a team results from a complex reality in which both individual and organizational differences may play important parts (Edmondson & Mogelof, 2006). For example, some teams in Study 2 were particularly concerned by the lack of understanding or follow-up by the top management

team and related this to their team psychological safety—or lack thereof. In Team Increase, despite their own team practices positively impacting team psychological safety, that safety was limited by a lack of clarifying and supporting practices on the part of the organization. Previous research confirms the importance of organizational support for team functioning in general (Cohen & Bailey, 1997) and team psychological safety in particular (Frazier et al., 2017). Thus, the team practices I present are only one piece of the puzzle when it comes to building and maintaining safe teams. It should be noted that despite the lack of organizational support and its consequent reduction in team psychological safety of the teams in Study 2, their team practices played an important role in avoiding team psychological safety from being further reduced. Indeed, through their team practices, they were able to keep their team psychological safety at a certain level, despite challenges outside the team itself. Still, the research field could benefit from studies considering two or more levels when analyzing team psychological safety dynamics.

Sixth, although I have tried to follow established guidelines throughout the qualitative data analysis and interpretation of the data, the research process is subject to just that—my interpretation. To take this into account, I started the data analysis during the data collection, so that in the final interviews I could make use of read-back and member-checking (e.g., through the team psychological safety development curve). Notably, although I was interested in how team psychological safety emerges and develops over time as a result of what the team members do in this time, I still did not use the term *team practices* in the interviews, since this term is not common among most people. The interviews were rather aimed at activities, behavior, and interactions between team members (cf. my definition of team practices). Participants were asked how these elements of team practices related to their team psychological safety perceptions. Thus, the team practices that emerged through the analysis came through the participants' own reflections on this matter. Still, the interpretation of

whether the respective team practices were descriptive of the team climate is primarily a result of my analysis, such as the number of relevant quotes and comments I was able to extract and the categorization (positive, neutral, or negative) of these (see Tables 2 and 4 for details). I acknowledge that other researchers could interpret these data differently, especially if studied through a different lens than team practices. Thus, I encourage future researchers to approach team psychological safety temporal dynamics through other lenses.

Practical Implications

This paper presents two case studies aimed at exploring the emergence and further development of team psychological safety and identifying team practices related to these temporal dynamics: *connecting*, *clarifying*, *supporting*, and *performing*. While more research is required to confirm these team practices, they are relatively consistent across the two studies. In the final part of this paper, I discuss the practical implications of its findings.

First, team psychological safety is a dynamic phenomenon. The team psychological safety developed early in a team's life is not necessarily representative of later team psychological safety. Thus, it should not be considered a static property; rather, it is a perishable good. Even if we have it, we can lose it. In fact, contrary to what one might assume—that the more we work together in the team, the safer we become—some teams ended up at with a lower level of team psychological safety than when they were newly formed. Apparently, time itself is neither sufficient nor necessarily positive for team psychological safety—it is how this time is spent that matters. Thus, more than a passive result of simply spending time together, team psychological safety appears to result from active choices to connect, clarify, and support. As the practice of performing is perhaps not as easy to *choose*, one can instead make sure to celebrate wins and emphasize the positive aspects of being together as a team.

Second, actions speak louder than words. As Team Stable experienced, walking the walk is harder than talking the talk. A team charter is not worth much if it is not applied to actual teamwork and followed in practice. Moreover, team practices fostering team psychological safety should be maintained over time for safety to be consolidated or even grow. For example, establishing a shared understanding as a clarifying practice is not only important in a startup phase but also something that teams need to keep up to date. While some of the team practices identified in my studies may be associated with Tuckman's (1965) stages of team development—forming, storming, norming, and performing—drawing a mechanical one-for-one parallel would be misleading. On the contrary, my data show that these practices do not belong to specific phases.⁴⁶ However, the practice of performing does become more apparent in long-term project teams, which may indicate that experiencing specific results of work is more important for perceptions of team psychological safety the longer the team is together.

Third, we need to see the individual team members, not just the team as a whole. As previously noted, team psychological safety can be experienced very differently by members of a team, and the same goes for team practices. All team members need to connect with others, experience clarity and support, and feel that they contribute to the performance of the team. Subgrouping within teams stands out as a major obstacle to building team psychological safety. If some people are on the inside, others are on the outside. In my studies, when team members felt that they were outside the subgroups, they perceived lower team psychological safety than those who felt that they were within those subgroups. As one participant noted, "I feel mostly safe. I know that everyone wishes me well and will listen to what I have to say." If

⁴⁶ On a related note, Clark (2020) presents four stages of psychological safety—inclusion safety, learner safety, contributor safety, and challenger safety—following a progression based on a natural sequence of human needs. To my knowledge, this model has not been tested in peer-reviewed journals. Though I do not find team psychological safety to go through certain stages or following specific patterns, both our theories support the view that psychological safety is a phenomenon that develops over time.

a team is to build robust psychological safety, it is thus important to establish a climate where this safety is perceived by *all* the team members.

Fourth, it is the sum of team practices that counts. Though I find an overall consistency between the team practices identified and team psychological safety, there is not an equal sign between a certain team practice and a given level of team psychological safety. For example, although subgrouping represents a low degree of connecting behavior in a team, its negative impact on team psychological safety was outweighed in one team by the positive impact of the team actually performing. Some team members saw the need to take more responsibility than the others to get the job done, and though not all team members were equally involved in team processes, the positive results of their work led to increased team psychological safety. Thus, though I have identified important team practices for building and sustaining team psychological safety, I acknowledge that team psychological safety in practice is a result of a complex picture, with potential paradoxes making it even more challenging.

Summary

In exploring the temporal dynamics of team psychological safety, I do not find a consistent pattern in *how* team psychological safety develops over time. Still, that dynamism is important for those interested in building psychologically safe teams. Interestingly, most teams in these studies have started out on somewhat similar levels of team psychological safety. However, from there, team psychological safety develops very differently. As team psychological safety does not emerge and develop naturally but is rather shaped by what teams *do* in this time, teams may benefit from increased knowledge of team practices that foster early and lasting team psychological safety: connecting, clarifying, supporting, and performing.

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Appendices

Appendix 1

Quotes and Comments From Participants in Study 1

Team practice / Team	Connecting	Clarifying	Supporting
1	<p><i>The more friends we became and a well-knit group, the easier it became for people to say things and come up with other input, not just chatter. So yes, it really just got better and better.</i></p> <p><i>Then we had a day where we all met at X's house, and we had some tasks to work on together. Then I think the safety actually increased. One felt a little of that togetherness.</i></p>	<p><i>We had a lot of meetings. Every morning, basically every day after the first start, to constantly update each other on what is happening, what needs to be done, and whether we have done what we have to do during the week.</i></p> <p><i>There were a number of things I had not understood at the start, but the others were very good at explaining things to me.</i></p>	<p><i>So, what I really started with is to be more myself and be a bit silly and a friend and show that I want to have fun. People become much safer around you and more motivated when they get a positive and a slightly more humorous tone.</i></p> <p><i>The atmosphere was not so stiff. I think everyone really felt that there was a very good atmosphere, and then you become much safer around the others when not everything is like straight ahead and only work.</i></p>
2	<p><i>I think it is nice to meet new people, so yes, we got to know each other pretty quickly.</i></p> <p><i>After the first day, there was a kick-off at the school. Then we had a party at my place because I live right next to the school. Then we became good friends right away. Just like that.</i></p> <p><i>When you know someone better, the threshold for making suggestions is much lower.</i></p>	<p><i>We have not really worked anything particular on how to be a good team.</i></p> <p><i>We just started out and had a strict leader [laughs].</i></p> <p><i>I wanted to set a kind of framework for the work, so that everyone would be safe.</i></p>	<p><i>We were good at working together, good at helping each other, and good at supporting each other. We praised each other.</i></p> <p><i>We were told that everything should go through her [the team leader]. But she has probably spent two days now without coming up with any new information. It is a bit frustrating. Especially when I know some of the people we can contact. I remember I sent him a message the other day, and then I was yelled at by X [the team leader]. Well, yelled at, I guess it was more of a rebuke.</i></p>

3	<p><i>The safety just got better and better. You notice that, because when you meet every day for so many hours, you also become friends.</i></p> <p><i>The first time we met, it was like... we went around the table, like: "Who are you?" and a little like that. But because our work started... well, no, it was a bit special because we started right on working.</i></p> <p><i>Right away we had something social down in the basement. That was the only thing. But it was not like... I do not know the others on the team, really.</i></p>	<p><i>I think our safety got better over time. At the start, there was a bit more uncertainty and nobody quite knew what our task was.</i></p> <p><i>As people became more confident on what we were going to do, more questions came, and people asked a lot of questions and contributed with what they knew.</i></p>	<p><i>Sometimes it was very difficult to get help, for example last week, when they were finished with theirs... No one really wanted to do more, so when we sent messages in the group chat, no one said yes. We got to the point where we had to send individual messages, like: "Can you be so kind..." And then they helped out. But no one really took any initiative.</i></p> <p><i>We kind of became a small group in the end, of 3–4 people, who did most of the work. It has gone well, but the cooperation has been poor.</i></p>
4	<p><i>From the start, we should have had a gathering where we got to know each other. We would perhaps have been more comfortable talking to each other and disagreeing with each other then. I definitely think so. Because when you are in that process where you start getting to know people, then everything is fine: "I have a good idea, I think maybe we can do it, but we do not have to do it like that." Getting past that bit would have been a good thing.</i></p> <p><i>We did not really do that [spend time getting to know each other]. We just worked and planned that we should meet and update each other.</i></p>	<p><i>The fact that the whole team sits down and gets an overview together, so that we have the same understanding of what needs to be done: "Oh, that is actually what we are going to do. That is what the task is. That is the goal of this week."</i></p> <p><i>At the very beginning, when she and I got our tasks, we should have more clearly divided the others' tasks as well. So that we knew what absolutely everyone had to do.</i></p>	<p><i>It seemed that she didn't think I did anything, or that I didn't have much control. She was always like: "Yes, are you sure? Can you make it?" I gradually felt that it was a bit like she didn't think I could do it... like she was much higher up, and then I was a bit like: "No, I can't do anything, help me with everything." It was a bit of a strange feeling, and I only got it towards the end.</i></p> <p><i>At times there has been management, perhaps a lot of management from the team leader, like: "I want you to..." and little room for discussion.</i></p>
5	<p><i>The safety increased then, because you get to know the people you are on a team with better. Along with my control, my safety also increased. And the fact that you form a bond with those you work with. Then the safety increases a little. Because then you know better how to deal with</i></p>	<p><i>There was relatively little, and no coordination where everyone had a shared understanding.</i></p> <p><i>I did not always know what I could sign up for, what I could do to help... Clear goals and intentions were lacking.</i></p>	<p><i>It is important to not just get like: "No, that is a stupid idea." I feel that if someone had said that, or come up with something completely new, everyone would have responded like: "That was a cool idea, it can be tried out."</i></p>

	<p><i>them. Maybe it is because the shoulders are lowered and the stress factor goes down.</i></p> <p><i>So, in a way, we became two groups in one group. At the same time as we were one group.</i></p>	<p><i>I stayed a couple of times to work and discuss, because then I had a little fresh in my mind what we were going to do before we went home. But I experienced that many others just got their work assignments and then went home. So it was not exactly great teamwork then.</i></p>	<p><i>I went up to him afterwards and asked if he was all right. Then he said "sure," and then I said that "you are allowed to tell the others that there are poor excuses, that they have to attend, so that you are not left with everything. You shall not do their job. They have signed up here because they are going to work. And if you feel like we need more people, just speak up, get hold of us, we are around you. We who show up are here, so you have to use us." Then he thanked me, and then we had a good tone.</i></p>
6	<p><i>We had the kickoff party...but then we just started right on.</i></p> <p><i>It was good that we got to know each other a bit beforehand and were able to talk together. I feel it was a good atmosphere. There was a good sense of safety in the group.</i></p> <p><i>I got to know the people I on the team very well. I kind of feel like we became a bit friends. Some of us became very close, but others not so much.</i></p>	<p><i>We tried to clarify how much we expected each other to work, but it went relatively quickly before we got started.</i></p> <p><i>I felt that we got slightly different roles over time. That you kind of just took a role.</i></p> <p><i>Although most people wanted to, it was a bit, uh, a bit lazy perhaps. A bit of a lack of proper leadership.</i></p> <p><i>There were sort of times where, yeah, I feel like we could have gone through the ideas better. We kind of came to a conclusion very quickly.</i></p>	<p><i>If you do a task and have done it together with someone, and then you may have gotten the impression that it went well, then you feel safe that the others are doing what they are supposed to, and I am handling what I am supposed to do.</i></p> <p><i>But there was that delegation to get things done as planned...That was kind of neglected.</i></p> <p><i>I don't know, I just felt that our leader was very good at giving praise if someone came up with new information or a new idea. So, that he kind of opened up for everyone to say what they were thinking and that it was clear that we appreciated others' input.</i></p>

Note: Quotes and comments are examples from the full representative data table, selected based on them being representative of most team members' experiences or descriptive of the contrasts in teams when team members had different experiences. The different colors indicate the degree to which respective team practices were descriptive of the team climate, based on the number of quotes and comments and their categorization (positive, neutral, or negative).

Red = Low; more negative quotes and comments than neutral or positive ones.

Yellow = Moderate; mostly neutral quotes and comments and/or equal numbers of negative and positive quotes and comments.

Green = High; more positive quotes and comments than neutral or negative ones.

Appendix 2

Quotes and Comments From Participants in Study 2

Team	Phase	Connecting	Clarifying	Supporting	Performing
Team Increase	Early	<p><i>What came out of the first meeting was that people needed to be safe and wanted structure. At the second meeting, we talked a bit to really get to know each other. Oh yes, that has to be worked on. Because people do not know each other very well in this team.</i></p> <p><i>It is an early phase, but we agreed in the first meeting that we should talk about ourselves, what our strengths and weaknesses are, and what we have worked on before. Because we do not usually do that.</i></p> <p><i>At the first meeting, we spent plenty of time for everyone to introduce themselves. Because some of us know each other, but then there are some we do not know that well.</i></p>	<p><i>This is a project that not everyone has an overview of, so we kind of had to talk ourselves into it a bit at the first meeting. I found that very useful. We cleared up some misunderstandings and got to know where people's commitment was at.</i></p> <p><i>I struggle to understand what this project actually is about. But I think I will become wiser during this teamwork. We need some time to understand what it really is.</i></p> <p><i>It was very nice as an introduction to talk more about which goals and how we think we want to work. We also talked a lot about how to play each other well, which I thought was a start on that team charter. Discussing rules of the game and what is important to people.</i></p>	<p><i>There will probably be a high degree of safety in this team. We also have a duty of confidentiality within the team, so that we do not talk about things outside of it.</i></p> <p><i>She creates a sense of safety. I think that there is room for me to say these things that I have said to you, which I might not want to say to the section manager, to put it that way.</i></p> <p><i>Even though she is a coordinator, I do not think she would call herself a leader. She has been very humble to hear our input.</i></p>	<p><i>I would like to believe that the team is meant to solve some challenges. I believe in teams. But it is far too early to say whether this team will solve anything.</i></p>
	Mid		<p><i>The meeting between the team and the responsible section manager created some discussion and uncertainty about the mandate.</i></p> <p><i>We made the team charter and had the mandate officially approved by</i></p>	<p><i>There is good chemistry in the team, and we have taken the necessary steps, I think, to make it work.</i></p> <p><i>We took a round around the table, without premises and not from top</i></p>	<p><i>We arrange monthly educational lunches that bring both teams and the entire staff closer together, with good contributions, discussions, and positive feedback that motivates</i></p>

		<p><i>the management team.</i></p> <p><i>We have not collaborated outside of the meetings, and it has been more that feeling of everything we should have done, but cannot do. So, perhaps we were a bit ambitious in the mandate that we created.</i></p> <p><i>What has been enforced the most is probably sitting and working on something else during meetings. If you are sitting in a meeting with a PC, then you have to say that this has to do with the team.</i></p>	<p><i>to bottom, but more like: now we are here, now we will find our way together, and we have many questions, but perhaps not so many answers along the way.</i></p>	<p><i>the team.</i></p> <p><i>Although I like each and every one in the team and think it is nice to be at the meetings, I cannot say that the sum of us has become more than the sum of us [laughs]. To put it that way.</i></p>	
	Late	<p><i>We know each other quite well. We have worked together for many years, so it should not be a problem.</i></p> <p><i>Everyone does not know each other that well. There are probably one or two who might not feel that way. I do not know them very well. But on the whole, I know most of them, both privately and at work.</i></p>	<p><i>Sometimes I just have to do other things [laughs], if it is too tempting. But I am much better in this team than elsewhere. And that is because we talked it through. We spent time talking about expectations, that everyone should attend the meetings, and that we should focus on what happened then and there.</i></p> <p><i>One team only got a mandate from a section manager, like: "You must do this." It has not worked at all, that team. The reason why I say something about it is that I work a lot on tasks that have to do with that team. So, I think at least the fact that we were involved in</i></p>	<p><i>The coordinator was ill, but the team worked well and independently together as a team.</i></p> <p><i>Despite high work pressure, the team members have made it a priority to attend the meetings with what I perceive to be great will. We have also had enough deliveries for the meetings to ensure progress in the work and in the discussions.</i></p> <p><i>I actually have a sick child today, so there was pressure on me to stay at home, and yes, I could do that because my boss knows that I have had a lot and that I have been behind schedule. So, he would probably understand that, but the</i></p>	<p><i>This month we also organized an educational lunch, which I feel is positive for the team and for the entire working environment.</i></p> <p><i>You work with them on other things, which you then get to know a little more about, also about other tasks outside the team. So, there will be synergies from that.</i></p> <p><i>I would like to highlight something that we have achieved. After all, that is what the educational lunches we have had once a month are all about. It was something we decided on to show that we were a team and what the team was supposed to</i></p>

			<p><i>creating the mandate was important.</i></p> <p><i>[The team coordinator] is clear, and I think that is very positive. She is clear in a gentle way.</i></p>	<p><i>team is the priority now and I wanted to contribute.</i></p>	<p><i>do. So, we stuck to that, and we have done it as a team. It has been a very positive thing.</i></p>
<p>Team Stable</p>	<p>Early</p>	<p><i>There is also the fact that we knew each other to very different degrees before we joined the team. Some of us have been in working groups before, the majority of us have not.</i></p> <p><i>I think it has probably led to us becoming more equal in that sense. It has, in a way, also removed these different starting points a bit.</i></p> <p><i>We have not had any kind of team building, where we have gone out to eat dinner or had games and such, but we have spent quite a lot of time getting to know each other and become safe.</i></p> <p><i>We did not have any strategy or measures on how we could become safe around each other. But it helps talking together. Time is the key, I think.</i></p>	<p><i>We have spent three meetings talking about what we are going to do, how we are going to work together, and how we can manage to limit ourselves so that we do not get the feeling that we are drowning. So, this should be fun.</i></p> <p><i>Now we are at the very beginning, but I think it has been a good investment to spend time discussing what we actually should work on.</i></p> <p><i>We have also spent quite a bit of time talking about the rules of the game in the team. I think both of those things have been important.</i></p> <p><i>It was important to understand what the team was supposed to be, because we were a little unsure at the start. I think it is very important that we have a common goal and that we understand the reason why we are created in a way. I think we have managed that now, and I also think it will develop because we gradually see that there are tasks that we think we can contribute to.</i></p>	<p><i>How will the balance of contribution be here? At least I thought about that. But we do not have that kind of positioning, even though we might have feared it. I feel that we have worked together, and all contributed in a way.</i></p> <p><i>We have an incredibly well-structured coordinator. She is also very consensus-oriented in the sense that she wants everyone to contribute, and she wants us to spend enough time to see that okay now we agree, now we have reached a decision together. I feel that she is very, yes, very listening and that everyone should be involved in a way.</i></p> <p><i>We looked at how we are as individuals and the fact that we are now going to sit together. That presupposes that we are paying attention to each other and bring out what others think. And that you don't ridicule or anything else like</i></p>	<p><i>One thing that has struck me now is that every time something has to be done, we have previously set up a working group. Then there have been slightly different people who have been part of those working groups, with slightly different motivations. It is clear that now there will be a specific team with people who will have ownership of that area and who will get to increase their expertise, who have a lot of opinions, and who thinks about how these things can get better at the section. So, that is very positive.</i></p>

				<i>that. That, yes, I experienced it very positively.</i>	
Mid	<p><i>There has been a better atmosphere. Less disagreement. We had a joint dinner which was nice.</i></p> <p><i>We have had dinner together, kind of extracted a reward, but we had to pay for it ourselves.</i></p> <p><i>In the beginning, our safety was lower because we did not know each other very well yet. Everyone had not worked together, so we were a little unsure. But gradually I think that we have gotten over the disagreements that have existed, and that we now feel that we want the best for each other.</i></p> <p><i>I had to look for allies. Luckily, I found two quick allies, so it went well.</i></p>	<p><i>One of the team members expressed in a meeting a feeling of being "run over" by one of the other members (who in turn expressed to just be "involved"). We will probably keep this "incident" with us further when, before Christmas, we are going to take a small round on compliance with the team charter and whether there is anything we should adjust.</i></p> <p><i>It is a bit of a balance sometimes because some people are very clever and very quick and so on, but then you lose perspective when it comes to involving the others. When someone asked questions, it was often like "no, this is not a rematch, we are done with this, why are you asking about this again?" But it was often because that someone just wanted to understand to be able to participate in the teamwork.</i></p>	<p><i>If I am being honest, I think that when we started, she was a bit like: "I can do this and listen to me," but I did not accept that. So, I challenged that a bit. Because I also have expertise and then I did not think it was cool to sit in a meeting and experience that.</i></p> <p><i>The team coordinator is a little impatient and can easily be irritated if you question matters that have already been discussed and "agreed on." This can happen because members do not necessarily remember all the details from the previous discussion. Then it is perceived as a "rematch" even if it is not intended as such. Then there will be a bit of a bad atmosphere.</i></p> <p><i>There was perhaps a bit of a clinch between two of the members in the autumn. Or not a clinch, but there one felt that the other in a way maybe spoke a bit too much.</i></p>	<p><i>I think there is mutual learning. I now learn much, much more about the organization and how the other sections work. When we sit with different glasses and perspectives on things, I feel that I am enlightened a great deal and more so than I would have on my own.</i></p> <p><i>I think we were internally strengthened. Last meeting, for example, we experienced that we took the discussion to new heights. We were very satisfied with ourselves, of course, but it was fun. We thought we had some very smart ideas.</i></p> <p><i>It gives such an inner strength, right, when we feel that the "we" is something good. That we get something more out than just the sum of us. It was incredibly nice. I think we have gotten into a pretty good groove, which we did not expect, but we have pulled it off.</i></p>	
Late	<p><i>Getting to know the others, I find that they are very decent people, in that there is no one who is</i></p>	<p><i>It was a bit of a downer here for a while [showing to the team psychological safety curve] when we kind of lost track on what we</i></p>	<p><i>I think that it was probably a bit more demanding in the beginning when I was faced with: "This is the literature, I know this." As time</i></p>	<p><i>...that we have some celebrations when we reach the goal, you know, so we get that, yes, that feeling. That we</i></p>	

		<p><i>interested in such hidden agendas or anything like that.</i></p> <p><i>People are put together in different ways and some people like a bit more intrigue and the like. But I find that there is little of that here. No games or anything like that.</i></p> <p><i>I have experienced lack of safety, not on my own behalf, but on behalf of others. We have team members who are more cautious by nature, and they can sometimes get sabered down. That is unpleasant to watch. So, I would not say that this is a very safe team. I have been to safer places, so to speak. We have not been able to create that. I think it is about the fact that we had such different backgrounds when we started, so we were not equal in a way, and we did not build the relationships to handle that.</i></p>	<p><i>were supposed to do. For some it was like: what is the point of us sitting and spending so much time on this? Then I noticed that there were slightly different signals from people, and some seemed like they wanted out a bit, because they felt that other things were more important. Then I think we went down on that safety. It started around then... We had just delivered a lot, but then we got little response. Then it started to have an effect on our feeling of the purpose of all this.</i></p> <p><i>We have had different starting points when it comes to competence about what we should work on. Some have had a lot of competence, while others have been more like: "what does that mean?" Then it is not so easy to communicate and build shared understandings.</i></p>	<p><i>went by, it loosened up a bit, and we have become more equal professionally. Now there is more like: "Yes, those are good thoughts." Because it can quickly become a bit of a ruling technique if you say: "Yes, but this is what the literature says, have not you read it?" There are still some incidents of that, actually.</i></p> <p><i>There are a lot of good people here, such that I feel that there is a mutual respect for what we can bring in. I think that is very positive.</i></p> <p><i>It was more challenging in the beginning, whereas now it has developed more when it comes to contributions. That is one of the nice things, that we have had different professional backgrounds. We have managed to work well interdisciplinary.</i></p>	<p><i>celebrate a little. We have also talked about that in this team.</i></p> <p><i>I think we agreed that 2+2 was 4 comma something [laughs]. It was quite obvious that our recommendations were better than if, for example, I had sat there and done it by myself.</i></p> <p><i>I think there have been meetings where one or two people could have done the whole job much faster in their own office. I would definitely say that. So that, yes, during the meeting each one of us has gained more knowledge and understanding, but if you think purely rationally on the fact that the work must be done at a given time, then it is a waste of time. Yes, I would say that.</i></p>
Team Decrease	Early	<p><i>We are spread out on separate locations and see to a greater and greater extent how the working environment is being broken up. We lose those daily relationships that we used to have. Many of the members in this team sat together previously, and now we do not do</i></p>	<p><i>Exactly how we should work together was one of the topics at the meeting, and then we did not fully agree on how we should work together. We who work in this team are quite different.</i></p> <p><i>I do not think there is any bad intentions, but I think we go into the</i></p>	<p><i>When I was going into this team, I got a feel for what the ruling techniques were. Because by knowing what ruling techniques there are, you can parry them. I have not made it clear for the others in this team yet. I still try to</i></p>	<p><i>At the same time, we also have to discuss the work to be done. We kind of cannot wait to do the work for all that basic stuff to be in place.</i></p> <p><i>A threat to the safety can be if I do not understand, if it is not communicated to me what to do</i></p>

		<p><i>that anymore. It is quite clear that it affects the work in our team. We feel that more and more with each passing day.</i></p> <p><i>You do not see the other people. You do not pick up on those little signals that he has had a sick child who has not slept for two nights and is dead tired. So yeah... You just have to call in to the meeting, and then it has been two weeks since you last saw them.</i></p>	<p><i>team with a number of different expectations, and some probably want the mandate to be the wait it is, while others still want to discuss it. There is a real disagreement.</i></p> <p><i>I wish we had sometimes gone around the table and said, yes. ... It is a bit funny, actually, that we have a team where some people do not express anything, neither one way nor the other. Yes, that is how it is.</i></p>	<p><i>find my place and where my limits are.</i></p> <p><i>I notice that he is trying to start like: "How are we doing in the team?" Five minutes of such small talk at the start. There is something going on. I believe that it can be a good team, even though the first meeting went so bad.</i></p> <p><i>What I would like to have experienced is that when I bring up things that are within my field, the other members are more like: "Oh, yes, we have not thought of that before." But no...</i></p>	<p><i>with this, and I do not pass it on. So, there... I think it has been said that here we will go out and spread the happy frenzy, so to say [laughs], but yeah, spread the message or bring in something. ... But we have to deliver. I am glad that we focus on that.</i></p>
	<p>Mid</p>	<p><i>I think we have had a very strong subgroup who have thought very similarly, and then we might not have had much else.</i></p> <p><i>I am worried that they might get so frustrated that they might lose faith in the team? I find that some team members can be a little less accommodating towards me, and hope that the disagreements in the team will not affect the relationships.</i></p>	<p><i>"What exactly are we going to do?" People had different perceptions of what should be done, and some could get quite frustrated that others experienced it so differently. I felt that too.</i></p> <p><i>I believe we could have benefitted from sitting down, taking a break and putting "a finger in the air," reflecting on where we are and where we are going.</i></p> <p><i>We are still operating and trying to understand what the task really is. Meanwhile, my own colleagues in the line here question our use of</i></p>	<p><i>I have felt very alone. I have not had anyone on the team that I have... Nor have I wanted to go out and lobby for my point of view and start walking the corridors to gather support.</i></p> <p><i>I would not go so far as to say that it is a lack of safety. My safety has not been threatened. But I have to admit that I am constantly searching for what to contribute with. I have to admit that I do not have things completely clear to me, and there is not much help out there.</i></p>	<p><i>But in November, you see the frustrations I mentioned earlier, that we are not getting anywhere.</i></p>

			<i>time and ask why we do not get started.</i>		
	Late	<p><i>It helps to get to know each other, because you do not know each other very well when you start. You know each other a little better, and maybe yourself too, when it is finished.</i></p> <p><i>That period of feeling forward could lead to one becoming a little irritated with individuals, while I saw that fortunately we got a better grasp of things when we took the time to know each other.</i></p> <p><i>We as [occupational title], we had to put our heads together and find out how we could fulfil our delivery. It was necessary, but I do not think it necessarily has occurred to the others.</i></p>	<p><i>I really think that the process we have had now, where we have sat down and thought through how we should do it, what the challenges are, and so on... That should have been in the beginning when we started as a team.</i></p> <p><i>I believe that people become safer around each other if everyone has a shared understanding, and it is very clear what we have to work on. That people have time to work and that there is acceptance to spend time on it.</i></p> <p><i>With her, whom I had challenges working with... I think we have gained a slightly more mutual understanding of what my tasks are and what hers are. So, instead of me thinking that her point of view is unreasonable, I have also tried to have an understanding of why she has had her views. I have disagreed, but when we established the new structure, I think we gained a greater understanding of how we should work, and then we could have a bit more factual discussions.</i></p>	<p><i>Well, we manage to have a good tone, but with certain team members I probably still have that feeling... Well, you know, when people laugh at what you say. That touch of ridicule. I think that someone in the management is also disappointed that we were not able to resolve this within the team. So yeah, there are probably people I have become less safe around after being in this team.</i></p> <p><i>I do not feel that there has been anything like that where we can sit down and talk about how we have worked together. No, we do not have that interest in one another.</i></p>	<p><i>It is partly to do with me having matured, but to a large extent it is about the fact that the task we have here is actually getting better because we have a much wider anchoring in the organization. So, it has definitely, yes, definitely improved as a result of us working as a team.</i></p> <p><i>We do not really feel that it works the way it was intended. Then one should really just phase out the team and possibly establish a new structure. It may well be a team for me, but with different people than now.</i></p> <p><i>What I feel we have achieved is at least a greater understanding of each other's tasks. That synergy in breaking down maybe some imaginary fences.... Now it is easier to just go and knock on the door and do it, right? So, in my experience, we had somewhat more waterproof bulkheads earlier. So, in that sense, I would say that we have won something and that something is easier now.</i></p>

Note: Early: T1, Mid: T2–T7, Late: T8–T9.

Quotes and comments are examples from the full representative data table, selected based on them being representative of most of the team members' experiences or descriptive of the contrasts in teams where team members have different experiences. The different colors indicate the degree to which respective team practices were descriptive of the team climate, based on the number and timing of the quotes and comments (early, mid, or late phases) and their categorization (positive, neutral, or negative).⁴⁷

Red = Low; more negative quotes and comments than neutral or positive ones.

Yellow = Moderate; mostly neutral quotes and comments and/or equal numbers of negative and positive quotes and comments.

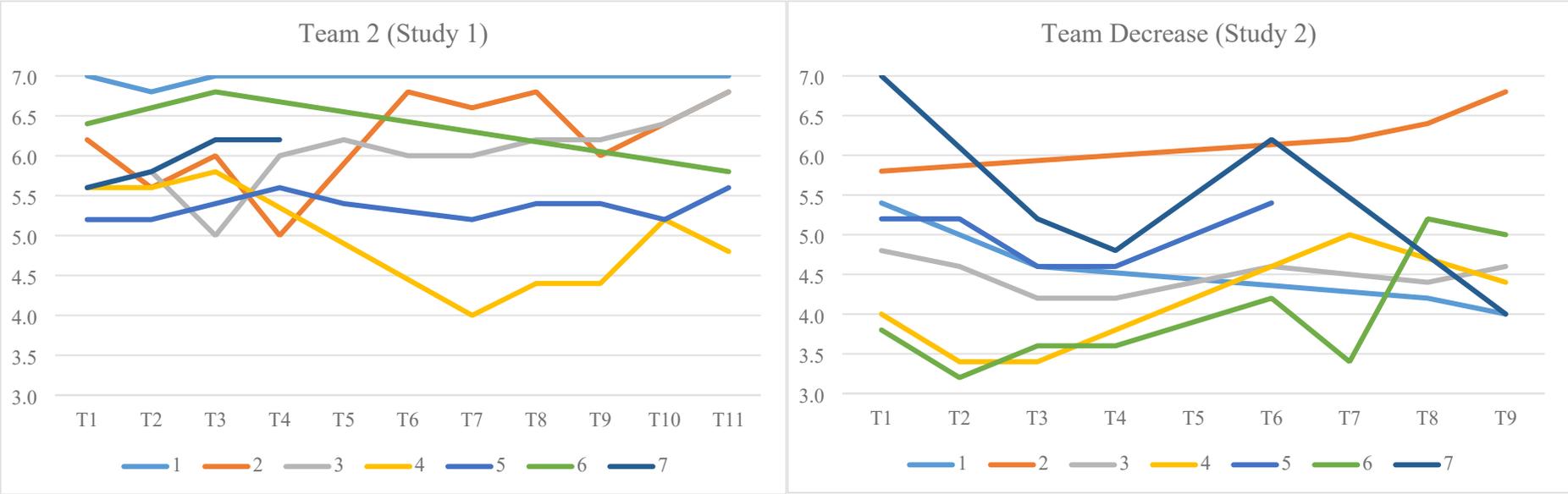
Green = High; more positive quotes and comments than neutral or negative ones.

Blank = Undefined; thin grounds for analyzing team practices due to a limited number of responses in this phase.

⁴⁷ For the final interviews, it was in some instances challenging to categorize a team practice within a certain phase because the data in question were obtained at the end of the late phase but were based on experiences in retrospect from the whole period and could also describe the early and mid phases. Where it was clear that the team practice described an earlier phase, it was categorized as such, even though it was described in the final interview.

Appendix 3

Examples of Two Teams With Individual Responses on Perceived Team Psychological Safety Over the Entire Study Period



Note: Each number represents one team member. Team members are given a random number within each team. Each time point (T1, T2, etc.) represents one day in Study 1 and one month in Study 2.

PAPER 3

Safe Among the Unsafe:

Psychological Safety Climate Strength Matters for Team Performance

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Reference

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Abstract

Team psychological safety, as a shared perception, is persistently found to be important for team performance. However, team members may not necessarily agree on the level of safety within the team. What happens when team members have dispersed perceptions of team psychological safety? Through a survey-based study involving 1,149 members of 160 management teams, we found that, not only is the *level* of team psychological safety positively related to team performance, but also that *sharedness* among team members (team psychological safety climate strength) moderates this relationship. The more team members agree on the level of team psychological safety, the stronger the effect of team psychological safety on team performance. Further, having at least one member who perceives the team as psychologically safe may lift team performance in a team of low psychological safety. We discuss theoretical and practical implications of looking beyond average levels of team psychological safety for building high-performing teams.

Keywords: team psychological safety, climate strength, team performance, management teams

Many organizations rely on teams to achieve more than the sum of members' individual contributions (Thompson, 2018). Still, how to reach a team's potential has puzzled both team researchers and practitioners. Recent research strongly suggests that team psychological safety plays an important role in team performance (Edmondson & Lei, 2014; Frazier et al., 2017). Team psychological safety refers to a climate where team members are "able to show and employ one's self without fear of negative consequences of self-image, status, or career" (Kahn, 1990, p. 708). A psychologically safe climate is important for a number of desirable team outcomes, such as team knowledge creation (Cauwelier et al., 2019), information sharing (Bunderson & Boumgarden, 2010), creativity (Madjar & Ortiz-Walters, 2009), voice behavior (Tröster & Van Knippenberg, 2012), and team learning (Wong et al., 2010).

Team psychological safety is commonly interpreted as a shared perception among team members (Edmondson, 1999). Despite a rapidly increasing amount of research on team psychological safety, our knowledge is mainly limited to studies assuming that such safety is perceived somewhat equally throughout the team. However, this is not necessarily the case; some team members may perceive a climate to be safe while others perceive it to be less so (e.g., Edmondson & Mogelof, 2006; Roussin et al., 2016; Schulte et al., 2012), and these differing perceptions may impact the relationship between psychological safety and performance (Koopmann et al., 2016). Thus, the goal of this paper is to examine the extent to which team psychological safety and shared perceptions thereof matter for team performance.

To answer our research question, we draw on Chan's (1998) dispersion model, which opens up different understandings of how team phenomena emerge, focusing not only on *agreement* of team members' attributes—such as their perceptions of a team climate—but also on *dispersion* of team members' attributes. This dynamic approach challenges the idea of a "group mind" (Klimoski & Mohammed, 1994) and emphasizes the need to look beyond

average scores when studying team phenomena like team psychological safety. Thus, in our study, we include not only the level of psychological safety in teams (team psychological safety) but also team psychological safety climate strength as a measure of the sharedness of team psychological safety. In team climate research, a climate gets stronger the more the team members share the same perception (Schneider et al., 2002). There is an increasing interest in the concept of climate strength in the team research field, focusing on how perceptions do or do not become shared (Perrigino et al., 2021) and the impact this has on team outcomes (Roussin et al., 2016; Waller et al., 2016). Still, we know little about how diverse perceptions of team psychological safety affect team performance (Newman et al., 2017).

We contribute to the research field of team psychological safety by examining to what extent shared perceptions of a team climate influences the relationship between team psychological safety and team performance. In doing so, we answer several calls from previous research. First, Perrigino et al. (2021), in their review of team climate, encourage research on team climate strength in general, while Newman et al. (2017) ask for research on team psychological safety climate strength in particular. Second, we also answer the call from Perrigino et al. (2021) to explore climate strength in depth through research questions rather than formalized hypotheses. Specifically, in our explorative analyses, we tease out team psychological safety dispersion within all teams and show how even one safe member in a generally unsafe team may lift the team's performance. Thus, these analyses provide new insights to our understanding of psychological safety within teams. Third, while previous research has studied the relationship between psychological safety climate strength and individual in-role performance in a team setting (Koopmann et al., 2016) and between climate strength and the performance of larger hospital units (Hirak et al., 2012), no study has examined the relationship between team psychological safety, climate strength, and *team* performance. Through our study of 160 management teams, we show that the degree of

sharedness among team members is important for the effect of team psychological safety on team performance.

Theoretical Background

Team Psychological Safety

Team psychological safety is “a shared belief held by members of a team that the team is safe for interpersonal risk taking” (Edmondson, 1999, p. 350). More specifically, it describes a climate where team members are not afraid to ask questions, do not fear being humiliated, are comfortable sharing ideas, can ask for help, and can safely admit mistakes (Edmondson, 2018).⁴⁸ The importance of psychological safety has been tested in a wide range of team settings, such as geographically dispersed teams (Gibson & Gibbs, 2006), financial companies (Coutifaris & Grant, 2021), the health care sector (O'Donovan & McAuliffe, 2020), and in virtual teamwork during the COVID-19 pandemic (Lee, 2021).

According to Edmondson (2003), team psychological safety is a *cognitive* group-level construct originating in team members' assessment of interpersonal risk in their team. For example, if a team member believes that she can express an opinion without fear of embarrassment or criticism within the team, she is more likely to do so. As such, team psychological safety is based on cognitive evaluations of whether one can be one's self without fear of negative consequences (Kahn, 1990). Nevertheless, the cognitive understanding of team psychological safety may be difficult to distinguish from a *feeling*. Both Edmondson (1999) and Kahn (1990) use the term “fear”—commonly recognized as a feeling—as the opposite of psychological safety. However, team psychological safety as a team climate construct builds on team members' *perceptions* of consequences (Edmondson & Lei, 2014). While perceptions may be closely related to *feelings* of safety, the cognitive aspect

⁴⁸ The terms *team psychological safety* and *team psychological safety climate* are used somewhat interchangeably in the teams literature (Zhang & Wan, 2021), with no clear difference in meaning (Bradley et al., 2012; Chen et al., 2017). We use *team psychological safety* rather than *team psychological safety climate* to better distinguish it from *team psychological safety climate strength*.

of team psychological safety is a useful distinction when studying the sharedness of perceptions. According to Sanner and Bunderson (2015, p. 2), “psychological safety creates a context in which team members feel safe,” and it is the team members’ perception of this *context*—the team climate of a specific team—that is being measured.

Psychological safety has been studied at different levels: individual, group (team), and organizational (Frazier et al., 2017). Liang et al. (2012) reported that *individual* perceptions of psychological safety collected just six weeks apart were only moderately correlated, indicating that levels of psychological safety may fluctuate over time. Through an *organizational* lens, Higgins et al. (2022) found that psychological safety was less important for organizational performance than felt accountability. According to Edmondson and Lei (2014), the *group* level is the most appropriate level of analysis. Edmondson (1999) introduced psychological safety as a team phenomenon after finding significant variations in psychological safety between teams within the same organization.

However, team members may not necessarily have similar perceptions of the psychological safety within the team (Edmondson & Mogelof, 2006; Roussin et al., 2016; Schulte et al., 2012). While some members may perceive low safety, others may perceive safety to be high. Team members’ perceptions of safety will likely have implications for whether and how people contribute to the team and may ultimately impact team performance. We therefore turn to recent research on dispersion in team climate perceptions.

Team Climate

A team climate reflects “individuals’ shared perceptions about various aspects of the organization (e.g., safety, justice, diversity) and lead to a variety of important team- and individual-level outcomes” (Perrigino et al., 2021, p. 151). As a team member, individuals’ perceptions are affected by the team (Klimoski & Mohammed, 1994). According to Kozlowski and Bell (2013), this creates team phenomena unique to the team that should be

studied at a higher level than the individual. A central characteristic of a group-level phenomenon is sharedness (Chan, 1998). The various team members' perceptions of the environment can gradually resemble one another and lead to a "group mind," a mental state based on individual expectations and beliefs that is more than just the sum of these individual properties (Klimoski & Mohammed, 1994).

Despite the common approach of assuming shared perceptions between team members, several studies have found that perceptions within teams are not necessarily shared (e.g., Costa et al., 2016; De Jong & Dirks, 2012; Jung & Sosik, 2003). Kozlowski and Klein (2000) present a framework for understanding the different ways that team-level phenomena can emerge. They present various models on a continuum, ranging from shared perceptions with no or little dispersion among team members on one end (composition model) to a highly dispersed distribution of perceptions on the other (compilation model). In practice, a team-level phenomenon will normally emerge through a combination of these extremes of the continuum (Kozlowski & Klein, 2000). Since most studies on teams rely on aggregated composition models, the team research field may benefit from extending their methods to include dispersion measures (Roussin et al., 2016). Studying within-team dispersion could provide important insights into team dynamics and divergent perceptions between team members, providing us with a more complete understanding of the team phenomenon of interest (Waller et al., 2016). This conceptual approach to within-team dispersion, beyond a purely methodological reason for aggregating data, has surfaced through the notion of *team climate strength* (Perrigino et al., 2021).

Team Climate Strength

Chan (1998) conceptualized climate strength as part of a dispersion model, focusing on within-group *variance*, where the more traditional composition models (e.g., additive and consensus-based models) relied on average levels and within-group *agreement*. This approach

opens up the possibilities of meaningful subgroups existing within the larger group (Chan, 1998). Schneider et al. (2002) connected Chan's (1998) work to the concept of organizational culture strength and operationalized climate strength as the standard deviation of employee perceptions of service climate. Choosing the term “strength” builds on the concept of situational strength, where strong situations lead people to perceive in similar ways, whereas people experiencing weak situations may perceive differently (Schneider et al., 2002). Research that has taken the same perspective on within-team dispersion has used other terminology, including *consensus*, as in climate consensus (Lindell & Brandt, 2000), and *asymmetry*, as in team trust asymmetry (De Jong & Dirks, 2012) and conflict asymmetry (Jehn et al., 2010).

Climate strength research on teams was recently reviewed by Perrigino et al. (2021), who highlight important aspects of climate strength development. Even though team members face the same situations as part of the same climate, it does not mean they perceive these situations identically or even similarly. There are potentially different theoretical approaches to *why* team members may perceive a team climate differently. One perspective is based on the concept of diversity, explaining divergent perceptions through largely stable characteristics like gender, personality, or age (Milliken & Martins, 1996). Diversity may also relate to cognitive elements (Mello & Rentsch, 2015) and may explain different perceptions based on “thinking styles, knowledge, skills, values, and beliefs among individual team members” (Shin et al., 2012, p. 197). Another theoretical perspective is the focus on stimuli (Perrigino et al., 2021). According to Perrigino et al. (2021), there are two different types of stimuli when speaking of team climate: *ambient stimuli*, which influence all team members’ perceptions, and *discretionary stimuli*, which differentially influence team members’ perceptions. Through this lens, one can understand that even *seeing* the same is not equivalent to *perceiving* the same. Whether a shared experience turns into a shared perception may rely

on the degree of skill differentiation, length of history, frequency of interactions, and the degree of authority differentiation (Perrigino et al., 2021). Hence, understanding climate strength through the theoretical framework of stimulus differences does not preclude a diversity approach; rather, it is a different approach to understanding what may affect team climate strength.

Hypothesis Development

In our study we ask: how is team psychological safety related to team performance in management teams, and to what extent does team psychological safety climate strength moderate this relationship? We now turn to our hypothesized relationships between team psychological safety, climate strength, and team performance, as visualized in Figure 1.

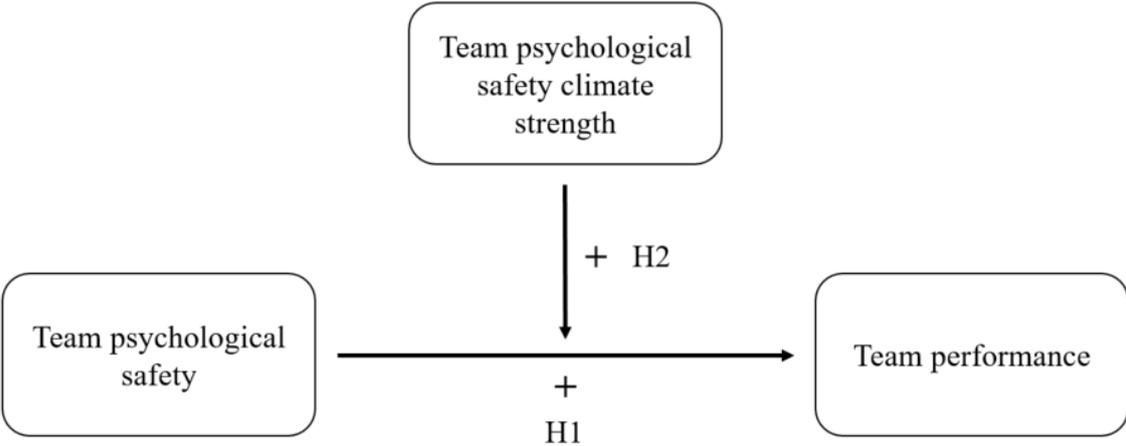


Figure 1. Research model.

Team Psychological Safety and Team Performance in Management Teams

Two literature reviews (Edmondson & Lei, 2014; Newman et al., 2017) and two meta-analyses (Frazier et al., 2017; Sanner & Bunderson, 2015) strongly support the existence of a positive relationship between team psychological safety and team performance. However, this relationship has not been particularly studied in the context of *management teams*.⁴⁹

⁴⁹ Different terms are used for these types of teams, such as *leadership team* (Wageman et al., 2008), *senior leadership team* (Hambrick & Mason, 1984), and *top management team* (Hambrick, 2015). Literature

Management teams are responsible for the overall performance of their business unit or for the organization as a whole (Cohen & Bailey, 1997). Generally, a management team consists of a senior manager and managers that report directly to him or her, stemming from an understanding of management as a shared activity more than in the hands of individual managers (Hambrick, 2015). Moreover, management teams are characterized by the need to exchange information, consult, discuss and make decisions, and coordinate activities (Wageman et al., 2008). Team psychological safety is particularly important in settings where problem solving and information sharing are central to success (Sanner & Bunderson, 2015). Thus, based on the type of work undertaken by a management team, we expect team psychological safety to be important for management team performance.

To our knowledge, only a few studies have explored the link between team psychological safety and team performance in management teams. Miao et al. (2019) found team psychological safety to partially mediate the relationship between entrepreneurial leadership by the CEO and management team performance. The findings of a qualitative study by Singer et al. (2015) suggested that an environment of team psychological safety could explain why some management teams performed better than others after going through a leadership training program. These studies suggest a relationship between team psychological safety and management team performance. Furthermore, related studies examining team psychological safety in management teams in general have found that psychological safety is positively related to leader-directed voice behavior (Tröster & Van Knippenberg, 2012), enhances understanding and power sharing across professional boundaries (O'Leary, 2016), and mitigates the negative effect of socio-emotional wealth on behavioral integration (Vandekerckhof et al., 2018).

Hence, we propose the following:

using these terms may be relevant for the present study. However, we do not look exclusively at teams at the very top but at management teams at different organizational levels, so we use the term *management team*.

Hypothesis 1: Team psychological safety is positively related to team performance in management teams.

The Moderating Effect of Team Psychological Safety Climate Strength

Team psychological safety is a team phenomenon emphasizing a “shared belief” in the team (Edmondson, 1999). It is in the very nature of team psychological safety that it is beneficial for the team that team members perceive they are safe enough to share their ideas, concerns, and questions (Edmondson, 2018). If this perception is shared in the team (and there is thus a strong climate), more of the team’s potential can be exploited through a balanced contribution of all team members, compared to a team with a more unbalanced exchange of information and contributions among team members due to divergent perceptions of team psychological safety. Hence, team psychological safety climate strength is likely to play an important role in understanding the full scope of team psychological safety.

As the strength of the positive relationship between team psychological safety and team performance varies across studies, moderators are likely (Sanner & Bunderson, 2015). Climate strength in general is likely to interact with the level of the climate, and this joint effect may add a significant increment to the prediction of team outcome (Lindell & Brandt, 2000). In their conceptual paper, Zhang and Wan (2021) propose that climate strength can moderate the relationship between team psychological safety and dysfunctional team behavior. This is in line with Chan's (1998) theory on climate strength, which suggests combining composition models with dispersion models in research, such as by investigating the moderating effect of climate strength (the dispersion form of a construct) on the relationship between the organizational climate level (the original construct) and organizational outcome. Other studies on team climates have found that climate strength may explain the link between the climate level and team performance more thoroughly (e.g., González-Romá et al., 2009; Kuenzi & Schminke, 2009).

Despite the interest displayed in conceptual papers and reviews (e.g., Newman et al., 2017), there are still few empirical studies addressing team psychological safety climate strength. To our knowledge, only one paper has examined team psychological safety climate strength as a moderator. Koopmann et al. (2016) studied the relationship between team tenure, team psychological safety, climate strength, and average team member performance in research and development teams. Climate strength moderated the relationship between team psychological safety and average team member in-role *task* performance but did not moderate the relationship between team psychological safety and average team member *creative* performance. Although Koopmann et al. (2016) focused on individual in-role team member performance rather than team performance, their study indicates that team psychological safety climate strength may have a positive influence on team performance.

In a related study, where Hirak et al. (2012) examined the relationship between leader inclusiveness, learning from failures, psychological safety, and performance in hospital units, they conducted supplementary analyses including unit psychological safety climate strength. Participants were randomly selected within larger work units, and individual scores were aggregated to represent each unit. They found that in units with stronger psychological safety climates, psychological safety levels were more positively related to learning from failure and contributing positively to unit performance (Hirak et al., 2012).

Based on the literature reviewed in this section, we propose that, the more team members agree on the level of team psychological safety (i.e., higher climate strength), the stronger the relationship between team psychological safety and team performance:

Hypothesis 2: Team psychological safety climate strength positively moderates the relationship between team psychological safety and team performance in management teams.

Methods

Participants

The sample in the present study is 160 management teams comprising a total of 1,149 team members (50.1% male, 49.9% female) who are managerial leaders in Norwegian organizations. The distribution of the respondents' tenure on their team was as follows: less than one year (23.6%), 1–2 years (27.4%), 3–4 years (18.7%), and longer than 5 years (30.3%). The management teams were located at different hierarchical levels: top management teams (50.4%), middle-management teams (31.9%), and lower-level management teams (17.7%). A little over half (57.0%) of the teams were from the private sector, while 43.0% were from the public sector. Team size varied from three to 19 members. The majority (62.0%) of these teams consisted of five to eight members, and average team size was 7.2 members ($SD = 2.7$).

Procedure

We collected data from two sources between March 2017 and October 2019: a) Norwegian management teams attending a team development program where they started the program by responding to a questionnaire measuring team psychological safety and team performance; and b) Norwegian management teams that asked this article's second author for an assessment of their team functioning. The team members were told that replying to the questionnaire was voluntary, and 1,149 of the 1,150 members of the 160 teams chose to respond and agreed that the anonymized data could be used for research purposes. About 0.3% of the respondents did not respond to the items measuring team performance, and 0.1% did not respond to the items measuring team psychological safety. A possible explanation for the high response rate is that the teams had collectively decided to take part in the development program or team assessment and knew that the validity of their team profile was

dependent on everyone responding. Team members who did not respond within the deadline were given a reminder to respond, and the deadline was extended one week.

Measures

Team Psychological Safety

Different scales have been used to measure team psychological safety in the existing literature, and Edmondson (2018) claims that “the psychological safety measure has proven to be robust despite variations in both the number and the wording of the items used” (p. 20). Edmondson (2018) refers to four different scales from her own research that consist of slightly different wording and number of items (ranging from three to seven), adjusted to fit the context of the type of teams being studied (see Edmondson, 1999; Garvin et al., 2008; Nembhard & Edmondson, 2006; Tucker et al., 2007). Albeit the differences, the scale items all reflect the essential aspects of team psychological safety.

In the present study, team psychological safety is measured with five items: three adapted from the 7-item scale used in Edmondson (1999) (i.e., “It is safe to take a risk in this management team”, “It is easy to ask other members of this management team for help”, and “Members of this management team are able to bring up problems and tough issues”), one item adapted from Garvin et al.'s (2008) scale (i.e., “It is safe to openly express your opinions in this management team”), and one item created by the authors (i.e., “There is room for expressing uncertainty in this management team”) to reflect the extent to which members of the team “know they can ask questions when they are unsure about something” (Edmondson, 2018, p. xvi). Participants rated the extent to which they agreed with each item statement on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). A principal component analysis showed that the five items loaded onto one factor, explaining a total of 70.0% of the variance, with a Cronbach’s alpha of .89. Corrected item-total correlations for the five items ranged

from $r = .56$ to $r = .81$. The *team psychological safety* score was aggregated based on the average (mean) of all team members' ratings of their perceived safety.

Team Psychological Safety Climate Strength

The dispersion (i.e., standard deviation) of the team members' ratings of team psychological safety was operationalized as *team psychological safety climate strength*. A small standard deviation within the team indicates high climate strength and similar perceptions among team members, whereas a large standard deviation indicates low climate strength and different perceptions. The standard deviation score was multiplied by -1 to create the *climate strength* construct; thus, a high score indicates a strong climate and a low score a weak climate (Roberson & Williamson, 2012).

Management Team Performance

Drawing on Nadler's (1998) description of management team performance—more particularly, the team's decision-making quality and success in solving problems and completing work—we developed seven items to measure team member's perception of team performance (e.g., “The management team clearly adds value to our organization” and “We consistently make high-quality decisions in our management team”; see Appendix 1 for all items). Participants rated the extent to which they agreed with each item statement on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). A principal component analysis showed that the seven items loaded onto one factor, explaining a total of 67.0% of the variance, with a Cronbach's alpha of .89. Corrected item-total correlations for the seven items ranged from $r = .62$ to $r = .81$. The *team performance* score was aggregated based on the mean value of all team members' ratings.

Data Analyses

Aggregation Justification

To conduct analyses on the team level, we performed analyses to justify aggregation from individual responses to the team level. First, we calculated *r_{wg}* value to assess interrater agreement (James et al., 1984). The team psychological safety scale had an average *r_{wg}* of .89 (.80 when adjusted for a slightly skewed distribution) and the team performance scale had an average *r_{wg}* of .94 (.90 when adjusted for a slightly skewed distribution). These values are well above the commonly accepted guideline, .70, for appropriate aggregation (Klein & Kozlowski, 2000). Second, we calculated intraclass correlations (ICCs), with ICC(1) indicating the amount of variance explained by team membership (LeBreton & Senter, 2008). The ICC(1) values for team psychological safety and team performance were .21 and .33, respectively, which is considered a medium to large effect (LeBreton & Senter, 2008). This confirms that team membership influences the ratings of the team members. ICC(2) indicates whether mean ratings between teams can be reliably distinguished; that is, whether team scores can be differentiated based on the mean of team member ratings. The ICC(2) values for team psychological safety and team performance were .68 and .80, respectively, which are also acceptable (LeBreton & Senter, 2008).

Common Method Variance

Since this is a cross-sectional study based on self-reported measures, common method variance may be a concern. Therefore, we conducted Harman's single-factor test in SPSS—an unrotated factor analysis that shows whether the majority of variance can be accounted for by one general factor. The criterion is 50.0%, which indicates that the majority of variance can be explained by one single factor (Podsakoff & Organ, 1986). Results of our analysis including all items showed that 48.3% of the variance was explained by one factor, which is acceptable because it is below the 50.0% criterion, but not ideal because it is on the cusp.

Thus, we followed up with a confirmatory factor analysis in Amos to further examine the distinctiveness of the constructs. Since team psychological safety climate strength was measured using the same items as team psychological safety, our confirmatory factor analysis only included team psychological safety and team performance. We calculated mean scores across team members for each item of both the team psychological safety scale and team performance scale. Fit indices of the confirmatory factor analysis on the team level showed an acceptable model fit overall ($\chi^2 = 164.21$, $df = 53$, $\chi^2/df = 3.10$, CFI = .95, RMSEA = .12), although the RMSEA-value is above the commonly used threshold (i.e., .08; Schreiber, 2008).⁵⁰ The standardized coefficients of the items ranged from .71 to .94 for team psychological safety and from .69 to .93 for team performance (see Appendix 1). An alternative model where all items were loaded onto *one* construct ($\chi^2 = 676.15$, $df = 54$, $\chi^2/df = 12.51$, CFI = .69, RMSEA = .27) shows that the original model with two constructs is a better fit.

To further examine the presence of common method variance, we conducted an unmeasured latent method factor test (Podsakoff et al., 2003), which is comparing the fit indices of a new model that includes a latent common factor with the original model. The fit indices improved slightly in the new model ($\chi^2 = 139.63$, $df = 52$, $\chi^2/df = 2.69$, CFI = .96, RMSEA = .10), indicating some degree of common method variance. The regression weight of the latent common factor on the items was .36, indicating a common method variance of 13.0% ($=.36^2$).

A potential common method *variance* does not necessarily represent a common method *bias* (Fuller et al., 2016). Factor analyses like Harman's single-factor test and the unmeasured latent method factor test do not address the reason for covariance, and real

⁵⁰ The RMSEA is less of a concern for smaller sample sizes (Kenny et al., 2015), as is the case when conducting this analysis on the team level (N = 160). A similar analysis on the individual level (N = 1,149) gave an RMSEA of .08.

functional relationships may be thrown out due to common method variance that is mistakenly identified (Podsakoff & Organ, 1986; Podsakoff et al., 2003). Post-hoc statistics to detect common method variance may in themselves be biased and exaggerated (Lance et al., 2010; Spector, 2006). Additionally, there is no consensus among researchers as to how much variance actually poses a problem (Podsakoff et al., 2003). According to Fuller et al. (2016), the acceptable threshold is 70.0% based on Harman's single-factor test before the common method variance represents a bias that overstates relationships. Moreover, calculating team scores differently in the same model, such as using aggregation and diversity scores of team psychological safety in the present study, may ease common method variance concerns (Vandekerckhof et al., 2018). Furthermore, Siemsen et al. (2010) argue that common method variance does not create interaction effects like the ones examined in the present study. As common method variance actually deflates regression estimates, "finding significant interaction effects despite the influence of common method variance in the data set should be taken as strong evidence that an interaction effect exists" (Siemsen et al., 2010, p. 470). Thus, since our data demonstrate an interaction effect (see below), common method variance may be only a minor issue in the present study.

Results

Table 1 shows descriptive statistics and correlations for the variables in our research model. There were significant and positive relationships ($p < .001$) between the independent variable (team psychological safety), the moderator (climate strength), and the dependent variable (team performance).⁵¹

⁵¹ To check for variables that potentially could disturb our interpretation of findings, we conducted preliminary correlation analyses. These analyses showed that variables such as team size and mean/diversity in age, gender, or team tenure were not significantly related to the dependent variable. Thus, following the recommendation by Becker (2005), we did not include these variables in our main analyses. Further details on these measures and correlation analyses are available upon request.

Table 1. Descriptive Statistics and Correlations for Variables in the Research Model.

Variable	Descriptive statistics level		Descriptive statistics dispersion		Correlations (based on mean values)	
	<i>Mean</i>	<i>Median</i>	<i>SD</i>	<i>Range</i>	1	2
	1. Team psychological safety	5.53	5.58	0.62	3.13	
2. Team psychological safety climate strength	-0.83	-0.82	0.34	1.56	.58**	
3. Team performance	4.87	4.91	0.67	3.47	.56**	.27**

Note. $N = 160$.

** $p < .01$

Table 2. Results of Hierarchical Regression: Team Performance As Dependent Variable.

Variable	Standardized regression coefficients		
	Model 1	Model 2	Model 3
Team psychological safety	0.561***	0.607***	0.603***
Team psychological safety climate strength		-0.081	-0.073
Team psychological safety x Team psychological safety climate strength			0.147*
R ²	0.315	0.319	0.340
R ² change	0.315***	0.004	0.021*

Note. $N = 160$.

* $p < .05$; ** $p < .01$; *** $p < .001$

We conducted a hierarchical regression analysis with team performance (mean centered) as the dependent variable to test Hypothesis 1, that there is a positive relationship between team psychological safety and team performance, and Hypothesis 2, that team psychological safety climate strength moderates the relationship (see Table 2). Team psychological safety (mean centered) was entered first in the model, followed by climate strength (mean centered), and the interaction term (product) of team psychological safety and climate strength. Team psychological safety made a strong and positive contribution, explaining 31.5% of the variance in team performance, $\Delta F(1,158) = 72.51; p < .001$ (Table 2, Model 1). Thus, Hypothesis 1 was supported. Adding team psychological safety climate strength did not explain more of the variance in team performance (Table 2, Model 2). However, adding the interaction term of team psychological safety and climate strength explained a small but significant part of the variance in team performance: $\Delta R^2 = .021; \Delta F(1,156) = 5.08; p < .05$ (Table 2, Model 3). This supported Hypothesis 2. The entire regression equation explained 34.0% of the variance in team performance.

To further examine the interaction effect, we first conducted a moderation analysis using Hayes process macro v4.0 in SPSS. The overall model, $F(3,156) = 26.84; p < .001; R^2 = .34$, confirmed that team psychological safety predicted team performance, $b = .65; t(156) = 7.58; p < .001; .48 < 95\% \text{ CIs} < .82$, and that team psychological safety climate strength moderated the relationship between team psychological safety and team performance, $b = .53; t(156) = 2.25; p = .03; .07 < 95\% \text{ CIs} < .99$. Second, we examined conditional effects based on different levels of climate strength. Conducting simple slope analyses with different levels of climate strength, we found a significant positive relationship between team psychological safety and team performance for *low* climate strength (i.e., one standard deviation below the mean; $b = .47; t(156) = 4.00; p < .001; .24 < 95\% \text{ CIs} < .70$), *moderate* climate strength (i.e., overall mean; $b = .65; t(156) = 7.58; p < .001; .48 < 95\% \text{ CIs} < .82$), and *high* climate strength

(i.e., one standard deviation above the mean; $b = .83$; $t(156) = 7.19$; $p < .001$; $.60 < 95\% \text{ CIs} < 1.05$). Slopes for team psychological safety predicting team performance at these three different levels of climate strength are visualized in Figure 2. Third, we probed the interaction effect beyond these three levels of climate strength. The Johnson-Neyman technique confirmed a significant positive relationship between team psychological safety and team performance, with a cut-off at the lower 5.0% of the moderator; in other words, team psychological safety was positively related to team performance for 95.0% of the range of climate strength values in the dataset. For the lower extreme end of climate strength (i.e., more than 1.78 standard deviations below the mean), team psychological safety and team performance were not significantly related.

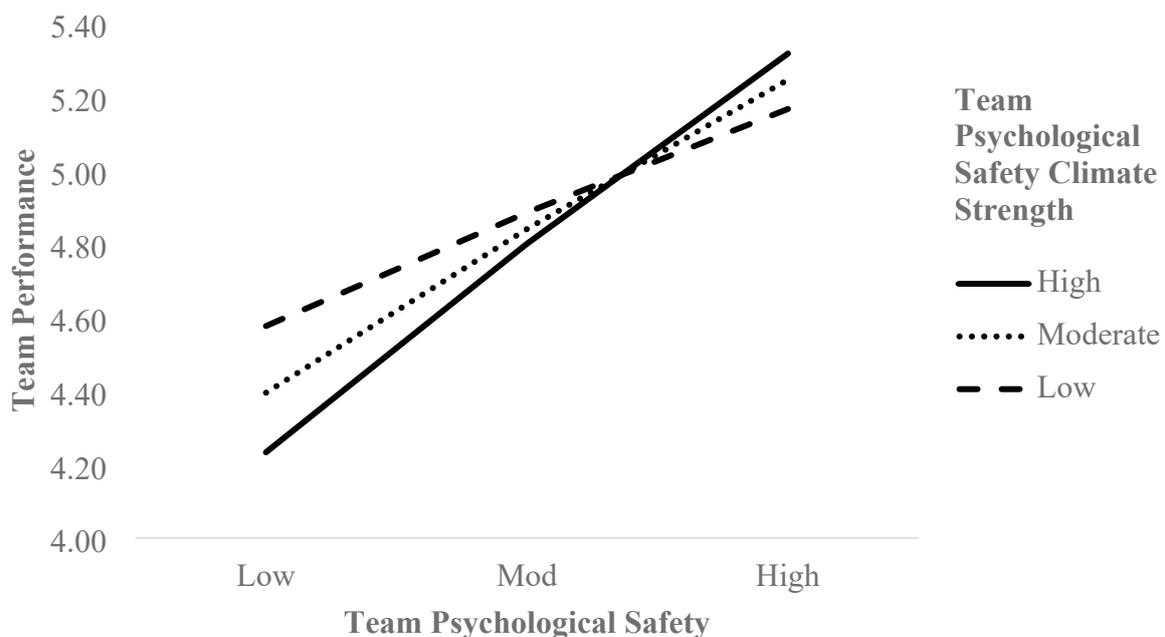


Figure 2. Team psychological safety climate strength moderates the relationship between team psychological safety and team performance.

To probe whether climate strength had different effects depending on the level of team psychological safety, we conducted another round of simple slope analyses, which showed that climate strength was negatively related to team performance for teams low on team psychological safety (i.e., one standard deviation below the mean; $b = -.47$; $t(156) = -2.25$; $p =$

.03; $-.89 < 95\% \text{ CIs} < -.06$). Analysis with the Johnson-Neyman technique showed that this negative relationship was significant for values less than 0.64 standard deviations below the overall team psychological safety mean.⁵² Above this threshold, the relationship between climate strength and team performance gradually turned more positive, but it was not significant within the range of our sample.

Additional Analyses

Post Hoc Robustness Analysis I: Different Measures

Given that team psychological safety and climate strength were operationalized based on the same measure, there is potential statistical bias in our main analyses because the mean (i.e., team psychological safety) and standard deviation (i.e., climate strength) of the same construct are statistically related. Thus, we tested the interaction effect using other measures to increase the robustness of our analyses. We replaced mean with *median* as the measure of team psychological safety and standard deviation with *range*⁵³ as the measure of climate strength. These calculations also describe the average and the dispersion in a sample, although they build on different statistical procedures. Linear regression confirmed the same pattern with the overall model, $F(3,156) = 26.84$; $p < .001$; $R^2 = .34$, showing that team psychological safety predicted team performance, $b = .57$; $t(156) = 7.25$; $p < .001$; $.41 < 95\% \text{ CIs} < .72$, and that team psychological safety climate strength moderated the relationship between team psychological safety and team performance, $b = .18$; $t(156) = 2.60$; $p = .01$; $.04 < 95\% \text{ CIs} < .32$. The interaction effect was even stronger using the new measures, and probing the interaction further also showed the same pattern as findings from the main analyses.

⁵² As the level of team psychological safety decreased beyond this threshold, the relationship between climate strength and team performance became more negative, with the following effect size at the lowest measured level of team psychological safety: $b = -1.13$; $t(156) = -2.47$; $p = .01$; $-2.03 < 95\% \text{ CIs} < -.22$.

⁵³ First, subtracting the minimum value from the maximum value of the individual psychological safety scores in each team, and second, reversing the score such that a high value represents a strong climate and vice versa.

Post Hoc Robustness Analysis II: Structural Equation Model

In our statistical models, there are two important aspects that might influence the results: nested data structures (i.e., individuals nested in teams) and the high empirical correlation between team psychological safety and climate strength (.58). To investigate these two aspects at once, we followed up our first robustness analysis by conducting a structural equation model in which within-team variability (i.e., climate strength) was modeled as a random path coefficient at the between level (Feng & Hancock, 2022).⁵⁴ Specifically, we included team psychological safety and team performance at the individual level and utilized the log-transformation approach for modelling the individual level variance as a random variable at the team level (see Feng & Hancock 2022, Model A). To estimate the (cross-level) interaction effect between team psychological safety and climate strength, we used a partial approach in which the effect of team psychological safety on team performance at the individual level was modeled as a function of climate strength at the team level.⁵⁵ As shown in Table 3, this robustness check yielded similar results to those from the main analyses (Table 2). At the team level, the main effect of team psychological safety on team performance, $b = .67$; $.47 < 95\% \text{ CIs} < .88$, as well as the interaction effect between team psychological safety and climate strength on team performance, $b = .21$; $.07 < 95\% \text{ CIs} < .34$, remained positive and significant. Moreover, the correlation between team psychological safety and climate strength was negative and strongly significant, $b = -.28$; $-.37 < 95\% \text{ CIs} < -.20$. In summary, this additional analysis shows that correcting for the nested data structure and the significant correlation between team psychological safety and climate strength does not influence the results, indicating robustness of our findings.

⁵⁴ We thank the editor for suggesting this approach.

⁵⁵ This analysis was conducted using Mplus version 8.4 with Bayesian estimation. The corresponding Mplus code is available upon request.

Table 3. Results of Structural Equation Model Analysis: Team Performance As Dependent Variable and Within-Team Variability as a Random Coefficient.

Variable	<i>B</i>	Lower 2.5%	Upper 2.5%
Between level			
Team psychological safety	0.666***	0.472	0.877
Team psychological safety climate strength ($\ln(\sigma_j^2)$)	0.451***	0.394	0.502
Team psychological safety x Team psychological safety climate strength ($\ln(\sigma_j^2)$)	0.209**	0.065	0.335
Correlation between Team psychological safety and Team psychological safety climate strength	-.277***	-.373	-.195

Note. $N = 160$.

** $p < .01$; *** $p < .001$

Exploring the Sharedness of Team Psychological Safety

We started out this project by asking what happens when some team members perceive the climate to be safe while others perceive it to be less so. With its high response rate, our dataset opens up not only for studying the *degree* of sharedness (through the standard deviation) but also various combinations of *how* the perceptions of team psychological safety in the teams differed. Thus, we conducted descriptive analyses as an extension of our main analyses to examine sharedness of team psychological safety.

First, we calculated the number of team members whose perceived team psychological safety scores fall one standard deviation above and below the team's mean score (i.e., outliers). Nearly all—159 of 160—teams had one or more outliers. Increasing the threshold for what would be recognized as an outlier still showed a widespread perception of team psychological safety within the teams, as 59.0% of the teams had outliers outside 1.5 standard deviations from the team's mean, and 9.0% had outliers outside two standard deviations from the mean. For further analyses, we chose the threshold of 1.5 standard deviations, which we considered most suitable for exploring the impact of having team members perceiving safety considerably differently (59.0% of teams), compared to not having such outliers (41.0%). We divided teams into four categories: conform, unsafe outliers, polarized, and safe outliers. The *conform* category consisted of teams with no outliers, the *unsafe outliers* category of teams with at least one outlier below the team's mean and without outliers above the mean, the *safe outliers* category of teams with at least one outlier above the team's mean and without outliers below the mean, and the *polarized* category of teams with at least one outlier both below and above the team's mean. Then, we split the dataset into two equal parts: teams low on team psychological safety (below the overall median) and teams high on team psychological safety (above the overall median). The moderation analysis showed that, despite a positive interaction effect of climate strength on the relationship between team psychological safety

and team performance, low climate strength could be beneficial for team performance when team psychological safety was low. To further explore this finding, in the following descriptive analyses, we focus only on the teams in the lower half of the dataset based on the median split (n = 80). Figure 3 shows team psychological safety and team performance for each of the four categories for teams low on team psychological safety (below the median).

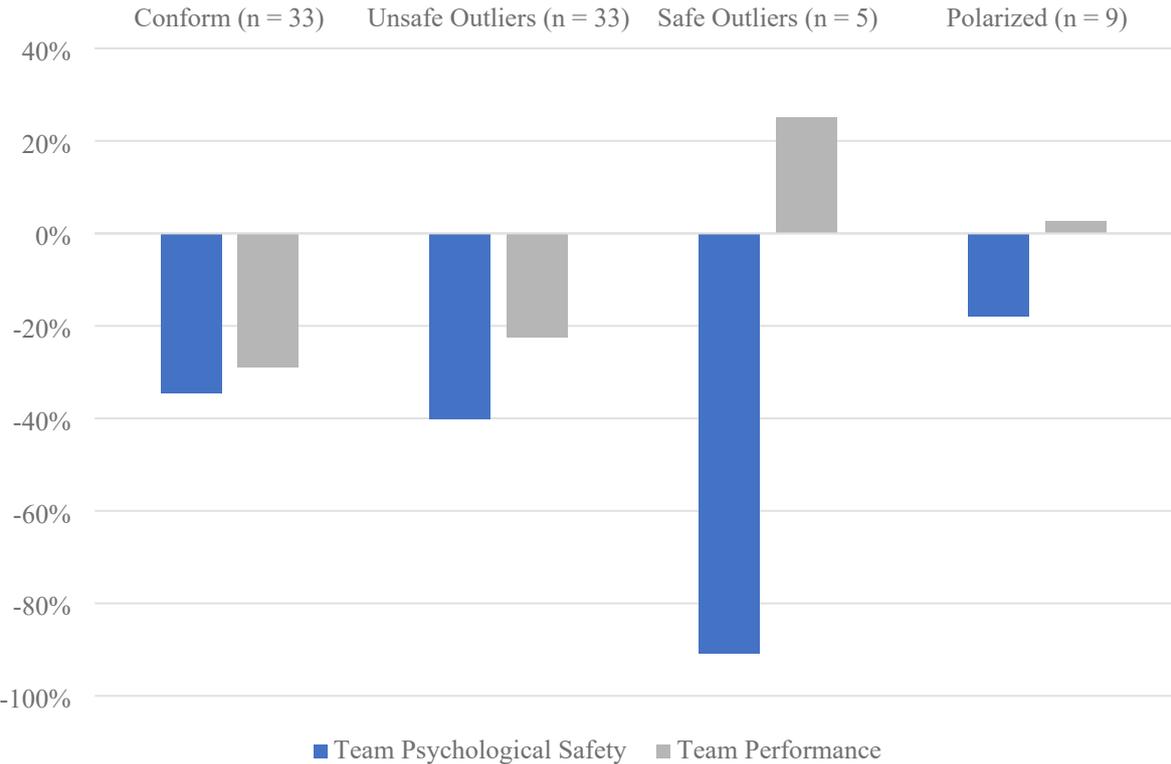


Figure 3. Team psychological safety and team performance for four categories of team psychological safety dispersion for teams low on team psychological safety.⁵⁶

Results of our analysis indicate that, for teams low on team psychological safety, members of teams in the *safe outliers* category perceive their team performance more positively than teams in the other categories. Further, the relationship between team psychological safety and team performance confirmed in our main analyses does not appear to apply to these teams; despite perceiving a considerably lower level of team psychological

⁵⁶ All variables are mean centered and standardized for comparison. The figure only includes teams with a team psychological safety score below the overall median (n = 80). “%” on the vertical axis refers to the percentage above or below the overall mean of the respective variable in the total sample (N = 160).

safety than teams in the other categories, *safe outliers* team members perceive their team performance more positively. In addition, the perceived level of team performance is higher in *polarized* team than the *conform* and *unsafe outliers* teams. Since polarized teams also have safe outliers—as well as unsafe outliers—it indicates that having someone on the team perceiving a higher level of psychological safety than the rest is beneficial for teams low on team psychological safety. In fact, both *safe outliers* teams and *polarized* teams perceive a higher level of team performance than the overall mean of the whole dataset ($N = 160$), despite their level of team psychological safety being below the overall median of the whole dataset.

Our descriptive analyses answer the call from Perrigino et al. (2021) to obtain deeper knowledge about climate strength through exploration instead of postulation, but these findings should thus be taken more as propositions than statistically valid conclusions. Notably, the number of teams in the *safe outliers* and *polarized* categories is quite small. Still, such analyses may contribute to our understanding of how the sharedness of team psychological safety in management teams may influence team performance. Moreover, these insights do not contradict our main analyses; rather, they offer support by giving a more detailed picture.

Discussion

Despite a rich literature on team psychological safety, there has been limited knowledge on what happens when team members disagree on the level of team psychological safety within teams. The present study contributes to the research field by examining the importance of team psychological safety on team performance in management teams—both in terms of the *level* (team psychological safety) and the *sharedness* (team psychological safety climate strength). Analyzing data from 1,149 members belonging to 160 management teams, our results showed that team psychological safety is positively related to team performance

and that this relationship is moderated by team psychological safety climate strength: the stronger the climate, the stronger the relationship between team psychological safety and team performance.

Theoretical Implications

Our findings have several theoretical implications. First, we found that team psychological safety climate strength moderated the relationship between team psychological safety and team performance, such that when climate strength is high, this relationship is stronger, whereas when climate strength is low, this relationship is weaker. Results of our interaction analysis showed that climate strength moderates both the relationship between high levels of team psychological safety and team performance, and the relationship between low levels of team psychological safety and team performance. To elaborate, the positive effect of high levels of team psychological safety on team performance is strengthened when climate strength is high, and the negative effect of low levels of team psychological safety on team performance is strengthened also when climate strength is high. This indicates that the *positive* effect of *high* levels of team psychological safety on team performance will be greatest when management team members agree that there is a *high* level of team psychological safety, while the *negative* effect of *low* levels of team psychological safety on team performance will be greatest when management team members agree that there is a *low* level of team psychological safety.

Consistent with previous findings (Hirak et al., 2012; Koopmann et al., 2016), our study showed the important influence of team psychological safety climate strength on the relationship between team psychological safety and team performance. For example, Hirak et al. (2012) found a similar relationship in hospital units. Koopmann et al. (2016) found that climate strength moderated the positive effect of team psychological safety on performance, though only for high levels of climate strength. In their study, when climate strength was low,

team psychological safety and performance were unrelated. This contrasts with our findings, where climate strength moderated the relationship between team psychological safety and team performance for nearly all levels of team psychological safety. One possible reason for this contrast is that Koopmann et al. (2016) used individual in-role performance in a team setting as the outcome variable. Even when averaged to the team level, performance as individuals in a team is not easily transferable to performing as a team (Miao et al., 2019). Moreover, climate strength did not moderate the relationship between team psychological safety and average team member *creative* performance in Koopmann et al.'s (2016) study, but only the relationship between team psychological safety and average team member *task* performance. Thus, team psychological safety climate strength may have varying effects, depending on the type of performance.

Second, as the moderation analysis showed, our findings indicate that team psychological safety climate strength works differently for teams low in team psychological safety than those with high levels. Despite the positive moderating effect of climate strength on the relationship between team psychological safety and team performance, low climate strength seems beneficial for team performance when team psychological safety is low. For low levels of team psychological safety, teams are better off (in terms of team performance) when team members do *not* agree on the level of safety. One possible explanation is that some team members may perceive a considerably *higher* level of safety than the rest of the team, hence reducing the negative effect of low team psychological safety. However, given that respondents generally rated the level of perceived team psychological safety at the upper end of the scale, it is more likely that a low climate strength is attributed to team members perceiving safety as considerably *lower* than the rest of the team instead of *higher*. With our additional descriptive analyses, we were able to explore this issue in greater depth.

Results of our descriptive analysis indicate that, for teams low on team psychological safety, it is beneficial for team performance to have a safe outlier (i.e., one or more team members whose rating of the level of team psychological safety falls more than 1.5 standard deviation above the team's mean). For example, consider a team with members whose ratings of the level of team psychological safety are 3.00, 4.00, and 5.00 (out of a 7-point Likert scale), compared to a team with ratings 3.00, 3.00, and 6.00. The average level of team psychological safety is the same in both teams ($M = 4.00$), which is well below the overall mean in our sample (5.53). According to results of our moderation analysis, the latter team will perform better because the latter team has a high outlier and the former does not. This prediction is also supported by findings from our descriptive analysis that the level of perceived team performance in *polarized* teams is higher than both the *unsafe outliers* teams (i.e., teams with low outliers only) and *conform* teams (i.e., when team members agree that safety is low; see Figure 3). This means that, as long as there is at least one person on the team that perceives enough safety to share their views, questions, and concerns, the team can perform relatively well. This also indicates that many good ideas and solutions may remain unspoken on the *unsafe outliers* and *conform* types of team because members feel it is unsafe to stand out, which is detrimental to team performance.

Third, our findings demonstrate the importance of team psychological safety for team performance in the context of management teams, corresponding with research findings in other contexts (Edmondson & Lei, 2014; Frazier et al., 2017; Newman et al., 2017; Sanner & Bunderson, 2015). Before our study, there had been little, if any, research on the relationship between team psychological safety and team performance in management teams. This gap in the literature is somewhat surprising since there are reasons to believe that team psychological safety should be particularly pertinent in management teams (Bang & Midelfart, 2021), because they are important decision-making groups that depend on sharing information and

raising concerns regarding the future of the organization (Boone & Hendriks, 2009; Hambrick, 2007; Hambrick & Mason, 1984; Luo & Lin, 2022). Indeed, through comparing our results with those of meta-analyses in the existing literature, it is indicated that the positive relationship between team psychological safety and team performance is even stronger in management teams than teams in general.⁵⁷ However, this is perhaps because of our use of self-reported performance measures, which we further discuss in the limitations section. Nevertheless, since contextual differences may influence the strength of the relationship between team psychological safety and team performance (Sanner & Bunderson, 2015), our findings contribute to the argument that team psychological safety has a robust influence by showing the relationship in the context of management teams.

Practical Implications

We find that team psychological safety has a positive influence for team performance in management teams. When members perceive enough safety to share their thoughts, questions, and concerns, a climate of open dialogue and effective cooperation may result. Still, our results showed that, even though team psychological safety is commonly considered a team phenomenon, not all team members necessarily perceive safety the same way. Shared safety among team members matters for team performance. Hence, teams will particularly benefit from a high level of team psychological safety when all team members share the perception that the team is psychologically safe (i.e., high climate strength). We encourage facilitators and members of teams to focus on potentially divergent perceptions when building safe teams. This could be done through ensuring that individual preferences for teamwork are addressed, for example through a team charter (Sverdrup et al., 2017). Team leaders are

⁵⁷ In our study, the correlation between team psychological safety and team performance is .56. On the same relationship, Sanner and Bunderson (2015) reported a sample-weighted mean correlation of .28 and a mean estimate of the corrected population correlation of .32. Importantly, they did not include self-reported performance measures in their meta-analysis. Similarly, Frazier et al. (2017) reported an estimated mean correlation and an estimated corrected correlation between team psychological safety and *task* performance of .24 and .29, respectively. They did not distinguish between types or sources of performance measures.

particularly encouraged to focus on whether all team members contribute evenly or if some team members take up too much space (Edmondson, 2003).

The highest-performing teams are those in which both the *level* and *sharedness* of team psychological safety is high. The potential of the team can more easily be reached when every team member's unique expertise is used. This implies that, to build safe teams, the focus should be on team psychological safety for the team as a whole and on lifting all team members to that level so the safety is shared. However, for unsafe teams, it is beneficial for team performance that safety (or lack thereof) is not shared (i.e., to have low climate strength). Thus, instead of increasing every team member's perceived safety because it may take some effort, it may be worthwhile to ensure that at least some team members experience safety in teams that are low on team psychological safety and need to perform in the short run. Even though the full potential of the team will not yet be reached when only a few members feel safe, it can make a sufficient difference in lifting the team to perform well, at least better than when no one on the team feels safe.

Strengths, Limitations, and Future Research

Most studies on team psychological safety use the mean value of team members' perceptions to operationalize the construct, which is based on the premise that safety is perceived somewhat similarly among team members. A strength of our study is moving beyond this common assumption and showing that mean analyses can miss something important. Furthermore, our study is based on a large and distinctive sample of management teams—from different levels of the organizational hierarchy, with approximately half the sample being top management teams, and a near 100% response rate from team members. Several measures were taken to guarantee the respondents' anonymity and reduce the potential of their answering in a socially desirable way (Podsakoff et al., 2003). However,

despite these strengths, we acknowledge certain limitations to our study and suggest directions for future research.

First, our cross-sectional study design means that we cannot offer a definitive conclusion on the causal direction in our research model. Since team performance was evaluated by team members based on their past experience, our finding that team psychological safety is positively correlated with team performance could mean that team psychological safety leads to team performance or it could also be argued that team performance leads to team psychological safety. Moreover, there may be a potential dual causality, or feedback loop, by which level of team performance influences team psychological safety at the same time as the level of team psychological safety influences team performance. Whereas many studies have investigated team performance as an outcome of team psychological safety (Frazier et al., 2017), to our knowledge, there is no research on how team performance may influence team psychological safety. We encourage scholars to investigate this relationship further. Moreover, although our focus has been on the dispersion of team psychological safety perceptions (i.e., climate strength), future studies may also explore how dispersion in perceptions of team performance relates to other variables.

Second, despite our controlling for common method variance with statistical techniques, potential common method bias cannot be excluded, since our dependent and independent variables are measured by the same rater at the same point in time. Based on our analyses and our discussion of common method variance above, we argue that the finding of a moderating effect of team psychological safety climate strength is valid. Nevertheless, we acknowledge that other designs, such as a longitudinal study, could help reduce potential common method bias.

Third, we relied on subjective performance measures. Using other measures like objective performance criteria or expert evaluations could lead to other results (Frazier et al.,

2017). We encourage future research to make use of such methods. Still, although objective performance measures may reduce common method variance, they are not necessarily better measures of the team's actual performance. Team members themselves may be the best raters of—that is to say, experts on—how their team performs, as they see team processes from the inside. In our case, it seemed that respondents were able to distinguish a high-performing team from a lower-performing team through the team performance scale.⁵⁸ While objective criteria, such as sales data or the organization's financial performance, may have validity through their quantitative nature, they may be confounded by factors other than how the management team performs. Hence, different performance measures may complement one another and make findings more robust—one is not necessarily better than the other.

Fourth, there is a potential statistical bias involved in using the mean and standard deviation of the same construct to operationalize two variables in the same analyses since the calculation of standard deviation is based on the mean value. The limitation of this method is that there is less potential for a large standard deviation when participants rate the level of perceived team psychological safety at the extreme end of the scale than at the middle. However, we have made use of other statistical calculations—replacing the mean with median and replacing standard deviation with range—to conduct a robustness check of our findings, which led to the same results as our main analyses. If anything, using median and range actually bolstered the strength of the hypothesized relationship. Moreover, we conducted a structural equation model analysis, which further supported that our main findings are robust even when correcting for the nested data structure and the correlation between team

⁵⁸ We conducted a t-test comparison between low- and high-performing teams based on their performance score (80 teams per group); they had means of 4.33 and 5.41, respectively. The mean performance score of low-performing teams was statistically lower than that of high-performing teams ($p < .001$). According to Malhotra et al. (2017), this verifies that respondents across teams had “well-understood perceptions of what constitutes a good performance versus bad performance” (p. 54).

psychological safety and climate strength. Still, we encourage future research to use other methods to test our findings, such as using a controlled experiment.

Conclusion

The quality of management team performance influences the performance of their organizations. Through our study, we find support for team psychological safety being strongly related to team performance in management teams. Moreover, we find that the level of team psychological safety climate strength moderates this relationship by strengthening the relationship between team psychological safety and team performance. The positive effect of high levels of team psychological safety on team performance is strengthened when climate strength is high, and the negative effect of low levels of team psychological safety on team performance is amplified when climate strength is high. Based on the results in this paper, it is important that every team member *shares* the perception that it is safe to contribute fully to the team for the team to reach its potential. Still, when safety is low, team members who are “safe among the unsafe” can make enough of a difference to lift the team’s performance.

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Appendices

Appendix 1

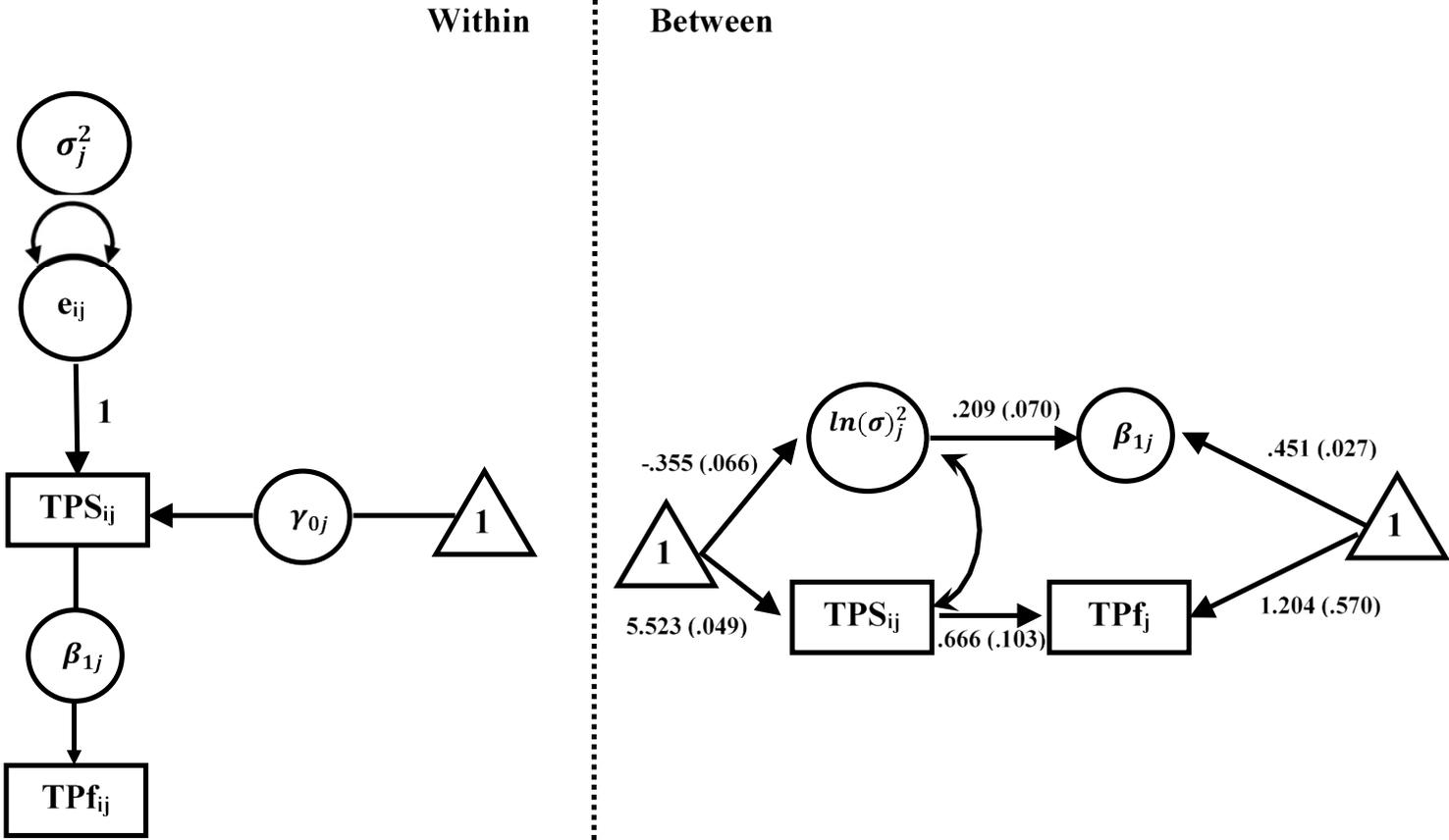
All Items with Corrected Item-Total Correlations and Standardized Regression Weights

Item	Corrected item-total correlations	Standardized regression weights
<i>Team psychological safety (Cronbach's alpha = .89)</i>		
TPS1: Members of this management team are able to bring up problems and tough issues.	.74	.88
TPS2: It is safe to take a risk in this management team.	.81	.94
TPS3: It is easy to ask other members of this management team for help.	.56	.71
TPS4: It is safe to openly express your opinions in this management team.	.81	.92
TPS5: There is room for expressing uncertainty in this management team.	.75	.87
<i>Team performance (Cronbach's alpha = .89)</i>		
TPf1: We perform really well as a management team.	.79	.93
TPf2: The management team clearly adds value to our organization.	.80	.90
TPf3: The management team sets a clear direction for our organization or unit.	.81	.91
TPf4: The management team ensures that goals and processes are coordinated and consistent.	.76	.90
TPf5: We consistently make high-quality decisions in our management team.	.75	.87
TPf6: Most of the management team's decisions turn out to be in the best interests of the organization.	.76	.88
TPf7: Those affected by the management team's decisions are generally very satisfied with its decisions.	.62	.69

Note. TPS = Team Psychological Safety. TPf = Team Performance. Corrected item-total correlations are based on a principal component analysis at the individual level. Standardized regressions weights are based on a confirmatory factor analysis at the team level.

Appendix 2

Robustness Check Using a Structural Equation Model-based Approach with Log Transformation to Model Within-Group Variability



Note. TPS = Team Psychological Safety. TPf = Team Performance. The point estimates are posterior means, while the posterior standard deviations are inside the brackets.