Impact of Team Agility on Team Effectiveness: The Role of Shared Mental Models, Team Empowerment, and Team Reflexivity

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Abstract

While more and more organizations are adopting team agility as a new work approach to cope better with change, research still lacks a proper understanding of the human-side of team agility. To investigate the effectiveness and the human-side of team agility, this study builds on the IMO-framework. Team agility is investigated as the input factor, shared mental models (SMM) and team empowerment as mediators, team performance and team satisfaction as outcomes and team reflexivity as moderator between the relationships of mediators and outcomes. Data was collected from 23 agile working teams ($M_{team-size}$ = 3.48). Using linear regression both hypotheses, that team agility positively impacts SMM and team empowerment, were supported. This study found a significant total model effect for the relationship between team agility and team performance mediated by both, SMM and team empowerment. This study contributes to a better integration of the agile and teamwork literatures by identifying the roles of SMM and team empowerment on team effectiveness in an organizational context of team agility, as facilitating emergent team states.

Keywords: Agile work; team agility; team effectiveness; shared mental models; team empowerment.

1. Introduction

Increased development speed, shorter product lifecycles, demanding customers, the evolvement of online businesses, and many more characterizations of today's working environment lead to the need for organizational structures towards highly coordinated working teams (Wageman, Gardner, & Mortensen, 2012). To react appropriately to the rapidly changing environment and deal with increasing complexity, organizations tend to focus more on project teams instead of handling operations (Papadakis & Tsironis, 2018). To cope with these new arising challenges, organizations started adopting team agility (Conforto, Salum, Amaral, Da Silva, & De Almeida, 2014; Denning, 2018; Moe, Dingsøyr, & Dybå, 2010; Qumer & Henderson-Sellers, 2008; Serrador & Pinto, 2015; Tessem, 2014).

Team agility is a relatively new working approach to enable project teams a high degree of flexibility – the ability to change (Conforto, Amaral, da Silva, Di Felippo, & Kamikawachi, 2016). It emerged from the software development discipline to enhance the handling of requirements changes, realize productivity gains, and improve business alignments (Abrahamsson, Salo, Ronkainen, & Warsta, 2002; Beck et al., 2001; Campanelli & Parreiras, 2015). It

is characterized by the ability to respond to change, extensive collaboration with customers, continuous improvement through team reflexivity of the project approach, and short work iterations (Beck et al., 2001). More and more executives from a wide range of business sectors are trying to implement team agility in their respective organizations (Denning, 2018; Tessem, 2014). But current research is mostly limited to either investigating a single or multiple specific agile methods, like Scrum or Extreme Programming (Campanelli & Parreiras, 2015; Schmidt, Kude, Heinzl, & Mithas, 2014; Serrador & Pinto, 2015), or focusing on the domain of software development teams (Dingsøyr, Fægri, Dybå, Haugset, & Lindsjørn, 2016; Williams & Cockburn, 2003). Agile methods are a part of team agility. They are designed to foster and enable the ability to change. Compared to team agility, they are limited to certain boundaries, like the context domain where they are applied. Thus, team agility is a more overarching approach to facilitate a higher flexibility of work teams in general. However, research currently lacks a proper theoretical grounding for explaining if and how team agility is related to team effectiveness. Especially how the human-side functions in such a work setting is still rather unclear. Therefore, understanding the impact

of team agility on emergent states of teams can improve our knowledge of successful applications of team agility. In addition, it can extend the current state of team effectiveness research by providing team agility as a new input factor.

Intensive collaboration of all team members is standard in agile teams and emphasizes the importance of the human-side. One way to deal with the increased level of coordination and cooperation effort for teams is the development of shared knowledge structures regarding how to solve a given task and how to interact as a team (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). Similarity of knowledge team structures facilitates a shared understanding for upcoming tasks. This enables team members to better align and adapt their actions and behaviors to the task and the needs of the others (Cannon-Bowers, Salas, & Converse, 1993). In order to coordinate and adapt effectively, team members must anticipate the behavior of their teammates (Mathieu et al., 2000). This cognitive team mechanism refers to shared mental models (SMM). Team members use that to build an internal knowledge basis to manage their collaboration more effectively (Yu & Petter, 2014). The function of SMM is to enable team members to use their internal knowledge basis as a decision-making foundation for their future actions, thus, enabling better interaction (DeChurch & Mesmer-Magnus, 2010; Guchait & Hamilton, 2013; Mohammed, Ferzandi, & Hamilton, 2010).

Another way to cope with increased collaboration effort in teams is team empowerment. Team empowerment has been conceptualized along four dimensions by Seibert, Wang, and Courtright (2011), namely: competence, meaningfulness, self-determination, and impact. Research has shown that team empowerment is one lever to handle changing environmental and competitive demands. The ability to react fast and proactively (Campion, Medsker, & Higgs, 1993; Mathieu, Maynard, Rapp, & Gilson, 2008) through enhanced team empowerment can optimize both team performance and affective responses of team members (Kirkman & Rosen, 1999). Team agility is characterized by a self-organizing nature of the teams to enhance their flexibility (Hoda & Murugesan, 2016; Moe, Dingsøyr, & Dybå, 2008; Moe et al., 2010).

An essential component of team agility is the approach of continuous improvement through reflecting on the achieved outcomes after short performance periods (Beck et al., 2001; Moe et al., 2010). Taking a step back to reflect is also a well-known team process to gain, share, connect, and utilize knowledge (Argote, Gruenfeld, & Naquin, 1999; Schippers, Homan, & Van Knippenberg, 2013). The concept of team reflexivity refers to the extent to which teams discuss and modify the way they work to improve future collaboration (Otte, Knipfer, & Schippers, 2019; West, 1996). Thus, team reflexivity is two-fold: it is about assessing the past and using that assessment to plan the future (Konradt, Otte, Schippers, & Steenfatt, 2016). This team process affects the actions and behaviors of a team (Marks, Mathieu, & Zaccaro, 2001). Therefore, it is mostly applied by teams who face complex situations (e.g., changing environments) with diffi-

cult decisions (Schippers et al., 2013; West, 1996). Hence, team reflexivity can create conditions that impact the relationship of emergent states of a team, such as SMM or team empowerment, and its outcomes.

The goal of this study is to integrate the agile literature and teamwork research by investigating team agility as an essential driver for the emergence of team effectiveness. In order to theorize and empirically show the impact of team agility, I build on the Input-Mediator- Outcome (IMO) framework (Ilgen, Hollenbeck, Johnson, & Jundt, 2005) for team effectiveness (Mathieu et al., 2008). Team agility is examined as an input factor on team-level. The two team emergent states SMM (cognitive) and team empowerment (motivational) are explored as mediators. Team performance and team satisfaction are investigated as team outcomes. I use a quantitative empirical approach to compare cross-industry agile working teams without limiting them to a specific method.

Building on the theoretical foundation of teamwork research in combination with team agility as a potential new component of it, the present study provides three main contributions. First, this study examines the impact of team agility on team effectiveness independent of explicit agile methods or specific industries. In this way, I seek to generate a more holistic view of the value of team agility for teams across all industries. Second, my study contributes to the literature streams of agile and teamwork research by combining and integrating them. By doing so I aim to determine that team agility works as a driver for emergent states that facilitate team effectiveness. Further, I can respond to research calls for action from both areas. Stray, Moe, and Hoda (2018) called for more insights on how agile working teams can effectively coordinate their actions and behaviors as a response to internal and external influences. Also, Mathieu, Hollenbeck, van Knippenberg, and Ilgen (2017) asked for new understandings of teamwork in new work settings, such as the agile work context. By combining both theorized concepts, I seek to open a new perspective on team agility mechanisms in new organizational contexts. Third, I examine the effects of team reflexivity to create conditions in which the relationship between team emergent states and team outcomes can emerge. Team reflexivity is a specific team process that is an essential part of team agility (Beck et al., 2001). Team reflexivity is intended to create a high self-awareness in teams regarding their past actions and behaviors to enable a bright future. Thus, I aim to illuminate the potential moderating effect of team reflexivity to shed light on what we know about the impact of a fundamentally used work practice in agile working teams.

2. Theoretical Background and Hypotheses

The underlying framework for this research study is the IMO-framework established by Ilgen et al. (2005). It is a broadly established and used framework to explain team effectiveness components (e.g., performance) for various team settings (Mathieu et al., 2008). Thus, this study considers

the IMO-framework as a suitable approach to examine the impact of team agility on team effectiveness via the role of SMM and team empowerment. In the following, I summarize the core idea of the Input-Mediator-Outcome framework.

Inputs are defined as "antecedent factors that enable and constrain members' interactions" (Mathieu et al., 2008, p. 412). Input factors are categorized mainly into three different levels: varying from individual (e.g., characteristics) over team-level factors to organizational context factors (Mathieu et al., 2008). The level depends on their layer of deployment. Individual team member characteristics can be competencies like knowledge, skills, and abilities (KSAs). They can differ between individuals and teams, because teams face specific challenges (e.g., coordination) compared to individuals who work alone (Morgeson, Reider, & Campion, 2005). One team-level factor can be external leadership that assumes an impact on the whole team by the external leader, who is responsible for the performance of the team (Burke et al., 2006). Another team-level factor is the interdependence of a team that reflects the "extent to which team members cooperate and work interactively to complete tasks" (Stewart & Barrick, 2000, p. 137). An organizational and contextual input factor, for example, is openness climate (Mathieu et al., 2008). Openness climate refers to the ability of teams to communicate with each other in an open manner and, thus, exchange and share information with no boundaries (Mathieu, Gilson, & Ruddy, 2006). Team agility reflects one team-level input factor because it describes a working approach of a team. The application on team-level is characterized by a degree of use of specific ways of working. Thus, the team agility reflects the input factor in my study.

Mediators are variables that convey "important [...] influences with explanatory power for explaining variability in team performance and viability" (Ilgen et al., 2005, p. 520). They are mainly categorized into emergent states and team processes (Ilgen et al., 2005; Mathieu et al., 2008). Team processes are defined as the interdependent actions of team members that convert given inputs into outcomes (Marks et al., 2001). One example of a team process is coordination that encompasses the synchronization of various team members' interdependent actions (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008). Emergent states are defined as "cognitive, motivational, and affective states of teams [that are] dynamic in nature and vary as function of team context, inputs, processes, and outcomes" (Marks et al., 2001, pp. 357–358). The main characteristic of emergent states is their development throughout the lifespan of a team. One affective emergent state, for example, is trust what is composed of the belief in a team's competencies and the safety that the individual or her/ his interests are protected (Ilgen et al., 2005; Mayer, Davis, & Schoorman, 1995). An example for a cognitive emergent state is strategic consensus, which represents the consensus on strategic priorities between team members (Kellermanns, Walter, Lechner, & Floyd, 2005). SMM and team empowerment reflect emergent states. SMM is a cognitive emergent state, thus, it refers to the creation of knowledge or understanding in teams based on their experiences

or thoughts. Team empowerment is a motivational emergent state, thus, it refers to experiences of teams through feelings or emotions. SMM and team empowerment are the two mediators of my research study.

Outcomes are classified as the "results and by-products of team activity that are valued by one or more constituencies" (Mathieu et al., 2000, p. 273). They can either be measured based on quality or quantity, like team performance (Mathieu et al., 2006; Lester, Meglino, & Korsgaard, 2002), or members' affection and viability, like satisfaction or commitment (Balkundi & Harrison, 2006). Extant literature has examined team performance and satisfaction until today based on the IMO-framework for various team settings. I follow the literature by investigating team performance and team satisfaction as outputs.

The evidence has shown the reliability and validity of the underlying framework. It is used in various team settings to investigate overall team effectiveness by using different input factors, mediators, and outcomes (Ilgen et al., 2005; LePine et al., 2008; Mathieu et al., 2008; Maynard, Mathieu, Gilson, O'Boyle Jr, & Cigularov, 2013). Team agility as a relatively new phenomenon is particularly designed for employees who work in teams. Thus, team agility is recently gaining more attention due to the replacement or supplementation of traditional project management approaches (Laanti, Salo, & Abrahamsson, 2011). Even though the IMO-framework has been applied successfully in various team settings and with various types, empirical work using the IMO-framework within an agile setting is missing. Hence, the present study investigates team agility as an input factor, in line with the IMO-framework, and investigates its relationship with mediators and outcomes.

2.1. Team Agility

The concept of team agility has become widely adopted in team and management research. However, scholars remain unable to establish a common and unambiguous definition across all application domains (Conforto et al., 2016; Dybå & Dingsøyr, 2008; Mafakheri, Nasiri, & Mousavi, 2008; Sheffield & Lemétayer, 2013). This study follows the definition of Conforto et al. (2016, p. 667), denoting team agility as "the project team's ability to quickly change the project plan as a response to customer or stakeholders needs, market or technology demands to achieve better project and product performance in an innovative and dynamic project environment". I stick to the definition of Conforto et al. (2016) because it is primarily focused on the broader context of project management rather than limited to a focus of software development (Beck et al., 2001; Dybå & Dingsøyr, 2008; Mafakheri et al., 2008).

The "Agile Manifesto" is considered as emergence of team agility and states four main values[1]: (i) individuals and interaction over processes and tools; (ii) working software over comprehensive documentation; (iii) customer collaboration

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[1]Originally developed for software development.

over contact negotiations; and (iv) responding to change over following a plan (Beck et al., 2001; Campanelli & Parreiras, 2015). It is supplemented by 12 underlying principles (Beck et al., 2001) that complete the definition. Team agility embodies four main components (Campanelli & Parreiras, 2015; Conboy & Fitzgerald, 2004) namely: "flexibility, velocity, learning and response to change, and leanness" (Ghezzi & Cavallo, 2020, p. 521).

Today, team agility is considered a new mainstay of project management to ensure long-term success (Denning, 2013). Hence, it has gained the interest of researchers in project team settings (Conforto et al., 2014; Conforto et al., 2016; Ghezzi & Cavallo, 2020; Misra, Kumar, & Kumar, 2009; Sheffield & Lemétayer, 2013). As traditional project management (TPM) approaches have been one of the main input factors of the IMO-Model to date, a clear distinction between TPM and team agility is helpful to explore team agility as a new input factor. This distinction supports a clear understanding of team agility management practices so that it can be investigated more generally instead of focusing on specific agile methods. This research paper follows Sheffield and Lemétayer (2013) suggestion to distinguish team agility from TPM according to three determinants: requirements uncertainty, customer collaboration, and team empowerment. Thus, team agility represents a new way of working together.

This study considers team agility as a team-level input factor of the IMO-framework. I examine team agility as a construct along six management practices. According to Conforto et al. (2014), those management practices are uniquely used in team agility and thus, differentiate it from TPM. This approach contrasts with traditional research about team agility, traditional research investigated team agility along specific agile methods (e.g., Scrum, pair programming, etc.) or agile practices (e.g., retrospective meetings, burndown charts). Those approaches neglect hybrid versions and hamper the comparability of teams across different industries (Abrahamsson et al., 2002; Dingsøyr et al., 2016; Dingsøyr, Falessi, & Power, 2019; Dybå & Dingsøyr, 2008; Guinan, Cooprider, & Faraj, 1998; Gustavsson, 2016; Hoda & Murugesan, 2016; Hummel, 2014; Moe et al., 2010; Serrador & Pinto, 2015). Building on the empirical support that team agility increases team effectiveness (Abrahamsson et al., 2002; Dingsøyr et al., 2016; Gustavsson, 2016; Schmidt et al., 2014; Serrador & Pinto, 2015), the present research focusses on team agility in terms of the management practices applied.

2.2. Shared Mental Models

SMM reflect a cognitive emergent state and thus, according to the IMO-framework, can represent a mediator (Ilgen et al., 2005; Mathieu et al., 2008) in the relationship between team agility and team performance and team satisfaction. From the perspective of multilevel theory, SMM is an emergent characteristic that stems from the knowledge and experience of individuals, but manifests as a collective characteristic (Klein & Kozlowski, 2000a). SMM are defined as "knowledge structures held by members of a team that enable them to form accurate explanations and expectations for the task, and in turn to coordinate their actions and adapt their behavior to demands of the task and other team members" (Cannon-Bowers et al., 1993, p. 228). SMM enable teams to adapt effectively through predicting what team members are planning next and which requirements need to be fulfilled to succeed (Cannon-Bowers et al., 1993). Some degree of similarity among the team members in terms of understanding the tasks and relationships within the team is necessary to accomplish team goals. Therefore, the concept of SMM explains the building of an internal knowledge basis of teams.

There are two different types of SMM that develop within a team. Researchers tend to categorize SMM in task-related SMM and team-related SMM (Cooke et al., 2003; Mathieu et al., 2000; Mohammed et al., 2010). First, task-related SMM include a shared understanding of work goals and performance requirements. Hence, it refers to the knowledge of how to execute tasks as a team. Typical tasks are knowing the goals, the interdependencies, and the process of how to approach a task. Second, team-related SMM include a shared understanding of interpersonal interactions, skills and responsibilities of other team members. Team-related SMM focus on shared understanding about how the team interacts, such as communication frequency, individual roles and responsibilities, and competencies (e.g., individual skills) of all team members (Cannon-Bowers et al., 1993).

Scholars have started to divide the evaluation of SMM development in teams into the dimensions of similarity and accuracy (Edwards, Day, Arthur Jr, & Bell, 2006; Mathieu, Heffner, Goodwin, Cannon-Bowers, & Salas, 2005; Mohammed et al., 2010). Similarity refers to the degree of internal consistency of team members' collective knowledge regarding teamwork and taskwork. Accuracy reflects the degree of SMM to "true state of the world" (Edwards et al., 2006, p. 728), which describes an objective view on teamwork and taskwork. This true score is often evaluated by experts. In the present study, I focus on the overall construct of SMM similarity. In what follows, I refer to a SMM similarity each time I mention SMM.

2.2.1. Team Agility on SMM

SMM are conceptualized to explain how teams are capable of dealing with complex and changing situations through different facets of knowledge, like declarative, procedural, and strategic knowledge (Marks et al., 2001; Mohammed et al., 2010). Developing SMM is similar to converging in the direction of a specific mindset. Aligned and adopted intra-team related guidelines can foster a team- and taskwork philosophy among team members. A philosophy is the core of the agile working's foundation. Abrahamsson et al. (2002) identified that working in an agile manner equals having a certain philosophy. That philosophy is captured by Beck et al. (2001) in the Agile Manifesto, which represents overarching guidelines for a successful application of team agility. It is further equipped with a set of methodologies and practices.

Together, agile working teams are provided with knowledge regarding their task- and teamwork.

For developing SMM various team interventions and team processes, like planning, reflexivity, leadership, and training, can act as an antecedent (Mohammed et al., 2010). Stout, Cannon-Bowers, Salas, and Milanovich (1999) have shown that effective planning results in higher SMM similarity. Effective planning allows team members to prioritize tasks, share information (or decide which kind of information should be shared), and discuss future events plus their implications for the team (e.g., how to back up each other). Orasanu (1994) identified that more planning contributes significantly to effective planning. An iterative planning approach is a fundamental agile project management practice, according to Conforto et al. (2014). Likewise, it is explicitly anchored in the twelve principles of "Agile Manifesto" (Beck et al., 2001). Moreover, the iterative planning is a major distinction between agile project management (Sheffield & Lemétayer, 2013) and a TPM that basically follows the initially set up plan (Boehm & Turner, 2005). Moreover, scholars (Klimoski & Mohammed, 1994) have identified various primary mechanisms that embrace a higher SMM similarity, such as communication or information sharing. According to the literature review of Gustavsson (2016), team agility enables teams to increase collaboration as well as improve knowledge sharing and better understanding of goals, tasks, and requirements. Practices of team agility, like iterative planning, frequent communication, and open information sharing, promote the development of SMM because they work like antecedents of SMM. Therefore, I assume a positive causal relationship between team agility and the SMM. Thus, I propose the first hypothesis:

H1a: Team agility positively impacts SMM.

2.3. Team Empowerment

Team empowerment reflects an motivational emergent state and thus, according to the IMO-framework, can represent a mediator (Ilgen et al., 2005; Mathieu et al., 2008) in the relationship between team agility and team performance and respectively team satisfaction. Team empowerment, according to Mathieu et al. (2006, p. 98), is defined as a team's "collective belief that they have the authority to control their proximal work environment and are responsible for their team's functioning". This definition encompasses four major domains of team empowerment: competence (to be able to perform tasks effectively), meaningfulness (in the sense of work), self-determination (to do task-related decisions), and impact (regarding outcomes (Kirkman & Rosen, 1999; Seibert et al., 2011). Team empowerment manifests among the team as shared perceptions of the empowerment level along the four dimensions (Chen, Kirkman, Kanfer, Allen, & Rosen, 2007).

2.3.1. Team Agility on Team Empowerment

Antecedents of team empowerment are encompassed in team agility, such as structural empowerment (Maynard et al., 2013) and high-performance management practices (Seibert et al., 2011). Antecedents of team empowerment enable its emergence. Structural empowerment reflects increased autonomy for employees through the transition of several activities to lower levels, such as scheduling or monitoring work. One characteristic of team agility is the high degree of self-organization and self-management of the teams (Moe et al., 2008). Thus, the underlying idea is that team agility gives teams increased autonomy in the structure of their work or task, which should improve their feeling of empowerment (Maynard et al., 2013). Chen, Sharma, Edinger, Shapiro, and Farh (2011) have shown that leadership distribution affects the embracement of team empowerment positively. Team agility similarly promotes shared leadership. It implements various roles (e.g., for Scrum: Product Owner, Scrum Master, Development Team) that share the decision-making power in order to empower the team (Cooper & Sommer, 2016). Thus, it should result in a greater feeling of project ownership and ultimately, enhance the feeling of autonomy.

High-performance management practices are reflected in "open information sharing, decentralization, participative decision making, extensive training, and contingent compensation" (Seibert et al., 2011, p. 983). According to Combs, Liu, Hall, and Ketchen (2006) a key component of empowering employees is information sharing. The kind of information differs between organizational roles and work tasks. The fundamental thought here is that team agility fulfills structural empowerment requirements and works with high-performance management practices. The nature of agile teams is described by a self-organizing and self-managing structure. Those features are anchored in the twelve principles of the Agile Manifesto (Beck et al., 2001) to ensure their autonomy. Thus, team agility advocates high degrees of autonomy and self-organized teams per se (Hoda, Noble, & Marshall, 2012; Moe et al., 2008). The team itself decides what tasks they approach, as well as when and how they approach them (Boehm & Turner, 2003; Dybå & Dingsøyr, 2008). One additional component of team agility is a high customer collaboration (Beck et al., 2001). The main goal of customer collaboration is to exchange and share information regarding expectations and updates. Team agility promotes those high- performance management practices that embrace team empowerment. Also, Gustavsson (2016) reported in his literature review that teams who worked agile increased their customer collaboration. Those findings are in line with Sharp and Robinson (2010), who go a little further and formulate the three C's of agile ways of working: collaboration, coordination, and communication. Combining the fundamentals of team agility, self-organized teams with high customer collaboration, I see reasonable ground for a positive causal relationship between team agility and team empowerment. Thus, I present the following hypothesis:

H1b: Team Agility positively impacts team empowerment.

2.3.2. Relationship of SMM and Team Empowerment

The two mediators SMM and team empowerment can also impact each other. SMM are intended to create a mutual understanding about taskwork and teamwork among team members (Klimoski & Mohammed, 1994). Additionally, they can improve collaboration, because it helps to share similar expectation concerning intra- and inter-team processes (Stout et al., 1999). Thus, it can foster the teams' feeling of impact because they create an internal knowledge basis that allows them to draw inferences about what they can achieve. Impact and competence are according to Seibert et al. (2011) two important dimensions of team empowerment. Further, SMM can enhance the feeling of competence within a team by promoting different roles to each team member such that the awareness about competencies can rise. A positive and vital role in the development of SMM is attributed to role differentiation (Cannon-Bowers, Salas, Blickensderfer, & Bowers, 1998) and performance monitoring (Rasker, Post, & Schraagen, 2000). Seibert et al. (2011) described role differentiation as well as performance monitoring in form high performance managerial practices as an antecedent of team empowerment. A high empowered team leads to a collectivistic belief of the team ability to successfully carry out certain tasks and foster a mutual understanding of the importance of that task (Seibert et al., 2011). Moreover, research has already stated that empowerment is related to a convergence of meanings and functional relations between individuals and on a team level (Chen et al., 2007). I see reasonable evidence for an interdependence between SMM and team empowerment. Thus, I formulate the following hypothesis:

> H2: SMM are positively related to team empowerment.

2.4. Team Performance

Team performance reflects one core team outcome (S. G. Cohen & Bailey, 1997). Thus, I investigate team performance as one outcome of the IMO-framework, which belongs to team- level outcomes (Ilgen et al., 2005; Mathieu et al., 2008) in this study. The main purpose of teams in organizations is to perform certain tasks (Ilgen, 1999). Thus, the ultimate goal of teams is considered to be a great team performance (Bommer, Johnson, Rich, Podsakoff, & MacKenzie, 1995). There are multiple ways to capture the performance of teams. The measurement of team performance mostly depends on the context. According to Mathieu et al. (2008) these context domains can vary from an organizational performance over team performances (e.g., team performance behaviors) to team member performance (e.g., affect and viability). The present study focuses on team performance outcomes as it represents the quality resulting from team- and taskwork processes (Klein & Kozlowski, 2000a).

2.4.1. SMM on Team Performance

The impact of SMM on team performance has been investigated in several manners regarding the work dimensions (team-related and task-related work) and the evaluation dimensions (similarity and accuracy). DeChurch and Mesmer-Magnus (2010) have shown in their meta-analysis that SMM is a significant predictor of team performance. Those findings are in line with earlier studies (Lim & Klein, 2006; Mathieu et al., 2005), which have shown that task-related as well as team-related SMM similarity were a good predictor of team performance. A more recent study (Guchait & Hamilton, 2013) showed also that team learning behaviors were positively related to the development of SMM which, in turn, had a significant effect on team performance. SMM enable a team to understand and process (new) information more consistently, explain situations equally, and predict future events (Mohammed et al., 2010). Thus, SMM allow a better task coordination and behavioral adjustments. These improve the decision making and the performance of a team (Cannon-Bowers et al., 1993).

Mohammed et al. (2010) concluded in their meta-analysis that a positive relationship between SMM similarity and team performance was found. Various scholars have presented a critical mass of studies under various conditions with different SMM measurements supporting the conclusion of Mohammed et al. (Cannon-Bowers et al., 1993; Cooke et al., 2003; Ensley & Pearce, 2001; Lim & Klein, 2006; Mathieu et al., 2000; Mathieu et al., 2005; Maynard & Gilson, 2014; Stout et al., 1999). SMM help teams to better understand the events in their environment in a threefold manner. First, they manifest a similar understanding of information among team members. Second, teams generate a shared explanation of events in their environment. Third, teams can more precisely predict future events based on this shared understanding (Klimoski & Mohammed, 1994; Mohammed et al., 2010). Thus, I assume that this results in increased quality of team performance. Based on this body of existing research, the following hypothesis is proposed:

> H3a: SMM positively impact team performance.

2.4.2. Team Empowerment on Team Performance

Team empowerment has been shown to be a good predictor of team performance (Chen et al., 2007; Kirkman, Rosen, Tesluk, & Gibson, 2004; Seibert et al., 2011). Seibert, Silver, and Randolph (2004) have shown a significant impact of team empowerment on individual performance and job satisfaction, Chen et al. (2007) supported those findings by showing that team empowerment is positively related to leadership climate and team performance. Jiang, Flores, Leelawong, and Manz (2016) found that team empowerment predicts knowledge sharing and thus, fosters team performance.

Seibert et al. (2011) have presented evidence that team performance is a behavioral consequence of team empowerment (Chen et al., 2007; Kirkman et al., 2004; Seibert et al., 2004; Srivastava, Bartol, & Locke, 2006). An empowered team develops a higher sense of ownership based on improved initiative opportunities of team members (Spreitzer, Noble, Mishra, & Cooke, 1999). Empowered teams can respond quickly to varying task demands by better leveraging

their capabilities, interests, and availability (Maynard et al., 2013). By optimizing the overall capabilities within the team and better distributing tasks and responsibilities, team performance should increase. Therefore, the following hypothesis is proposed:

> H3b: Team empowerment positively impacts team performance.

2.5. Team Satisfaction

Team satisfaction reflects one core team outcome (S. G. Cohen & Bailey, 1997). Thus, I investigate team satisfaction as another team-level outcome of the IMO-framework (Ilgen et al., 2005; Mathieu et al., 2008) in this study. Team satisfaction is the aggregated value of individual job satisfaction among team members. Job satisfaction is a multifaced concept that can be broken down to "how people feel about their jobs and different aspects of their jobs [. . .] that is, whether or not the job met the employee's physical and psychological needs for the things provided by work" (Spector, 1997, p. 2).

2.5.1. SMM on Team Satisfaction

The impact of SMM on team satisfaction has remained relatively unexplored by literature (Chou, Wang, Wang, Huang, & Cheng, 2008; Mohammed et al., 2010). SMM facilitate high-quality interpersonal relationships that contribute positively to the job satisfaction of each individual team member. SMM enable team members to perceive their surrounding environment in a more similar manner (Mathieu et al., 2000). This similarity fosters a team attitude of cooperation and assistance (Chou et al., 2008). This attitude is reflected in the anticipation of each other's needs, which, in turn, establishes high-quality interpersonal relationships in a team. Those relationships lead to a more positive feeling of each team member at work due to a better interaction in the team. Empirical evidence has shown that a positive relationship between a positive feeling at work and job satisfaction exists (Bretz & Judge, 1994). Hence, I suggest the following hypothesis:

> H4a: SMM positively impact team satisfaction.

2.5.2. Team Empowerment on Team Satisfaction

The impact of team empowerment on team satisfaction has rarely been investigated. The main focus of research has been on job satisfaction (Seibert et al., 2011). As team satisfaction is the aggregated value of job satisfaction, I argue that team empowerment positively impacts job satisfaction and hence, team satisfaction. Team empowerment is greater when individuals experience meaningfulness in their work, which contributes to increased job satisfaction (Seibert et al., 2004). Meaningfulness is a core component of team empowerment (Spreitzer, 1995). Also, evidence showed that the stimulation of meaningfulness is the best predictor of job satisfaction compared to the other three components of empowerment (Spreitzer, Kizilos, & Nason, 1997). Those findings

are in line with earlier work regarding job satisfaction. Locke (1976) showed that individual fulfilment of values because of one's own work leads to job satisfaction. Some scholars (Kirkman & Rosen, 1999; Seibert et al., 2004) validated this and presented similar findings in additional studies. Thus, I argue that an empowered team experiences a great feeling of meaningfulness and that feeling leads to greater team satisfaction. Team empowerment can also lead to a feeling of responsibility and ownership of work (Maynard et al., 2013). Team Empowerment is likely to facilitate the pursuit of continuous improvement in work process and innovative solutions. Therefore, an empowered team strives for better outcomes that, in turn, result in increased efficiency and productivity (Seibert et al., 2011). Some scholars have shown that team empowerment supports the fulfillment of individuals' needs at work through increasing meaningfulness or self-determination (Deci & Ryan, 1985; Hackman & Oldham, 1980). The fulfillment of individual needs at work are related to satisfaction. The more the needs are fulfilled, the more satisfied individuals are (Locke, 1976). Thus, I argue that team empowerment enables a feeling of autonomy which satisfies an individual need at work. In doing so, team empowerment becomes an antecedent of team satisfaction. (Seibert et al., 2011). Hence, I propose the following hypothesis:

> H4b: Team empowerment positively impacts team satisfaction.

2.6. The Mediational Role of SMM and Team Empowerment

As explained previously, I hypothesize that team agility positively impacts SMM and team empowerment. Based on an extant body of literature (Gustavsson, 2016; Mathieu et al., 2000; Maynard et al., 2013; Mohammed et al., 2010; Seibert et al., 2011), this study also postulates a positive relationship between each mediator (SMM and team empowerment) and each outcome (team performance and satisfaction). Hence, this study argues that team agility positively impacts SMM and team empowerment, which, in turn, positively impact team performance and team satisfaction. Thus, I propose the following:

> H5a: SMM mediate the positive relationship between team agility and team performance.

> H5b: SMM mediate the positive relationship between team agility and team satisfaction.

> H6a: Team empowerment mediates the positive relationship between agility and team performance.

> H6b: Team empowerment mediates the positive relationship between agility and team satisfaction.

2.7. Team Reflexivity

Team reflexivity refers to, based on the proposed taxonomy by Marks et al. (2001), a transition processes and is defined as "the extent to which team members collectively reflect upon the team's objectives, strategies and processes and

adapt them to current and anticipated endogenous or environmental circumstances" (West, 1996, 559). Hence, team reflexivity encompasses a dual focus: first, to reflect on and interpret the progress up to now and second, to align on future actions to ensure future accomplishments (LePine et al., 2008). It can be subsumed to inspect the current work context (e.g., goals or strategy) and adapt the working methods to ensure an effective response. Team reflexivity allows team members to communicate openly and frequently over the past working period. Thus, there is the opportunity to talk about what went well and where is still room for improvement. Teams can either conduct a self-regulated or a guided reflexivity session. The two options mainly differ in their initiation. Self-regulated refers to a more autonomous and spontaneous approach whereas guided refers to a more organized and formalized session (Otte et al., 2019). In what follows, I refer to a guided team reflexivity session each time I refer to team reflexivity.

2.7.1. The moderating role of team reflexivity on the relationship between SMM and team performance

Team reflexivity is a transition process (Marks et al., 2001) that aims to collectively discuss how past team activities have or have not contributed to the status quo of the team (Otte et al., 2019). Some specific characteristics of team reflexivity include understanding, conversation, preparing, as well as transitioning to action, of group task facets (Schippers et al., 2013). It occurs mainly in transition phases when teams assess recent activities and plan next steps. Therefore, team reflexivity is typically conducted at the end of one performance period (Marks et al., 2001). Hence, team reflexivity promotes an atmosphere to share and integrate the experiences of all team members. This atmosphere enables open communication and information sharing that contribute to high self-awareness regarding the tasks and interaction in a team (Schippers et al., 2013). In contrast, non-reflective teams lack in their degree of self- awareness of their tasks and interactions. A highly reflective team tends to constantly observe its work environment. Such an assessment supports the adaptability to changing conditions of a team (West, 2012). This work climate can facilitate shared cognitive knowledge among team members and also work as motivation to improve the team performance. Thus, team reflexivity creates conditions in which a shared understanding of team tasks and team interactions can rise and have a stronger positive impact on team performance. Accordingly, I assume that team reflexivity can moderate the relationship between SMM (a cognitive emergent state) and team performance such that different levels of team reflexivity can lead to an increased/decreased relationship between SMM and team performance. I, therefore, propose:

> H7a: Team reflexivity moderates the positive relationship between SMM and team performance in such a way that the relationship is stronger when team reflexivity is high.

2.7.2. The moderating role of team reflexivity on the relationship between SMM and team satisfaction

Team reflexivity incorporates discussions about recent strategies and team processes, like communication (Schippers et al., 2013). Team reflexivity has a dual focus: interpreting the past and planning for the future. Thereby, it can generate working conditions in which team members share good and bad experiences from the last performance period. Further, it is not limited to the performance dimensions: teams also reflect about their behavior (Konradt et al., 2016). Team reflexivity encourages teams to agree on certain guidelines under which they will operate in the future. The opportunity to adjust those guidelines supports conditions in which shared perspectives can rise and team members can feel more understood. Employees pursue fulfillment at work that impacts their satisfaction (Al Jenaibi, 2010). The ability to engage in a pleasant work behavior supports that satisfaction (Mullins, 2016). Such an environment encourages the sharing of experiences and agreement on a satisfactory common way of working. Thus, team reflexivity creates conditions in which a shared understanding of team tasks and team interactions can rise and have a stronger positive impact on team satisfaction. Accordingly, I assume that team reflexivity can moderate the relationship between SMM and team satisfaction such that different levels of team reflexivity can lead to an increased/decreased relationship between SMM and team satisfaction. I, therefore, propose:

> H7b: Team Reflexivity moderates the positive relationship between SMM and team satisfaction in such a way that the relationship is stronger when team reflexivity is high.

2.7.3. The moderating role of team reflexivity on the relationship between team empowerment and team performance

Team reflexivity enables a team to cope with internal and external circumstances through reviewing the status quo and provide ideas for the future (Hoegl & Parboteeah, 2006). Team reflexivity refers to a mutual session of the team and is characterized by frequent communication about what went well and where there is still room for improvement (Tjosvold, Tang, & West, 2004). By doing so, the process of team reflexivity enables a team to exchange knowledge and to foster a feeling of competence, meaningfulness, responsibility, and control. By clearing up misunderstandings and addressing explicit wishes for future cooperation, the interaction with each other can be further improved (Schippers et al., 2013). A team with a higher degree of reflexivity is aware of its strengths and weaknesses and should emphasize their expertise to generate an atmosphere with a feeling of competence. Reviewing the progress and adjusting methods to ensure future success are drivers for a greater feeling of competence, meaningfulness, responsibility, and control. Team reflexivity enables a team to better understand how they collaborate (Tjosvold et al., 2004). Thereby, team reflexivity allows teams who feel responsible for their functioning

to reach greater outcomes and feel more satisfied. Accordingly, I assume that team reflexivity can moderate the relationship between team empowerment and team performance such that different levels of team reflexivity can lead to an increased/decreased relationship between team empowerment and team performance. I, therefore, propose:

> H7c: Team reflexivity moderates the positive relationship between team empowerment and team performance in such a way that the relationship is stronger when team reflexivity is high.

2.7.4. The moderating role of team reflexivity on the relationship between team empowerment and team satisfaction

The inspect and adapt approach of team reflexivity allows a team to assess their current situation (Otte et al., 2019). To take a step back and critically reflect on the achieved results allows a team to share and evaluate information (Otte, Konradt, Garbers, & Schippers, 2017). Moreover, they can consider their work from a new perspective with all its facets, like the impact for their organization or the meaningfulness to themselves. This provides a working environment in which team members become much more aware of what they have accomplished (Konradt, Schippers, Garbers, & Steenfatt, 2015). Further, they can adjust their work towards a more fulfilling direction. Team reflexivity is key component of employees' well-being (West, 2012). The satisfaction of an employee is related to its perception of the work environment. A good-natured wok environment can contribute to its satisfaction (Mullins, 2016). Reviewing the progress and adjusting methods to ensure future success are the drivers for a greater feeling of competence, meaningfulness, responsibility, and control. Team reflexivity enables a team to better understand how they collaborate (Tjosvold et al., 2004). Thereby, team reflexivity allows teams who feel responsible for their functioning to reach greater outcomes and feel more satisfied. Accordingly, I assume that team reflexivity can moderate the relationship between team empowerment and team satisfaction such that different levels of team reflexivity can lead to an increased/decreased relationship between team empowerment and team satisfaction. I, therefore, propose:

> H7d: Team reflexivity moderates the positive relationship between team empowerment and team satisfaction in such a way that the relationship is stronger when team reflexivity is high.

3. Method

To explore the impact of team agility on the emergence of SMM and team empowerment and, as a result, on team performance and team satisfaction, I conducted an online survey.

3.1. Sample

Twenty-three teams ($M_{team-size} = 3.48$ individuals per team, $MIN = 3$, $MAX = 6$) participated in my online survey. Every participant answered the same questionnaire regarding their project team (see below for questionnaire details). The final sample after applying predefined exclusion criteria consisted of 80 individuals of twenty-three teams. They were rewarded by receiving the results once the research study was finished. 44 participants indicated that they wanted to be informed about the results (either by receiving a management summary or by getting invited to a webinar). In total, the participants were mostly male (58.8%) and a bit less female (40.0%) and a few diverse (1.2%) with an average age of $M_{age} = 30.85$ years, ($SD_{age} = 7.28$). The sample consisted of 13 different nationalities who had worked in 14 different industries. The sample showed diverse functional roles. The participants showed a wide range of company sizes (number of employees and revenue) in which they were employed (see Appendix A). The sample consisted only of participants with experience of agile working practices from different industries, different functional departments, and different organizational roles. Those differences helped to investigate the phenomenon of team agility on a broader scale.

Before using the sample, I applied data cleaning and data preparation practices for analysis. I screened the data and excluded unusable data following predefined criteria. First, I only considered completed surveys. 99 teams ($n_{individuals} = 424$) started the survey. 43 teams ($n_{individuals} = 116$) completed the survey with a response rate of 43.43% (individuals = 27.36%). Followed by the exclusion of teams with less than three participants. Three participants per team ensure a representative team perspective. This led to 26 teams in total ($n_{individuals} = 94$). Further, two individuals were screened out automatically because they said that they did not work with agile methods or practices. This did not lead to an exclusion of an additional team due to sufficient remaining members per team of those 26 teams ($n_{individuals} = 92$). In addition, three teams were excluded due to invariant responses ($n_{individuals} = 80$). Invariant responses are defined as repeatedly using the same answer option (DeSimone, Harms, & DeSimone, 2015). As a cutoff-value, I followed the conventional approach by Huang, Curran, Keeney, Poposki, and DeShon (2012) of 14.

Furthermore, I also checked for exclusion cases of very short completion time (below 5 minutes) and unreliable responses (Goldammer, Annen, Stöckli, & Jonas, 2020) due to their psychometric synonyms with a recommend cutoff-value of 0.03 (DeSimone et al., 2015; Huang et al., 2012; Johnson, 2005). These cases did not lead to an exclusion of a participant or team. Thus, it is not shown in the Figure 2. The respective flowchart illustrates all previously explained exclusion cases.

3.2. Design and Procedures
3.2.1. Research Design

The purpose of this research study was to explore the impact of agile ways of working on team effectiveness and to
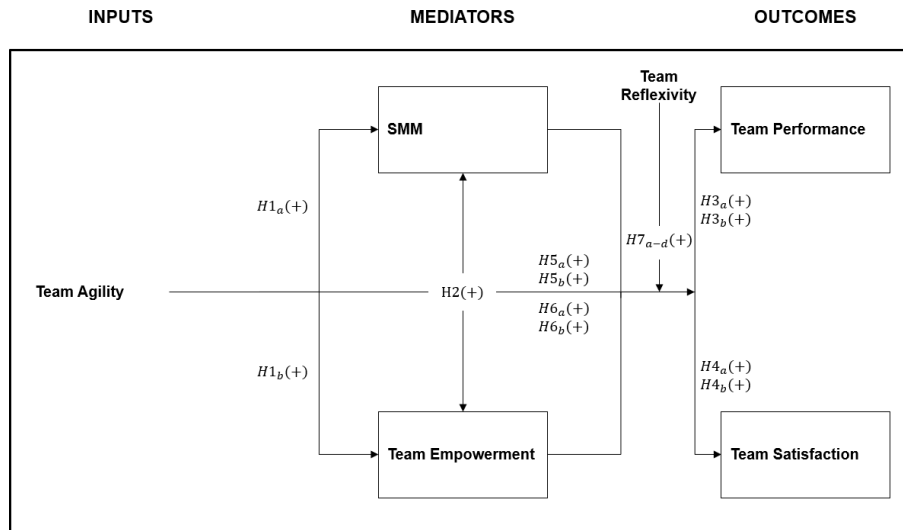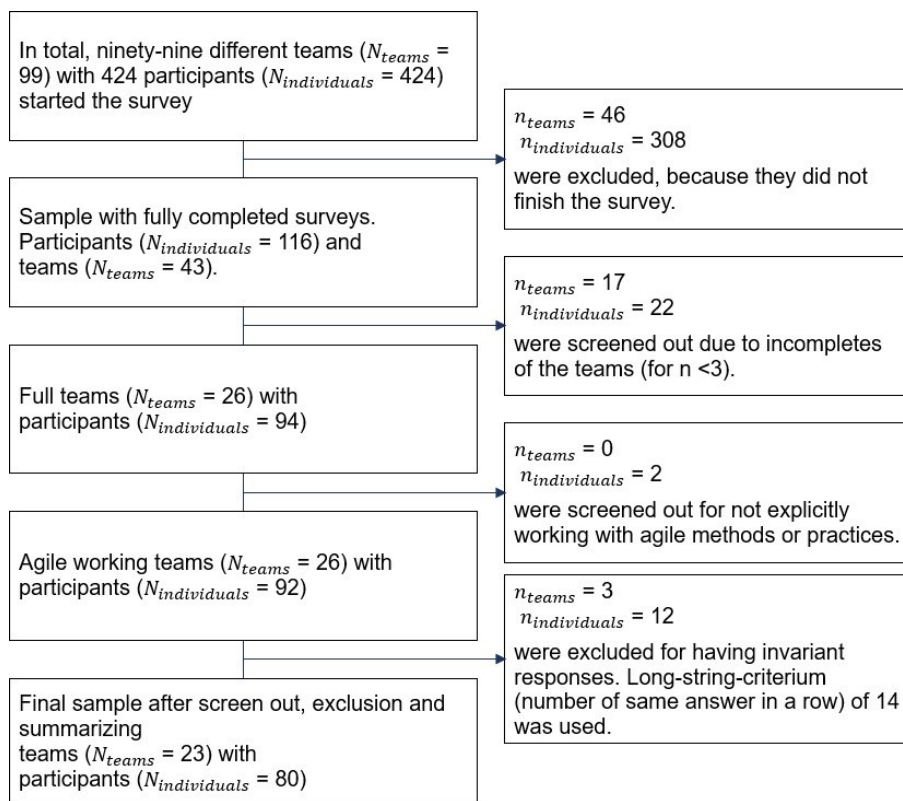
Figure 1: Research model.

Figure 2: Flow Chart of Case Exclusions.

understand the role of team processes (SMM and team empowerment) in this relationship. Thus, I developed 16 hypotheses to test my assumptions. To validate or falsify these assumptions, I chose a cross-sectional, quantitative study design in form of an online survey. An online survey as a research design represents an appropriate instrument to collect data from a large number of individuals and to draw inferences regarding a larger group (Marshall & Rossmann, 2006). One strong advantage of online surveys is the capa-

bility to collect data fast and easily. Further, the distribution channels of an online survey allowed me to gather information from a more comprehensive participant sample (Döring & Bortz, 2016). Another advantage is the opportunity to apply appropriate analysis methods for online data (Laanti et al., 2011).

3.2.2. Procedure

To prepare and distribute the online questionnaire, Unipark[2], a web-based survey software program, was used. Prior to distributing the survey, I pretested it. The pilot survey was sent to some colleagues of mine who had experience in working with agile methods. They were asked to provide feedback regarding the understanding of the self-developed team agility construct, the approximated length of the survey, and general errors (e.g., spelling mistakes or incorrect formatting). The goal was to optimize the survey to avoid potential dropouts based on their feedback. Hence, the item "My team uses the 'product vision' concept." was changed to "My team uses the 'product vision' concept (e.g., north star)." in order to be clearer. The pilot survey also provided an approximation for the average time to complete the survey (Creswell, 2008), which was relatively long. Therefore, the number of open-questions regarding the use of agile ways of working on an organizational-level was reduced from six to two. Moreover, the pilot survey highlighted spelling mistakes and items that were difficult to understand that were then changed accordingly.

I created 120 specified team links. Thus, the links helped to first, categorize single participants to one team and second, keep track of the progress of the teams. Only people that used agile practices were contacted. I followed three different approaches to contact them. First, I contacted personal acquaintances directly via LinkedIn[3]. Second, I contacted people that I did not know personally via LinkedIn by searching for keywords in profiles like "AGILE", "AGILE TRANS-FORMATION", "SCRUM", "SCRUM MASTER", and "PRODUCT OWNER". I tried to contact those people by sending a request to connect. In these cases, I sent a personal message to each one. I explained that I was conducting a survey as part of a research study. Further, I introduced the purpose of the study and asked whether they have worked with agile methods (or parts of it). I offered to share an excerpt of the results[4] with them once the study was finished. That offering had two intentions: First, to increase the willingness to participate (Döring & Bortz, 2016) and second, to increase the validity of self-reporting measures through honest responses (Mertens, 2005). The message ended with the question of if they would like to participate or if there are still open questions (see Appendix B). After receiving a positive response, I sent a follow-up message that included a specified team link to the survey. Further, I added information regarding the approximate length of the study (10 minutes) and that two-language options (English and German) available (see Appendix C). At the end, I reminded the participants to distribute the link to the survey by themselves in their team.

The team-specific link enabled me to track how many participants per team completed the online survey at any point of time. If after two weeks, less than three members of a team had participated, I sent another reminder message via LinkedIn (see Appendix D). If one week later, the minimum of three participants had still not been reached, I sent another reminder message. After that, no further reminders followed. The follow-up reminder emails were sent in order to encourage participation (Dillman, Smyth, & Christian, 2014).

The third approach to collect data differs to the previous ones. I joined eight groups on LinkedIn and Xing[5] to extend my reach. I searched for groups with one of the following keywords "AGILE", "AGILE TRANSFORMATION", "SCRUM". In each group, I created one identical forum post (see Appendix E) explaining the research study according to the personal messages (approach one and two). Moreover, the post contained a universal link to the study. The universal link differs in such a way that I was not able to send any reminders, because I received no information about who participated and when.

3.2.3. Study Design

On the initial page, the user could decide for either German or English as the language to proceed. Next, the introductory page stated the purpose of the study, the opportunities to share the results with each participant, and the approximate survey length (10-12 minutes). Before starting the survey, all participants agreed to the terms and conditions in which I ensured all participants' confidentiality, anonymity, with respect to the guidelines of the German Research Foundation[6], and voluntariness. Further, the survey showed an information page, which explained that only teams with at least three participants per team can be considered in this study. Next, I introduced a filter question to ensure that the participant had worked with agile methods or practices. Participants who denied that question were directly guided to an ending page. This page explained that the study only considered teams who had experience in using agile methods or practices. Participants who affirmed the question continued regularly with the survey. Further, I assessed the shared mental models, team empowerment, and team reflexivity. Then, participants were asked to answer items regarding team performance, team satisfaction, and team agility. According to Döring and Bortz (2016), demographic questions followed after the last content block of questions. On the next page, participants were asked if they want to receive the results. They could choose between a management summary, attending a webinar, both, and none. To receive the management summary or to attend the webinar, participants had to provide their email addresses. Lastly, the participants received their team- based created link, were reminded to distribute it within the team, and were thanked for their participation. The average duration was 20.63 (SD = 16.45) minutes.

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[2]Survey software for students & universities developed by the German company Questback GmbH.

[3]A web-based social network for maintaining existing business contacts and making new business connections.

[4]Either a management summary or to particpate in a webinar in which the research process will be explained.

[5]Xing is a German social network in which the members primarily manage their professional contacts.

[6]The German Research Foundation is a registered association that functions as a self-governing institution for the promotion of science and research in the Federal Republic of Germany.

3.3. Measures[7]

All measures of this study were captured with a 5-point-Likert scale ranging from 1 = strongly disagree to 5 = strongly agree, unless stated differently. The bilingual availability of the questionnaire led to a back-translation of all items to German based on Brislin's (1970) suggestions.

3.3.1. Shared Mental Models

The measurement of SMM was distinguished into task-related and team-related. Task- related SMM were assessed by a four-items scale established by Ellwart and Konradt (2007). This scale consists of items to determine the degree of convergence in knowledge structures regarding the performed tasks (one sample item is "I know how the tasks of my team members are related to each other."; $\alpha = .74$). Team-related SMM were assessed with a four items scale established by Konradt et al. (2015). The scale was developed to capture the degree of convergence in knowledge structures regarding the team(work) (one sample item is "I know which team members have expertise in specific areas"; $\alpha = .84$). According to DeChurch and Mesmer-Magnus (2010), I also captured SMM as one construct by using an eight-item scale consisting of the items from both scales. The reported overall Cronbach's alpha was $\alpha = .85$.

3.3.2. Team Empowerment

I measured team empowerment with a 12-item scale from Kirkman et al. (2004) divided into four dimensions with three items in each dimension. One example for meaning of the work of team is "My team feels that its tasks are worthwhile.", for self-determination within a team "My team determines as a team how things are done in the team.", impact of the team "My team performs tasks that matter to this company." and competence of the team "My team can get a lot done when it works hard.". Seibert et al. (2011) and Spreitzer (1995) have shown that those four subdimensions provide a holistic view on whether employees feel psychologically empowered. The four subdimensions were aggregated because they "combine additively to create an overall construct of psychological empowerment. In other words, the lack of any single dimension will deflate, though not completely eliminate, the overall degree of felt empowerment" (Spreitzer, 1995, p. 1444). The reported Cronbach's alpha was $\alpha = .83$.

3.3.3. Team Reflexivity

I measured reflexivity by using a scale introduced by De Jong & Elfring, 2010. The scale consisted of five items (one example regarding work effectiveness is "In our team, we regularly discuss whether we are working effectively together."). The reported Cronbach's alpha was $\alpha = .81$.

3.3.4. Team Performance

I measured team performance by using the four items scale developed by Lewis (2004). The scale consisted of items regarding the quality of the team output (e.g. "My team's deliverables are of excellent quality.") and the ability of time management (e.g. "My team meets important deadlines on time."). The reported Cronbach's alpha was $\alpha = .73$.

3.3.5. Team Satisfaction

I assessed team satisfaction based on the satisfaction scale of Van Der Vegt, Emans, and Van De Vliert (2000) consisting of two items (one example is "I am satisfied with working in this team"). The reported Cronbach's alpha was $\alpha = .89$.

3.3.6. Team Agility

I assessed the team agility with a self-developed scale based on six agile management practices proposed by Conforto et al. (2014). These agile management practices were classified as fundamentally different from the management practices used in TPM. Specifically, I formulated six statements reflecting each of the six typical agile management practices that are shown in Table 1. The reported Cronbach's alpha was $\alpha = .69$.

3.3.7. Demographic Variables

The measured demographic variables were gender, age, nationality, job position, department, industry, number of employees, and revenue. I measured Gender by using three answer options: 1 = female, 2 = male, 3 = prefer not to answer. In this study, I assessed age with a free text field to enter numbers ("Please enter your age.") and nationality also via a free text field ("Please enter your nationality."). Job position ("What is your current position at your company?") and department ("In which department are you working?") were captured by using a free text field while department was provided with an additional note "Please aggregate your department on the following level e.g., Procurement, Sales, Top Management, R&D etc.". I assessed the item industry by providing a list of 15 industries to choose from plus the option "Other Industry:" with an additional text field. The list of industries can be found in the Appendix F. The number of employees were measured by requesting "Please select the range of number of employees of your company." with the following response options: 1 = 1-49; 2 = 50-249; 3 = 250-499; 4 = 500-999; 5 = 1,000-4,999; 6 = 5,000-9,999 and 7 = > 10,000. The revenue was assessed by asking "Please select the range of number of employees of your company." with the note "Revenue is displayed in million euros." and using the following ranging options: 1 = 0-9; 2 = 10-49; 3 = 50-249; 4 = 250-499; 5 = 500-999; 6 = 1,000-4,999; 7 = 5,000-9,999 and 8 = > 10,000 (see Appendix A).

3.4. Data Analysis

Before I aggregated the data of the team level constructs (SMM, team empowerment, team reflexivity, team agility,

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[7]The data of the present study were collected as part of a larger project, but I will describe only the variables used in the present research study.

Table 1: Overview team agility construct based on Conforto et al. (2014).

	Item
1.	My team uses the "product vision" concept (e.g., north star).
2.	My team uses simple project plan communication tools and processes.
3.	My team uses an iterative planning approach.
4.	My team develops self-managed and self-directed activities in the project plan.
5.	My team uses self-managed and self-directed plan monitoring and updating activities in the project.
6.	My team frequently applies project plan monitoring and updating processes.

team performance and team satisfaction), I computed several indices to measure within and between-team agreement including r_{wg}[8] and ICC[9] (Bliese, 2000; Klein & Kozlowski, 2000b). According to the literature for team analysis (e.g. Mathieu et al., 2008), aggregating single answers from each team member to the mean value per team is the most common and recommended method. In this study, I followed the r_{wg} definition as "the degree of reliability associated with a single assessment of the group mean" (Bliese, 2000, p. 355). Thus, the r_{wg} indicates whether team members show a similar evaluation of an item varying from 0 to 1 (complete agreement to complete disagreement). All values are displayed in Table 2. All values exceeded cutoff-value of 0.70 (introduced by Lance, Butts, and Michels (2006) as a recommendation value. The ICC values show if a construct has enough consistency within a team so that it can be aggregated to the team level (Bliese, 2000). In this paper, I followed Bliese (2000) definition of ICC: "the degree of reliability associated with a single assessment of the group mean" (Bliese, 2000, p. 355). All variables showed acceptable levels of agreement (A. Cohen, Doveh, & Eick, 2001; LeBreton & Senter, 2008).

Prior to hypothesis testing, I controlled whether the conditions for a linear regression were given (e.g., OLS, multicollinearity, homoskedasticity, etc.). I then tested the hypothesis 1a-4b by using linear regression. For moderation and mediation analysis (Hypothesis 5a – 7d), I used the Process Macro (Hayes, 2013). All the analyses were conducted using SPSS (IBM SPSS Statistics Version 25). Means, standard deviations, and intercorrelations between the study variables are presented in Table 3.

4. Results

4.1. Hypothesis Testing

With respect to the positive relationship between team agility and SMM (Hypothesis 1a), findings did support Hypothesis 1a. In line with my expectations, team agility explained a significant amount of the variance in SMM (F(1,21) = 5.25, R^2 = .20, p = .032). As expected, I also found support for Hypothesis 1b. Team agility explained a significant amount of the variance in team empowerment (F(1,21) = 28.66, p = .000, R^2 = .58).

With respect to the positive relationship between SMM and team empowerment, findings supported Hypothesis 2. In line with my expectations, SMM is pistivels related to team empowerment (F(1,21) = 7.28, R^2 = .26, p = .013).

With respect to the positive relationship between SMM and team performance, findings did support Hypothesis 3a. In line with my expectations, SMM explained a significant amount of the variance in team performance (F(1,21) = 4.45, R^2 = .18, p = .047). As expected, I also found support for Hypothesis 3b, i.e., team empowerment is positively related to team performance (F(1,21) = 16.23, R^2 = .44, p = .001).

With respect to the positive relationship between SMM and team empowerment, findings supported Hypothesis 4a. In line with my expectations, SMM explained a significant amount of the variance in team satisfaction (F(1,21) = 16.23, R^2 = .44, p = .001). As expected, I also found support for Hypothesis 4b, i.e., team empowerment is positively related to team satisfaction (F(1,21) = 6.91, R^2 = .25, p = .016). Tables 4 – 6 show the results of Hypothesis 1a to 4b.

Regarding the positive indirect effect of team agility on team performance through SMM, the results did not support Hypothesis 5a. Contrary to my expectations, the results indicated no significant indirect effect of team agility on team performance via SMM (β = 0.06; 95%, CI [-0.06, 0.39]). With respect to the positive indirect effect of team agility on team satisfaction through SMM, findings did not support Hypothesis 5b. In contrast to my expectations, SMM did not mediate the relationship between team agility and team satisfaction (β = 0.16; 95% CI [-0.03, 0.63]).

Regarding the positive indirect effect of team agility on team performance through team empowerment, the results did not support Hypothesis 6a. Contrary to my expectations, the results indicated no significant indirect effect of team agility on team performance via team empowerment (β = 0.23; 95% CI [-0.10, 0.60]). With respect to the positive indirect effect of team agility on team satisfaction through team empowerment, findings did not support Hypothesis 6b. In contrast to my expectations, team empowerment did not mediate the relationship between team agility and team satisfaction (β = 0.36; 95% CI [-0.19, 0.94]).

Contrary to my expectations, the results indicated no significant moderating effect of team reflexivity on the relationship between SMM and team performance (β = 0.06, p = .871). Thus, I did not find support for Hypothesis 7a. With

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[8]r_{wg} = interrater agreement index.
[9]ICC = interclass correlation coefficients.

Table 2: Within-group agreement and between group variance of Study Variables.

Variable	ICC(1)	ICC(2)	F	p	M	rWG(J) Median	rWG(J) N(Teams) <.70
Team Agility	.31	.61	2.58	.002	.80	.91	5
SMM	.19	.44	1.79	.040	.94	.97	3
Team Empowerment	.10	.28	1.39	.161	.96	.96	0
Team Performance	.02	.08	1.08	.391	.85	.91	4
Team Satisfaction	.10	.29	1.40	.153	.77	.91	3
Team Reflexivity	.28	.58	2.37	.005	.83	.88	5

Note. N = 23. ICC = interclass correlation coefficients. rWG(J) = interrater agreement index.

Table 3: Descriptive statistics, reliabilities, and correlations among the study variables.

	Variable	N	M	SD	1	2	3	4	5	6	7	8	9	10
1.	Gender	23	1.61	0.24	NA									
2.	Age	23	30.67	4.76	-.28	NA								
3.	Employees	23	3.91	2.37	.02	.32	NA							
4.	Revenue	23	4.14	2.80	-.05	.27	.96**	NA						
5.	Team Agility	23	3.66	0.49	-.16	.01	-.29	-.27	(.70)					
6.	SMM	23	4.20	0.36	-.09	-.38	-.54**	-.53**	.45*	(.85)				
7.	Team Empowerment	23	4.11	0.31	.06	-.21	-.15	-.09	.76**	.51*	(.83)			
8.	Team Reflexivity	23	3.61	0.58	.01	-.42*	-.25	-.20	.39	.72**	.56**	(.81)		
9.	Team Performance	23	3.89	0.38	.02	-.19	-.19	-.17	.70**	.42*	.66*	.53*	(.73)	
10.	Team Satisfaction	23	4.38	0.49	-.27	-.38	-.17	-.11	.39	.47*	.50**	.69**	.47*	(.89)

Note. Cronbach's α (individual level) are on the diagonal in parentheses. NA = Not Applicable. response categories for gender were: 1 = male, 2 = female and 3 = diverse. Age is displayed in years. Employees and Revenue are displayed in accordance with Appendix A. * p < .05, ** p < .01.

Table 4: Results of Simple Linear Regression Analysis for Hypotheses 1a – 1b.

	SMM			Team Empowerment		
Variable	B	SE B	β	B	SE B	β
Team Agility	0.33	0.14	0.47	1.19	0.22	0.76
R^2		0.20*			0.58***	
F for change in R^2		5.25			28.66	

Note. N = 23. B = unstandardized coefficient. SE B = standard error. β = standardized coefficient. * p < .05. ** p < .01. *** p < .001.

Table 5: Results of Simple Linear Regression Analysis for Hypotheses 3a – 3b.

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
SMM	0.44	0.21	0.42			0.44
Team Empowerment				0.55	0.14	
R^2		0.18*			0.44**	
F for change in R^2		4.45			16.23	

Note. N = 23. B = unstandardized coefficient. SE B = standard error. β = standardized coefficient. * p < .05. ** p < .01. *** p < .001.

respect to team reflexivity moderating the relationship between team empowerment and team performance, the results were not significant ($\beta = 0.32$, p = .344). Thus, I also did not find support for Hypothesis 7b.

Table 6: Results of Simple Linear Regression Analysis for Hypotheses 4a – 4b.

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
SMM	0.64	0.26	0.47			0.64
Team Empowerment				0.32	0.12	
R^2		0.22*			0.25*	
F for change in R^2		5.23			6.91	

Note. N = 23. B = unstandardized coefficient. SE B = standard error. β = standardized coefficient. * p < .05. ** p < .01. *** p < .001.

Contrary to my expectations, the results indicated no significant moderating effect of team reflexivity on the relationship between SMM and team satisfaction (β = -0.28, p = .515). Thus, I did not find support for Hypothesis 7c. With respect to team reflexivity moderating the relationship between team empowerment and team satisfaction, the results were not significant (β = 0.08, p = .860). Thus, I did not find support for Hypothesis 7d. Tables 7 – 8 show the results of the mediation analysis to test Hypotheses 5a to 6b.

4.2. Exploratory Analysis

In accordance with the theoretical framework of SMM (Mohammed et al., 2010) and the results of various scholars (Cooke et al., 2003; Lim & Klein, 2006), I further explored all the assumed relationships involving SMM by separating SMM into task-related SMM and team-related SMM. As previous findings have shown, testing for potential dependencies between SMM types can unmask important findings (Smith-Jentsch, Mathieu, & Kraiger, 2005).

With respect to the positive relationship between team agility and task-related SMM, team agility explained a significant amount of the variance in task-related SMM (F(1,21) = 7.43, R^2 = .26, p = .013). However, results did not show support for the positive relationship between team agility and team-related SMM (F(1,21) = 2.61, R^2 = .09, p = .156).

With respect to the positive relationship between task-related SMM and team performance, task-related SMM explained a significant amount of variance in team performance (F(1,21) = 8.85, R^2 = .30, p = .007). However, results did not show support for the positive relationship between team-related SMM and team performance (F(1,21) = 1.23, R^2 = .06, p = .283).

With respect to the positive relationship between task-related SMM and team satisfaction, task-related SMM explained a significant amount of variance in team satisfaction (F(1,21) = 6.07, R^2 = .22, p = .023). However, results did not show support for the positive relationship between team-related SMM and team satisfaction (F(1,21) = 3.31, R^2 = .14, p = .083,).

With respect to the positive relationship between task-related SMM and team empowerment, task-related SMM explained a significant amount of the variance in team empowerment (F(1,21) = 10.10, R^2 = .23, p = .005). However, results did not show support the positive relationship between

team-related SMM and team empowerment (F(1,21) = 3.03, R^2 = .12, p = .096).

Regarding the positive indirect effect of team agility on team performance through task- related SMM, the results indicated no significant indirect effect (β = 0.06; 95%, CI [-0.06, 0.39]). With respect to the positive indirect effect of team agility on team performance through team-related SMM, findings did indicate that team-related SMM mediated the relationship (β = 0.01; 95% CI [-0.05, 0.21]).

Regarding the positive indirect effect of team agility on team satisfaction through task- related SMM, the results indicated no significant indirect effect (β = 0.19; 95% CI [-0.08, 0.51]). With respect to the positive indirect effect of team agility on team satisfaction through team-related SMM, findings did indicate that team-related SMM mediated the relationship (β = 0.09; 95% CI [-0.04, 0.47]).

The results indicated no significant moderating effect of team reflexivity on the relationship between task-related SMM and team performance (β = -0.10, p = .801). With respect to team reflexivity moderating the relationship between team-related SMM and team performance, the results were not significant (β = 0.21, p = .489). The results also indicated no significant moderating effect of team reflexivity on the relationship between task-related SMM and team satisfaction (β = -0.47, p = .272). With respect to team reflexivity moderating the relationship between team-related SMM and team satisfaction, the results were not significant (β = -0.06, p = .855)

Given that the small sample team size may be the reason for the non-significant mediation findings (Hypothesis 5a – 6b), I conducted an exploratory investigation into the same mediating relationships on the individual-level (N = 98).

The results showed a positive indirect effect of team agility on team performance through SMM. The results indicated a partial mediation via SMM (β = 0.10; 95% CI [0.03, 0.19]). With respect to the positive indirect effect of team agility on team satisfaction mediated by SMM, the results indicated a partial mediation by SMM (β = 0.13; 95% CI [0.04, 0.26]).

The results showed a positive indirect effect of team agility on team performance via team empowerment, indicating a partial mediation (β = 0.21; 95% CI [0.08, 0.36]). With respect to the positive indirect effect of team agility

Table 7: Results of Mediation Analysis for Hypotheses 5a – 5b (Mediator SMM).

Outcome	Effect of IV on mediator (a)	Unique effect of mediator (b)	Direct effect of IV (c)	Standardized indirect effect	BC 95% CI		Total model effect (a x b + c)	BC 95% CI	
					LL	UL		LL	UL
Team Performance	0.33*	0.14	0.49**	0.06	-0.06	0.39	0.54***	0.29	0.79
Team Satisfaction	0.33*	0.50	0.22	0.16	-0.03	0.63	0.39	-0.03	0.81

Note. N = 23. IV = independent variable. DV = dependent variable. BC = bias-corrected. LL = lower limit. UL = upper limit. * p < .05; ** p < .01; *** p < .001.

Table 8: Results of Mediation Analysis for Hypotheses 6a – 6b (Mediator Team Empowerment).

Outcome	Effect of IV on mediator (a)	Unique effect of mediator (b)	Direct effect of IV (c)	Standardized indirect effect	BC 95% CI		Total model effect (a x b + c)	BC 95% CI	
					LL	UL		LL	UL
Team Performance	0.49***	0.37	0.36	0.23	-0.10	0.60	0.54***	0.29	0.79
Team Satisfaction	0.49***	0.74	0.03	0.36	-0.19	0.94	0.39	-0.03	0.81

Note. N = 23. IV = independent variable. DV = dependent variable. BC = bias-corrected. LL = lower limit. UL = upper limit. * p < .05; ** p < .01; *** p < .001.

on team satisfaction mediated by team empowerment, the results indicated a partial mediation by team empowerment ($\beta = 0.28$; 95% CI [0.14, 0.44]). Tables 9 – 10 show the results of the exploratory mediation analysis.

5. Discussion

The application of team agility has developed into a mainstream approach in the workplace context in order to cope better with change (Denning, 2018; Tessem, 2014). Although a principle of the Agile Manifesto holds that individuals and interaction take precedence over tools and processes (Beck et al., 2001), we still lack insights into how the human-side functions. Moreover, one critical issue is the absence of a theoretical basis of team agility that puts it into the context of teamwork research. Therefore, the main goal of the current study was to examine the impact of team agility on team effectiveness using SMM and team empowerment as potential mediators in the relationship between team agility and team outcomes. Further, using team reflexivity as a moderator in each relationship between mediators and team outcomes, my work provides an important step towards a new theoretical viewpoint of team agility. In order to theorize and empirically investigate the impact of team agility, I draw on the IMO-framework (Ilgen et al., 2005) and examined agile teams in various industries without limiting my study to a specific agile method. Furthermore, this study builds on specific management practices used in team agility (Conforto et al., 2016).

The results indicated a positive relationship between team agility and team effectiveness. These findings are in line with previous research (Schmidt et al., 2014), but also extend it with a different study focus. The present study focused more on the investigation of team agility in general than on limited specific agile methods. Results also showed

that team agility worked as an antecedent of both, SMM and team empowerment, that facilitate team effectiveness. Besides, results showed a positive relationship between these two emergent states. In line with previous research (Kirkman et al., 2004; Lim & Klein, 2006; Seibert et al., 2011), my findings showed a positive relationship between all four relationships of the mediators (SMM and team empowerment) and the outcomes (team performance and team satisfaction). Further, the results showed no mediation effects for SMM and team empowerment in the relationship to team performance and team satisfaction. However, the results have indicated that a total model effect exists for the relationship between team agility and team performance mediated by SMM and team empowerment. No moderating effect of team reflexivity on the relationship between SMM and team performance respectively team satisfaction was supported by the results. Also, the findings did not support a moderating effect of team reflexivity on the relationship between team empowerment and team performance respectively team satisfaction.

5.1. Interpreting the Results
5.1.1. Team Agility and SMM

The current study revealed that team agility positively impacted SMM. These findings validate the conceptual analysis of Yu and Petter (2014): team agility is beneficial to the development of SMM. Further, it extends the research of Schmidt et al. (2014) regarding the impact of team agility on SMM. They focused on software development teams that applied specific agile practices or methods. Thus, my results imply that the building of SMM through team agility is not bound to certain industries (e.g., software development) or methods (e.g., Scrum). These results can be explained and understood in two ways. First, the results are in line with the argumentation that team agility impacts the building of SMM because it encapsulates important antecedents

Table 9: Results of Exploratory Mediation Analysis for (Mediator SMM).

Outcome	Effect of IV on mediator (a)	Unique effect of mediator (b)	Direct effect of IV (c)	Standardized indirect effect	BC 95% CI		Total model effect (a x b + c)	BC 95% CI	
					LL	UL		LL	UL
Team Performance	0.29***	0.34*	0.41***	0.10	0.03	0.19	0.51***	0.33	0.68
Team Satisfaction	0.29***	0.53**	0.35*	0.13	0.04	0.26	0.50***	0.28	0.71

Note. N = 98. IV = independent variable. DV = dependent variable. BC = bias-corrected. LL = lower limit. UL = upper limit. * p < .05; ** p < .01; *** p < .001.

Table 10: Results of Exploratory Mediation Analysis for (Mediator team empowerment).

Outcome	Effect of IV on mediator (a)	Unique effect of mediator (b)	Direct effect of IV (c)	Standardized indirect effect	BC 95% CI		Total model effect (a x b + c)	BC 95% CI	
					LL	UL		LL	UL
Team Performance	0.46***	0.46**	0.30**	0.21	0.08	0.36	0.51***	0.33	0.68
Team Satisfaction	0.46***	0.72***	0.17	0.28	0.14	0.44	0.50***	0.28	0.71

Note. N = 98. IV = independent variable. DV = dependent variable. BC = bias-corrected. LL = lower limit. UL = upper limit. * p < .05; ** p < .01; *** p < .001.

of SMM. In detail, the iterative planning approach of team agility can work as one factor to facilitate SMM as Orasanu (1994) has shown that (effective) planning facilitates the building of SMM. In fact, regular planning is also associated with frequent communication and alignment what can lead to a better coordination. That means the iterative planning approach of team agility contributes to a shared understanding of the next steps and ensures that the team is on the same page. Second, team agility can be interpreted as a form of structured self-reliance. A team agrees on intra-team related working guidelines (e.g., Scrum framework) and adopts them. Adopting these kinds of working norms is comparable to committing to one philosophy. The more pronounced this takes place, the greater the resulting shared philosophy on the working model. Therefore, a shared philosophy can foster clarity regarding teamwork (e.g., how to work, how to interact). The common philosophy ensures one mindset among team members, which can contribute positively to the building of SMM (Klimoski & Mohammed, 1994). Moreover, team agility can be understood as an important antecedent of SMM.

5.1.2. Team Agility and Team Empowerment

Another important finding was that team agility positively impacted team empowerment. These findings extend previous research studies (Tessem, 2014), which showed greater individual empowerment through an increased flow of information in agile work teams compared to traditional, more documentation-oriented work teams. My study adds an additional layer of inquiry by examining the issue at the team level. My findings can be interpreted in three ways. First, the results are in line with the argumentation that team agility impacts team empowerment because it encapsulates important antecedents of team empowerment. According to Seibert et al. (2011), socio-political support leads to greater team

empowerment. Therefore, it seems like teams with a higher degree of freedom (respectively team agility) experience a higher feeling of competence because they feel socio-political support. Socio-political support can be expressed by providing employees with resources that are either material, social, or psychological (Spreitzer, 1996). Thus, one explanation could be that team agility provides some kind of socio-political support in form of psychological resources, so that it positively impacts team empowerment.

Second, it is possible that advanced team agility results in a greater feeling of team empowerment through participative decision-making and shared leadership. One important component of team agility is the ability to distribute and prioritize tasks together in the team without being told by management (Moe et al., 2008). Therefore, it can enhance the team's feeling of responsibility and ownership. These feelings perhaps reflect an increased experience of autonomy and competence. This working approach can also be characterized as one form of high-management performance practices. High-management performance practices work as an antecedent of team empowerment. They are intended to provide employees with better control over their work (Seibert et al., 2011).

Third, it is possible that team agility advocates high information sharing, which fosters the team's feeling of empowerment. Teams who work agile aim to provide each team member with as much information as possible, often daily (e.g., daily stand-ups). Another way of information sharing that they use are so called information radiators, such as burn charts (Williams & Cockburn, 2003). Information radiators are used to easily make information on the status of the project visible and transparent to all. In addition, the increased exchange of information eventually has a positive effect on the team's feeling of competence, as it has a better basis for making decisions.

Overall, these findings may help us to understand the positive relationship of team agility and team empowerment. My study contributes to a better theoretical understanding of the impact and consequences of team agility. Further, the findings relate team agility to the literature of team effectiveness by showing team agility as a possible antecedent of team empowerment.

5.1.3. SMM and Team Empowerment

The present study showed a positive relationship between the cognitive emergent state SMM and motivational emergent state team empowerment. My results can be explained in the following ways: High SMM similarity explains that the team is consistent in how to approach a task and how to interact as a team. Having this knowledge possibly fosters the collective belief that they have the competence to master the upcoming tasks. Further, it improves the internal knowledge basis of the team. A team gains knowledge regarding the responsibilities, competencies, and feelings of each team member. In this way, it can contribute to a team's greater empowerment. Using the internal knowledge can support the collective establishment of objectives and the creation of a supportive work environment. In this way, it can contribute to a team's greater feeling of self-determination. Fulfilling the aim of self-determination is an important component to empower a team (Seibert et al., 2011). Overall, these findings can enhance our knowledge about the relationship of cognitive and motivational states. There is an interaction between these two emergent states.

5.1.4. Mediational Role of SMM

My assumptions that SMM positively mediate the relationship of team agility and team outcomes were not supported. These findings could be explained by the following factors: First, team agility and SMM work too similar to identify a mediational effect. Team agility works as a kind of philosophy with a form of structured self-reliance. That means teams commit to a special way of working, which allows them to have a certain degree of autonomy. Therefore, it could be that team agility requires SMM and does not foster it. Having a similar understanding of how to operate as a team is a necessary prerequisite for team agility. Because the responsibilities are shared from the start, the team members must be able to rely on each other (Moe et al., 2008). If a team member is unable to predict the next steps which other team members are planning and how they can be supported to be successful, it may diminish the applicability of team agility. Further, it is possible that team agility enables increased communication, coordination, and visibility of tasks (Dingsøyr, Dybå, & Moe, 2010; Williams & Cockburn, 2003) that may render the effects of SMM obsolete. While SMM are developed that team members can better predict and expect what other team members are doing, the nature of cooperation in agile working teams might substitute that through the open and free communication.

Second, it is also possible that different emergent states might explain the relationship between team agility and team outcomes. For example, team trust could be investigated as an additional mediator. Team trust refers to the willingness of each team member to believe that the others will perform their tasks as expected without controlling them (Mayer et al., 1995). Team agility relies on self-organizing and collaboration in the team. Self-organizing, agile teams must be able to rely on each other because each team member is responsible for his or her own tasks. When one team member is not delivering the results on time, it will negatively affect the whole team (McHugh, Conboy, & Lang, 2011). Further, team agility promotes open communication and problem sharing that is needed to discuss mutually next steps and to reflect on the past performance period (Moe et al., 2010). When teams lack trust, it has a negative impact on their collaboration. Team members will shift their focus to monitoring and controlling each other rather than sharing ideas (Salas, Sims, & Burke, 2005). Thus, team trust is an emergent state that could be better suited to impact the relationship between team agility and team outcomes.

Moreover, my exploratory analysis supported that SMM positively mediates the relationship of team agility and team performance. It is possible that the constructs were perceived differently on an individual-level than on a team-level so that their relationship worked better on an individual-level. One reason for this could be that team agility impacts some individuals more than others. Those promote their development of SMM to greater extent compared to other team members. This effect could be neglected on a team-level if others feel the opposite or did not experience the effect as strongly. This could be also related to their individual knowledge and experience with team agility. Team members who have already worked agile over a longer period could not perceive that effect because they already developed a mental model which they also assume the others to have.

Overall, the results demonstrate that SMM did not mediate the relationship of team agility team performance or team satisfaction. Thus, the need to test further variables which may mediate these relationships persists. In agreement with LePine et al. (2008), other team processes should be examined.

5.1.5. Mediational Role of Team Empowerment

Contrary to my expectations, team empowerment did not mediate the positive relationship of team agility and team outcomes. These findings could be explained by the following factors: First, in this relationship, team agility already requires team empowerment. Teams that are self-managed and self-organized need to be empowered in the first place. When a team does not believe in its competence and self-determination, team agility would not be the right working approach for them. In addition, team members need to have a strong will to overtake responsibility if they want to work successfully. In other words, some components of team empowerment could be an important antecedent of the willingness to work agile. Another explanation could be that team agility enables feelings of self-determination and competence through the self-managing nature so that team empower-

ment is not that essential to reach high outcomes. Thus, it can be that team agility per se captures some effects of team empowerment in such a way that it diminishes the relationship via team empowerment to team outcomes.

Second, it is also possible that different emergent states might explain the relationship between team agility and team outcomes. For example, team cohesion could be investigated as an additional emergent state. Team cohesion refers to the commitment of the entire team to hold together and share agreement on team responsibilities and team tasks (Mullen & Copper, 1994). It implies that the team is aligned considering their priorities. Frequent communication supports the integration of all team members into a team and create a cohesive atmosphere (McHugh et al., 2011). Information sharing through information radiators increases the awareness of the entire project team regarding what is the status quo (Williams & Cockburn, 2003). Through reducing the lack of awareness, team cohesion should be impacted by team agility (Whitworth & Biddle, 2007). Thus, team cohesion is an emergent state that could be better suited to impact the relationship between team agility and team outcomes.

In addition, the exploratory analysis showed that team empowerment positively mediates the relationship of team agility and team performance. It is possible that the constructs were perceived differently on an individual-level compared to the team-level so that their relationship worked on an individual-level. One reason for this could be that the individuals differ in their perception of empowerment. Whereas one could perceive the self-organizing nature of team agility as self-determination, the other could perceive that more as a burden. Further, their feelings may differ along the team empowerment dimension of meaningfulness. For one individual, it could be more related to the way of working whereas someone else could relate it more to the topic they work on. That means the dimensions of team empowerment can differ among individuals such that the effect of team empowerment was not observable on a team-level. This could also be related to their individual knowledge and experience with team agility. Team members who already have experiences with team agility may have a different understanding of team empowerment compared to others.

Overall, the results demonstrate that team empowerment did not mediate the relationship of team agility, team performance, or team satisfaction. Thus, the need to test further variables which may mediate these relationships persists. In agreement with LePine et al. (2008), other team processes should be examined.

5.1.6. Moderating Role of Team Reflexivity

This study did not find any moderating effect of team reflexivity in the relationship between the mediators and the team outcomes. That could be explained in three ways. First, I argued that team reflexivity creates conditions in which teams embrace a higher level of self- awareness to be better aligned in terms of team interactions and tasks. But this may hold only for teams that work traditionally and not agile. Two core components of team agility is frequent com-

munication and regular planning (Dybå & Dingsøyr, 2008). These components can counter the effect of team reflexivity to create awareness and an open atmosphere of sharing experiences because those conditions are present the whole time. In an agile work environment, teams constantly challenge and adapt their solution approach (Schwaber, 2004).

Second, agile working teams are may limited in their functional dimension, thus, a lack of diversity can affect the impact of team reflexivity (Yang et al., 2020). Poor diversity in a team can hinder a broad range of information because the degree of cognitive overlap increases, and teams miss necessary perspectives. Thus, team reflexivity cannot unfold its effects and contribute to a work environment in which teams diversely assess their status quo.

Third, teams may require some important drivers of effective team reflexivity, like feedback availability, psychological safety, and empowering leadership (Otte et al., 2019). When these antecedents are not met, team reflexivity is likely to fail. Teams may spend too much time on superficial considerations and omit important topics or come to false conclusions (Konradt et al., 2016). Thus, team reflexivity cannot embrace conditions such that it positively impacts the relationship between emergent states and team outcomes. In sum, in teams with an agile working approach, team reflexivity possibly conflicts with the general openness of teams in such a way that it cannot truly unfold its benefits in these conditions. Team agility seems to encompass at least parts of team reflexivity so that it diminishes the impact of team reflexivity. Interestingly, the analysis revealed that reflexivity was negatively related to age, meaning that the older the participants, the less they reflected. A closer examination of this finding offers an interesting avenue for future research, as it could provide important insights into how willingness to adapt to a particular practice changes with age.

5.1.7. Task-related SMM and team-related SMM

According to Mohammed et al. (2010), previous studies have too often disregarded the multidimensional nature of SMM. Therefore, this study examined additionally task-related SMM and team-related SMM separately in an exploratory manner. The results showed different direct effects for both SMM dimensions on all variables. These findings are in line with previous studies showing different effect sizes when separating the SMM dimensions into task-related and team-related (Cooke et al., 2003; Lim & Klein, 2006; Mathieu et al., 2000; Mathieu et al., 2005). A possible explanation is that this is related to the context domain the teams operate in. The idea of SMM is mostly applied and investigated in a more action-based environment, like military teams (Mohammed et al., 2010), where a task-related SMM is may more important, because the interaction and communication follows strict hierarchies and principles. Similar for top-management teams in a corporate world, they would probably focus more on how to operationally conduct a task because the communication is associated to be time consuming and to be responsible for decision delays (Smith et al., 1994). Both team contexts have in common that they

normally face high-complex tasks and where the teams are primarily evaluated by their performance. Thus, teams are rather concentrating on finding solutions by taking all internal and external circumstances into consideration than aligning the way how they work together. I assume that results could differ in work contexts where teams are not always confronted with high pressure situations.

Further, team agility positively impacted task-related SMM, but not team-related SMM. It is possible that task-related SMM is more important in an agile working context. One reason for this could be that the focus of the iterative planning approach is on continuous adaptation to work objectives and performance requirements. The whole team regularly discusses what has been achieved in the past performance period and what has to be next in order to fulfill the project goals. Additionally, agile work teams often use the product vision concept (Highsmith, 2004). The product vision concept is designed for teams to define their overarching project goal. Thus, these measures contribute to a better shared understanding of the tasks. Task-related SMM refer to a team similarity in knowledge structures regarding which task should be performed next and how should it be performed to reach the goal. Therefore, team agility works better as an antecedent for task-related SMM than for team-related SMM. However, the interaction between both forms of SMM lead me to conclude that they combine in some manner to impact team outcomes. Presumably, these effects can change over time and become more aligned for teams working together over longer periods.

5.2. Theoretical Implications

This study makes several important contributions to the existing agility literature and teamwork research, linking the two. First, my study extends previous work on the impact of team agility on team performance (Campanelli & Parreiras, 2015; Schmidt et al., 2014; Serrador & Pinto, 2015) beyond focusing on explicit agile methods (e.g., Scrum) or certain industries (e.g., software development). By introducing a measurement approach to assess team agility, it opens the path to a broader investigation of team agility beyond the software development context. I argue that the application of team agility becomes more and more popular in the organizational context (Denning, 2018; Tessem, 2014) without knowing whether it delivers the expected impact or not. Thereby, it helps to further explore and understand how the human side of team agility functions.

Second, my findings successfully integrate the agile literature and teamwork research by demonstrating team agility as an essential driver for the emergence of team effectiveness. In contrast to most previous literature (Dingsøyr et al., 2010; Dingsøyr et al., 2016; Laanti, 2013; Moe et al., 2010), I provide empirical support for the theorized relationship. Besides, the implementation of team agility in the IMO-framework provides a strong theoretical basis for explaining the impact of team agility at the team level. In this way, my study contributes to prior literature on team effectiveness by showing that SMM and team empowerment are related to

team agility. Moreover, I respond to the calls of Stray et al. (2018), who demanded, from the agile literature stream, a more detailed investigation of mechanisms that enable agile work teams who coordinate their actions and behaviors as a response to internal and external circumstances. Further, Mathieu et al. (2017) asked, from a teamwork research perspective, for deeper insights regarding teaming in new work arrangements, like the agile work context. By examining team agility with a focus on emergent states as a consequence of it, this study also provides additional insights into how the human side of team agility works (Grass, Backmann, & Hoegl, 2020; Schmidt et al., 2014). By clearly outlining the relationship of team agility and emergent states, this study goes beyond the existing literature. While previous literature relied on conceptualizations (Moe et al., 2008; Yu & Petter, 2014) or a limited investigation perspective (Hoda & Murugesan, 2016; Schmidt et al., 2014), this study could validate that relationship on a broader scale. Thus, my results can form the basis for a more detailed analysis of team agility by providing more theory-based ideas of how team agility functions in organizational contexts. Third, this study helps us to better understand and critically review the concept of team reflexivity in the context of team agility. Team reflexivity is a well-known and investigated concept that is positively related to team outcomes (Konradt et al., 2016). As team reflexivity is anchored in the idea of team agility (Beck et al., 2001; Moe et al., 2010), I argued that it should be investigated if it strengthens the relationship of emergent states (SSM and team empowerment) and outcomes in an agile work context. Surprisingly, in my study, team reflexivity did show any effect. One of the issues that emerges from these findings is if the impact of team reflexivity is reduced in an agile work environment. One reason could be that an agile work environment fosters an open communication and discussion forum on a regular basis. If so, there is a necessity to reevaluate whether the concept of team reflexivity holds up in these work environments. This study did not distinguish between self-regulated reflexivity or guided reflexivity. They differ in their initiation. While self-regulated reflexivity focuses on a dynamic process that happens by chance, guided reflexivity focuses on a structured and pre- arranged teamwork session (Otte et al., 2019). Team agility relies on a more structured reoccurring team reflexivity process. In combination with the open-minded teamwork policy that should foster self-regulated reflexivity, it can be assumed that the positive effect of the specific team reflexivity session decreases. Further, time is an important factor, as teams need to develop over time to implement a meaningful reflexivity process.

Lastly, this study also contributes to SMM research by enhancing our knowledge of the relation to team empowerment and by further supporting our understanding of task-related and team-related SMM. By doing so, I respond to the call of Mohammed et al. (2010), who suggested to further extend the criteria and context of empirical research of SMM and to measure multiple SMM content domains. Results extend literature by showing a relationship between SMM and team empowerment, demonstrating the impact on team satisfac-

tion. However, the causal effects remain unclear. In the context of decision-making management teams, the task-related SMM is the predominant component that positively impacts team outcomes, such as team performance or team satisfaction. Knowing that, the study helps to better clarify the roles of both mental models.

5.3. Practical Implications

The results of my study also provide valuable insights for various practitioners, including decision-makers, project managers, human resource managers, or, more broadly, organizations. In general, my findings should encourage organizations to adopt team agility as a project management approach. Team agility helps to increase SMM and team empowerment of teams. For example, SMM are especially useful for teams that operate in a complex, dynamic, and uncertain environment (Cannon-Bowers et al., 1993). Teams that share an internal knowledge base and agree on what tasks need to be completed and with whom actions need to be coordinated consequently demonstrate better team performance. Further, organizations benefit from team agility as it impacts team empowerment. Team empowerment is a newly arising important factor for the future workforce. Graduates strive for self- determination, meaningfulness, and making an impact. Implementing team agility as a work approach can support organizations in remaining attractive for future employees as it is a state- of-the-art working approach.

Human resource manager should seek for employees who exhibit skills and competencies that are inherent in agile work teams, such as the ability to self-organize and self-manage. Further, they can design developments paths for employees to practice those abilities. In alignment with the corresponding organization, they can advertise their firm with the benefits of team agility like perceived team empowerment or creating an internal knowledge basis with their colleagues (SMM).

Project managers can make use of the results because they offer them team agility as a new project management approach. Implementing (parts of) team agility supports the development of SMM and the feeling of team empowerment. When they assemble a new team, they can use the team agility approach to bring the team on the same page regarding their task- and teamwork. Moreover, the self-organizing approach can be used to take some pressure of the project manager by distributing responsibilities. However, they should be aware of the fact that team reflexivity is not always the way to go for agile working teams. Moreover, it should be considered how and when teams reflect. Even though agile practitioners propose a routine to reflect (Abrahamsson et al., 2002), my findings should serve as caveats. The beneficial implications of team reflexivity can depend on various impact factors, like task complexity, team development stage or type, or reflexivity (self-regulated vs. guided). Therefore, project managers should experiment with the optimal way of when and how to apply team reflexivity.

The study is beneficial for decision-makers because they can better assess the impact and effectiveness of team agility in a more generalized context (e.g., compared to software development context). Through developing a better understanding of how the mechanisms triggered by team agility work, decision-makers are provided with an idea of how the power of team agility unfolds. Therefore, they should keep in mind that results proved that teams with greater team agility also showed greater effects. Examining the impact of team agility on SMM and team empowerment provides decision makers with valuable insights into what other factors they should consider when evaluating the benefits of team agility.

Overall, this study provides evidence that team agility positively impacts the SMM and team empowerment, that, in turn, leads to higher team effectiveness. The assumption that team agility encompasses great features for improving collaboration within the team could be validated.

5.4. Limitations and Future Research

Despite the promising results, this study does not come without some limitations. However, some of these can also provide opportunities for future research. First, this research is based on a relatively small sample size. A small sample size comes with low statistical power and is susceptible to a type II ("false positive") error. Thus, the generalizability is limited, and the data must be interpreted cautiously. Future research may attempt to replicate this study with a larger and more international sample size to validate my findings. I assume that different cultures tend to stick differently to team agility management practices, which could reveal a more comprehensive view of single effects.

Second, the cross-sectional survey design does not allow to draw conclusions about causality because all variables were assessed simultaneously. But teams go through a process of development (e.g., forming, storming, norming, performing) that leads to a change in their interactional behavior (Tuckman, 1965) and team emergent states change over time (Marks et al., 2001). For example, it is conceivable that relationships differ for new teams compared to teams that have been working together for a while. Future research should investigate these complex relationships in longitudinal studies. Besides, an interesting new research avenue includes studying team agility and the emergence of SMM and team empowerment over time. Next, given that this study relies only on self-reporting measures, it can result in a self-reporting measure bias. Participants might rather give desired than honest answers. In addition, various questions may have been rather difficult to answer accurately to oneself, like evaluating the team agility or team performance. Participants may answer team agility better or worse if they like or dislike this approach. In terms of evaluating their own team performance, participants may be more likely to rate their performance as they would like it to be. In particular, future attempts should be made to measure team performance either by external raters or on the basis of more objective criteria. To reduce the self-reporting bias completely future research should aim to observe actual behavior. One idea would be to use the state space grids method to better cap-

ture and analyze team dynamics (Meinecke, Hemshorn de Sanchez, Lehmann-Willenbrock, & Buengeler, 2019).

The aggregation of individual data on team-level showed that the ICC(2) estimates are not ideal compare to the standard .70 benchmark. But in accordance with Bliese (1998), it is not unregular that ICC(2) values are rather low when teams are small. By choosing three as a minimum amount of team members to form a team, the team average of this study is with 3.48 individuals per team rather small. Bliese (1998) argued that a possible explanation for low mean team reliability can be the underestimation of actual team-level relationships. However, researchers should note that both the ICC(1) and the rWG values are within a common and acceptable range.

Lastly, I used a not established construct to measure team agility in a quantitative empirical research design. Nonetheless, the reliability and validity checks (Cronbach's $\alpha = 0.69$) were rather acceptable and build on the identifications of typical agile project management practices (Conforto et al., 2014). However, future research should strive to further improve the proposed construct by conducting qualitative research (e.g., interview agile practitioners), a confirmatory analysis, and ultimately, validate and introduce the construct. In addition, it should be investigated if team agility could be distinguished into teamwork and taskwork dimensions, like the traditional literature on work teams does (Fisher, 2014). These caveats should be kept in mind when interpreting my results.

Countering these limitations, the study provided some strengths that should be noticed as well. One important strength is the investigation of teams from different industries as well as teams with different functional roles. This allows us to generate a broader perspective of team agility. In total, teams varied across 14 different industries and 13 functional roles. In addition, I was able to assess teams consisting of various team sizes, ranging from minimum three to maximum six people. Investigating different team sizes is important because it can reveal vital information about dynamics of distinct teams.

5.5. Conclusion

More and more organizations are adopting team agility as a working approach to cope with the arising challenges of a rapidly changing work environment and to deal with increasing complexity (Conforto et al., 2014; Denning, 2018). Previous research did not sufficiently investigate the impact of team agility on team effectiveness, and especially how the relationship between team agility and emergent states works. Therefore, the goal of my research study was to combine the new literature stream on team agility with established theories from teamwork research.

My results indicate that team agility has a positive impact on both SMM and team empowerment. Team agility incorporates important antecedents of SMM, like iterative planning, that foster the development of SMM. Moreover, it is the nature of agile teams to work self-organized and self-managed within a certain framework. This form of struc-

tured self- reliance can facilitate the teams' perception of empowerment through increased feelings of autonomy and competence. Further, the results showed that the role of team reflexivity in an agile work environment remains unclear. Although team reflexivity is an essential component of team agility, it did not create conditions that fostered a relationship between SMM, respectively team empowerment, and team outcomes. These findings help us to understand and explain how team agility can contribute to team effectiveness.

Overall, my study takes a significant step towards the integration of the literature stream on team agility and teamwork research. My work can provide the foundation for further research and theory on team agility as an approach to increase team effectiveness. The insights into the relationship between team agility and SMM and team empowerment improves our understanding of how the human-side functions in an agile work environment.

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