The Relationship between Management Team Size and Team Performance:

*The Mediating Effect of Team Psychological Safety*

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Abstract

The purpose of this thesis is to explore the relationship between team size (number of team members) and team performance in management teams. There is a lack of empirical research exploring the potential links between these two elements within management teams. Further, little attention has been paid to potential mechanisms affecting this relationship. In this study, team psychological safety has been examined as a potential mediator in the size-performance relationship, hypothesizing that team size and team performance are negatively related and that team psychological safety will mediate the relationship between team size and team performance. Data was collected using a questionnaire titled “effect”, which measured effectiveness within 215 management teams in Norway and Denmark. Results showed that there was a negative association between team size and team performance and that team psychological safety significantly mediated this relationship. These findings contribute to the understanding of the relationship between input factors, processes and outcomes in management teams, showing that team size negatively affects team performance. Furthermore, larger teams tend to be associated with lower levels of team psychological safety, which in turn is negatively related to team performance.
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TEAM SIZE AND PERFORMANCE IN MANAGEMENT TEAMS
The Relationship Between Management Team Size and Team Performance:  
The Mediating Effect of Team Psychological Safety

Management teams are assumed to play a pivotal role in an organization’s performance and success (Finkelstein, Hambrick & Cannella, 1996; Certo, Lester, Dalton & Dalton, 2006), by providing leadership and working strategically, through being goal-oriented, and unifying competence, skills and abilities from distinct departments within the organization.

A management team’s ability to perform well is linked to both internal and external characteristics of the team and processes within the team (Marks, Mathieu & Zaccaro, 2001). One such internal characteristic is team size. However, few studies have examined the relationship between team size and team performance within management teams, and the limited number of studies that do exist, show mixed findings. Examples of such studies are Wheelan (2009), which included management teams as part of a larger team sample, Espedalen (2016), which studied management teams at different organizational levels, and Halebian and Finkelstein (1993), which studied the relationship between management team size and firm performance.

As suggested by Amason and Sapienza (1997), it is not team size itself that is problematic or beneficial with regards to organizational performance, but rather the diverse effects that team size produces through different mechanisms within the team. On one hand, increased team size provides the opportunity for larger amounts of information to be shared and the potential to add more diverse perspective when making decisions and planning ahead (van Knippenberg, De Dreu & Homan, 2004). On the other hand, increased team size can lead to coordination problems, motivational loss (Steiner, 1972), relational problems within the team and a wide range of biases linked to social categorization (Tajfel & Turner, 1979). In general, it is assumed that size is negatively associated with team size, outweighing the potential benefits when increasing the number of team members (van Knippenberg et al., 2004).

Few studies however, have looked into the mechanisms that potentially influence the relationship between team size and team performance in management teams. By examining potential mediators for this association, we can broaden our understanding of how team size influences team performance.

In this thesis, I will examine the association between team size and team performance, and examine to what extent team psychological safety plays a mediating role in this relationship.
Conceptual Framework

Management Team

A management team can be defined as “a group of individuals, each of whom has a responsibility of leading some part of an organization, who are interdependent for the purpose of providing overall leadership for a larger enterprise” (Wageman & Hackman, 2010, p. 477). A management team usually consists of a senior leader, and leaders for distinct departments within the organization who report to the senior leader. Management teams are crucial in an organization due to their contribution in terms of decision making, strategic planning and providing direction for the organization (Bang & Midelfart, 2012).

A management team is expected to create added value for the organization; outcomes that exceed the sum of the individual contributions of the leaders and their departments. To achieve these goals, management teams must participate in activities such as information sharing, the discussion of matters of importance, the evaluation of ongoing processes within the organization, and decision making, concerning different aspects of organizational work and future strategies (Bang & Midelfart, 2012).

Team Psychological Safety

Edmondson (1999) defines team psychological safety as “…a shared belief that the team is safe for interpersonal risk-taking… and that the team will not embarrass, reject or punish someone for speaking up” (p.354). Within management teams, the above definition refers to the climate between members of the management team when they share thoughts and ideas, make decisions and discuss matters and issues related to the organization.

Within the related literature, the terms: ‘psychological safety’; ‘team psychological safety’; and, ‘team trust’, are often used interchangeably. For the purpose of this study, the term ´team psychological safety´ will be used. The construct of the study is at the group level, describing the group (team) climate, as opposed to focusing on each team member’s individual feelings or perceptions concerning their sense of psychological safety. Team psychological safety refers to a group climate that encourages team members to openly share thoughts, discuss controversial issues, ask for help, speak up and show vulnerability, without having to fear being rejected, humiliated or punished by other group members.
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Team Size

Team size refers to the number of members in the management team. In management teams, the size of the team is usually a reflection of the organizational chart (the number of departments reporting to a senior leader). Research on group and team size and performance has yielded mixed results (Haleblian & Finkelstein, 1993), with more studies indicating a negative association between size and performance (Ringelmann, 1913; Steiner, 1972; Karau & Williams, 1997).

Team Performance

Team performance is a general term used to describe what a (management) team accomplishes. Terms such as: ´team effectiveness´; ´team performance´; and, ´team productivity´ are often used interchangeably, but for the purpose of this thesis, the term ´team performance´ will be used consistently. Team performance is described by Forsyth (2014), as an output factor in the input-process-output-model (IPO). Input factors are basic individual, team and environmental conditions, which enable individuals and teams to perform. Processes refer to all the different activities which facilitate and inhibit teamwork (Forsyth, 2014), regarding task planning, task work and interpersonal processes shaping team dynamics and team functioning. Processes can also be a mediator between input and output factors. Output factors, i.e. team performance, are all the outcomes a team produces through their work and activities, and should not be limited merely to the product they deliver to a stakeholder or the organization (Hackman, 2002). According to Hackman (2002), outcomes from a team should be viewed within a multidimensional framework, emphasizing outcomes at both organizational, team and individual level, to determine level of performance. Within this thesis, I will pay attention to two specific levels of performance: ´task performance´; and, ´individual well-being and growth´.

Individual well-being and growth

According to Hackman (2002), individual well-being and growth, is one of three outcomes that a successful team produces, and is defined as “the group-experience, on balance, contributes positively to the learning and personal well-being of the individual team member” (p. 28). Hackman assumes that a team has much to offer its members, in terms of learning, acquiring new skills and exploring new perspectives, but also by being part of a social group and developing interpersonal relationships. Bang and Midelfart (2012) expand on this definition by suggesting that being part of a team is potentially beneficial and could
positively affect motivation and development, as well as personal well-being. In sum, all of the above provide added value that benefit each individual team member.

**Task Performance**

Task performance is defined as “the productive output of the team (that is, its product, service or decisions) the standards of quantity, quality and timeliness of the team’s clients – the people who receive, review or use the output” (Hackman, 2002, p. 23). Here, we can deduce that the service, solution or product that a team delivers must satisfy stakeholders’ expectations. These stakeholders could be both external customers and internal employees or departments. In addition, a management team is expected to create added value for the organization itself, by providing direction, alignment and commitment (Bang & Midelfart, 2017).

**Previous Research on the Relationship Between Size and Performance**

The effect of size on performance has been a matter of interest since the early 1900s. Ringelmann (1913) found in a rope pulling test, that each team member contributed less as team size increased. Ingham, Levinger, Graves and Peckham (1974), replicated Ringelmann’s rope pulling study and found similar results, acknowledging a curvilinear effect on performance as team size increased. Karau and Williams (1997) conducted a meta-analysis consisting of 78 studies, and found that social loafing, defined as “the tendency for individuals to exert less effort when working collectively rather than when working individually or coactively” (p. 156) is a robust phenomenon across various tasks and populations. In other words, as group size increases, there is a general tendency towards decreased group performance, or less efficiency, directly related to the individual members’ contribution or effort.

To my knowledge, very few studies have examined exclusively the effect of team size on management team performance. One exception is Espedalen (2016), who found a negative association between management team size and performance. Otherwise, results are ambiguous, or not consistent enough to demonstrate the direct effect of team size on management team performance.

Wheelan (2009), conducted a study on the relationship between team size, team productivity and team development, and examined different team sizes and how team size affected developmental processes and group productivity. Wheelan’s (2009) sample consisted of different work groups and teams, including some management teams. Group size
ranged from three to eleven members (or more). Wheelan (2009) found that smaller teams experienced greater levels of structure and trust within the team and also experienced and delivered higher performance levels compared to larger groups. The groups comprising three to six members scored significantly higher in terms of positive attitude and behaviour, than the larger groups that comprised eleven or more members. These findings align with those of Sharma and Ghosh (2007), who also demonstrated how large(r) teams were associated with lowered performance in contrast to smaller teams in the IT-sector in India.

Two studies have examined the relationship between management team size and firm performance. Certo et al. (2006) found no direct relationship between management team size and firm performance, while Haleblian and Finkelstein (1993) found a positive relationship. However, the term firm performance in these instances differs from the two performance-measures concerned with in this thesis. In Haleblian and Finkelstein’s study, performance represents overall organizational performance, instead of specific outcomes of the team, or the individual perception of being a team member, as is the performance measure in this study.

Based on these findings, there is no conclusive description as to how the effect of team size is associated with performance in management teams and therefore, and more studies are needed to describe these effects. While there appears to be a tendency for large(r) groups to perform less in general, or be less efficient than smaller groups, no clear evidence exists with regards to this association within management teams. However, when considering the general findings on groups and teams, it is reasonable to assume that the effects described are also transferable to management teams. One thing is knowing that size seems to affect productivity within groups and teams, but understanding why this association exists is even more interesting. I will now look at different theoretical explanations as to why the productivity of a team does not necessarily increase linearly in proportion to the size of the team.

Steiner (1972), attributes this association between size and performance to process loss, defined as the tendency for the increase in a group’s productivity to diminish when the number of group members increase, due to coordination and motivation problems. Mueller (2012), suggests that relational loss might cause lower team performance, as support from other team members becomes less available as team size increases.

In contrast to this rather negative view that effectiveness will decrease as team size increases, some researchers have suggested that increased team size can in fact enhance performance (Ancona & Caldwell, 1992; DeDreu & West, 2001). This claim is based on the
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assumption that a larger group or team possesses greater diversity, more information and ‘more heads to think’. As such, this can ideally lead to better decision making and increased creativity potential within the group and, due to diversity and information-sharing, large(r) groups may outrange the sum of the individuals’ contribution when performing. This is in contrast to Steiner (1972), who suggests that group performance in a larger group is in fact reduced, compared to the potential of the sum of each individuals’ contribution. This perspective will be elaborated on later in this thesis.

Looking beyond the general assumption that increased group size will result in a decrease in performance, increased group size can also have implications at both the organizational and the individual level. Studies indicate that as group size increases, member satisfaction decreases (Steiner, 1972; Guzzo & Salas, 1995), communication is less initiated by the individual (Diehl & Strobe, 1987), counterproductive behaviour appears more frequently (Aubé, Rousseau & Tremblay, 2011), members report a greater incidence of feeling threatened and inhibition (Gibb, 1951), and the amount of expressed disagreement increases (Wheelan, 2009).

Even though most research indicates that size and performance are negatively associated, there are researchers proposing the opposite effect; that being that larger teams are beneficial rather than destructive for team composition, dynamics and performance (Nye & Brower, 1996; Williams & O´Reilly, 1998). These are essential factors when considering the relationship between size and performance.

**Process Loss, Task Focus and Productivity**

Steiner (1972) suggests that a group’s actual productivity will always be inferior to its potential productivity, due to coordination and motivation loss. This means that the sum of the potential individual contributions will always exceed a team’s actual performance. Steiner claims that this phenomenon is due to *process loss*. ‘Process loss’ takes place when performance potential is reduced due to problems related to coordination and motivation within a team, and these problems negatively impact the potential for performance. Steiner presents this as a simple equation: “actual productivity = potential productivity – losses due to faulty processes” (Steiner, 1972, p. 79).

Firstly, Steiner (1972) emphasizes how larger teams will have increased coordination problems. As the number of team members increase, greater coordination links will arise and it will be more difficult to coordinate members regarding different aspects of team work, e.g. communication, meetings, information sharing, and coordinating tasks and roles within the
team. Forsyth (2014) supports this notion by providing the ‘coordination equation’, an equation indicating how many coordination links will be necessary in a team, dependent on number of team members. Steiner (1972) argues that the number of coordination links will increase exponentially as group size increases, implying consequences for team performance.

Secondly, Steiner (1972) proposes how motivation loss can cause process loss. Motivational loss, often referred to as social loafing (George, 1992; Murphy, Wayne, Liden & Erdogan, 2003) is, according to Karau and Williams (1993), “the reduction in motivation and effort when individuals work collectively compared with when they work individually or coactively” (p. 681). This decreased effort and motivation may have several origins, most of which relate to how the individual identifies him or herself within the group. As group size increases, it is more difficult to identify the individual’s contribution to group success and rewards awarded to the team’s success become less contingent on the individual’s behaviour and performance. The individual team member receives little direct feedback with regards to one’s contribution and in turn experiences a lower sense of responsibility for the outcome. The assumption is that all these factors, both separately and when co-occurring, decrease the individual’s motivation to engage in tasks in the team. In a larger team, members can also perceive less responsibility for accomplishing team tasks and thereby experience decreased motivation. Chidambaram and Tung (2005) propose that members of a large group feel diminished responsibility as group size increases, leading to social loafing.

There are several reasons why the group productivity-process loss-perspective is relevant when examining management teams. Tasks managed by management teams are often complex, and require focused and well-considered contributions from the managers relevant to that task. Managers often work independently outside the management team within their respective departments, often limiting the communication among them to that which is shared at management team meetings. Several complex decisions are made, highlighting the importance of efficient and precise information sharing, which is proven to become more problematic as team size increases. Meetings might be difficult to coordinate due to tight work schedules, with coordination links increasing for every added team member.
Diversity, Team Size and Performance

In general, diversity within groups and teams has been assumed to be a crucial factor for group functioning (O’Reilly & Williams, 1998; van Knippenberg & Schippers, 2007; Joshi & Roh, 2009). Diversity can be defined as “…differences between individuals on any attribute that may lead to the perception that another person is different from self” (van Knippenberg et al., 2004, p. 1008). However, research regarding the effects of diversity on teams is somewhat ambiguous, dependent on various theoretical perspectives. An elaboration of these perspectives will now follow, contextualizing their association to team size and performance.

The Information/Decision-Making Perspective

Some researchers suggest that larger groups may have a positive effect on team performance. This assumption is based on the potential concerning diversity, information sharing and decision making (Nye & Brower, 1996; Williams & O’Reilly, 1998; Brodbeck, Kerschreiter, Mojzisch & Schulz-Hardt, 2007). In this context, diversity refers to job-related attributes, such as skills, knowledge and educational background (van Knippenberg et al., 2004). According to the information/decision-making perspective, diversity is the key to quality decisions and decision making, i.e. the more perspectives added, the more information will be shared and greater skills and knowledge will be accessible for decision making. As such, this may lead to better decisions being made (Caldwell, 1990; van Knippenberg et al., 2004). Furthermore, this type of diversity is especially beneficial when teams are making complex decisions and face difficult and intricate problems which need to be solved (Williams & O’Reilly, 1998).

This perspective is particularly relevant for management teams, whereby in order to add more perspectives, it is necessary to add more members. Secondly, management teams consist of relatively independent managers, with skills, knowledge and abilities primarily relevant to their respective departments. Thirdly, the tasks that management teams accomplish are in coherence with those tasks considered especially beneficial for larger teams. In this context, size as a result of increased diversity is assumed to have a positive effect on the size-performance relationship.
The Social Categorization Perspective and Social Identity

This perspective depends largely on two concepts, namely social categorization and social identity. Social categorization refers to how an individual categorizes oneself and others as members of different groups, e.g. in-groups and one or more out-groups (van Knippenberg et al., 2004). Social identity refers to how one’s self-concept is derived from membership within social groups (Tajfel & Turner, 1979). In this context, diversity is referred to in somewhat of a different way to that in the information/decision-making perspective, emphasizing constant, visible attributes such as age, sex and ethnicity.

Research has shown that identifying with a group is positively linked to liking and trusting other group members, as well as for group cooperation. According to van Knippenberg et al. (2004), team members are more positive to other team members if they experience similarity and identification towards those other group members. Members of homogeneous groups tend to have higher levels of commitment, higher team cohesion, and experience less conflict within the group (van Knippenberg et al., 2004; Riordan & Shore, 1997; Tsui, Egan & O’Reilly III., 1992; Witte & Davis, 2013). Karau and Williams (1993) argues that team members who perceive their team as vital to one’s self-concept and/or social identity, may enhance their effort to achieve team goals and increase motivation to work hard on team tasks. Team members feel committed and responsible for the team’s success through identifying with the group and perceives both the team and its success as being of personal importance.

The Categorization-Elaboration Model (CEM)

van Knippenberg et al. (2004) suggest an interactive model, namely the categorization-elaboration model, to integrate the two perspectives of social categorization and information/decision making and their effect on team performance. Further, van Knippenberg et al. (2004), postulate that isolating the two processes of decision making and social categorization is too rigid, and that it will suppress the actual effect on team performance. The logic is presented as follows: “elaboration and social categorization processes interact in that the intergroup biases that may result from social categorization disrupt elaboration of task-relevant information and perspectives” (van Knippenberg et al., 2004, p. 1011). This implies that even though there may be benefits linked with increasing team size, the negative consequences that might come into play through this increase will override the assumed benefits, indicating that increase in team size is generally negatively associated with team performance.
Ideally, based upon the logic of social categorization and the information/decision-making perspective, diversity in a group or team should lead to the elaboration of task-relevant information and perspectives. Furthermore, the group should have adequate or improved abilities to process relevant information and to make high quality decisions as a result of added perspectives. The group should also ideally be highly motivated to process this information and possess a high level of task ability. How do such assumptions apply to the nature of a management team?

van Knippenberg et al. (2004) suggest that for a team to benefit from different numbers of team members, specific conditions must be fulfilled. Firstly, the task the team performs must be of a certain level of complexity, since this is what generates most information-sharing and deep-level processing. Secondly, the team needs to possess sufficient levels of task ability. Thirdly, the team must be motivated to fulfil the task, with accountability as a core component.

For most management teams, the first condition above will be present, due to the nature of management work tasks. Such tasks include for example, long-term strategic planning and important decisions that will have an impact within several departments and on various levels of an organization. Secondly, managers will most likely be skilled and in possession of specific knowledge relevant to their department or domain within the organization, thereby fulfilling the second required condition. Thirdly, it is reasonable to assume that in most cases, management teams are motivated to fulfil the tasks set before them, due to the importance of management team activities for the entire organization. The question however, is whether these conditions alone enable performance to such an extent that it neutralizes the negative effects caused by process loss and motivational loss (Steiner, 1972) and social categorization (Williams & O’Reilly, 1998). In the CEM-perspective, van Knippenberg et al. (2004) suggest that as team size increases, more inter-group bias will occur and members will become less motivated to contribute. Therefore, the negative effects of diversity will override the positive effects, thereby impacting negatively on performance. According to CEM, there will be a negative association between team size and performance.

**Rationale and Hypotheses**

Although there are variations in how the literature on the relationship between team size and performance concludes, the majority of research indicates that larger groups and teams tend to be less productive on a variety of tasks. Members of large teams report lower levels of individual well-being and less satisfaction than members of smaller teams (van
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Knippenberg et al., 2004), which in turn affects learning (Edmondson, Kramer & Cook 2004). Taking the theoretical framework of CEM into account, the proposed benefits of size and diversity will be overshadowed by the negative effects of social categorization, for example, in terms of inter-group bias and relationship conflict. I therefore suggest the following hypotheses:

\[ Hypothesis\ 1a: \text{There will be a negative relationship between management team size and management task performance.} \]

\[ Hypothesis\ 1b: \text{There will be a negative relationship between management team size and individual well-being and growth.} \]

The Mediating Role of Team Psychological Safety

Team psychological safety is a group level construct, often referred to as a group climate variable where the individual’s perception of the safety climate in a team is central. A healthy sense of team psychological safety is shown through behaviours such as members feeling free to speak openly, daring to state their opinions and express disagreements, and a sense of feeling safe to ask questions (Bang & Midelfart, 2012).

According to Marks et al. (2001), team psychology safety should be included in the previously presented IPO-model to help explain the process of how inputs and processes result in different outcomes. Ilgen, Hollenbeck, Johnson and Jundt (2005) suggest that team psychological safety should be included in the model as an emergent state rather than a process factor. Emergent states are constructs that develop during a team’s life-span, and these ‘states’ will affect both inputs, processes and outcomes long-term. For the purpose of this thesis, it is particularly interesting to examine how team psychological safety is related to input factors (team size) and output factors (team performance).

As proposed in the CEM, larger management teams will face challenges related to social categorization and inter-group bias. From the literature research carried out for this thesis, few studies that examined the direct effect of team size on team psychological safety were found.

However, Amazon and Sapienza (1997), found that openness, a core component in team psychological safety, could affect larger teams in several ways, which could result in damaging performance and interpersonal relationships. In particular, Amazon and Sapienza (1997) found the following: larger teams were more likely to encounter dissimilar feelings
and goals; found it harder to reach true consensus; and, problem solving abilities diminished as more team members were involved in conflicts. In addition, when examining 45 management teams, they found that the number of affective conflicts tended to increase as team size increased, indicating that interpersonal problems and conflicts were more likely to arise as team size increased. In this particular study, the findings were attributed to the team’s self-reported low level of openness, impacting negatively on the concept of team psychological safety. Thus, these findings are also in accordance with propositions from the CEM-perspective, proposing that diversity (here as a result of size) could harm the presumed benefits linked to information-sharing and decision making.

Sato (1988) studied how psychological safety and group size were related when facing a social dilemma. The participating groups in the study comprised either three or seven members. Significant differences between self-reported perceptions of trust between the different groups emerged. Groups comprising three members reported high levels of trust, whereas groups comprising seven members, reported almost non-existing levels of self-reported perceived trust. Even though this study was conducted in a laboratory and is therefore not directly transferable to allow for assumptions to be made about management teams, it supports the notion that trust among group members might decrease as team size increases.

According to Parker (2003), members of large teams are less likely to be open and honest, and more likely to disagree with their leader. Parker (2003) reports that members of large teams were less confident and provided each other with less honest feedback due to lowered trust in other team members, compared to members of small teams. Parker´s (2003) study indicates a negative association between team size and team psychological safety.

A recently published meta-analysis of 7763 teams by DeJong, Dirks and Gillespie (2016) found that team psychological safety is a single, unique predictor variable of overall task performance. In their article, performance was defined as the extent to which a team accomplishes its goals or missions. This direct effect of team psychological safety on task performance was also significant when controlling for several relevant mediators and moderators such as trust in team leaders and previous task performance. The effect was reported as “above average impact” (DeJong et al., 2016).

Baer and Frese (2003), conducted a study to see if a climate of psychological safety affected task performance, and found a significant positive relationship between the two variables. The researchers attributed this finding to the feeling of psychological safety, where people are encouraged to propose new ideas and discuss problems openly, and dare to take
interpersonal risks. In turn, such an environment positively affects overall organizational performance. Edmondson (1999), found a correlation of $r = .47 \ (p \leq 0.05)$ between team psychological safety and performance, $r = .72 \ (p \leq 0.05)$ if not observer-rated. Further, Edmondson (1999), examined how team psychological safety could affect task performance in teams through the mediating effect of learning behaviour, and found that team psychological safety enhances team performance through encouraging learning behaviours.

Bradley, Postlethwaite, Klotz, Hamdani, & Brown (2012), suggested that team psychological safety could also lead to better team performance, through its mediating effect on task conflict. In Bradley et al.’s (2012) study, they found that when team psychological safety was perceived as high, task conflict and team performance was positively associated. Thus, team psychological safety works as a moderator between the two variables. Task conflict was positively associated with task performance under conditions of team psychological safety, indicating that psychological safety facilitates the performance benefits of task conflict in teams, under certain conditions.

Considering the negative effects of size on various dimensions of team psychological safety, I suggest the following hypotheses:

**Hypothesis 2:** There will be a negative relationship between management team size and team psychological safety

**Hypothesis 3:** Team psychological safety will mediate the effect of team size on task performance

**Team Psychological Safety and Individual Well-Being and Growth**

**Team psychological safety, learning and growth**

Team psychological safety has been found to facilitate team learning behaviour and team performance in highly interdependent teams through affect and cognition based trust in the leader, as well as improving organizational goal achievement and return on assets (Shaubroeck, Lam & Peng, 2011). Furthermore, individual well-being at work is associated with individual-level performance (Judge, Thoresen, Bono & Patton, 2001), which again can lead to enhanced organizational performance (Taris, 2009).

Individual well-being and growth is an important component of overall performance in a team (Hackman, 2002). Furthermore, psychological safety is a central antecedent of individual learning in an organization (Edmondson, 2004), and learning and development at
work is crucial for individual growth and perceived job satisfaction (Chang & Lee, 2007; Egan, Yang & Bartlett, 2004). Edmondson (1999) suggests that seeking feedback, sharing information, asking for help and discussing errors are typical learning behaviours that are positively related to the concept of team psychological safety. All these behaviours are important for the efficient and precise completion of team tasks, but have also been shown to decrease in effectiveness when team psychological safety is perceived as low, which might be the consequence of increased team size.

Furthermore, Edmondson (1999), proposes that when initiating and displaying such behaviours, the individual places themselves at risk to an extent, which is at the core of whether a positive climate of team psychological safety exists or not. In Edmondson’s (1999) study of 51 work teams, her findings supported the theory that team psychological safety is positively associated with organizational learning behaviours.

The association between team psychological safety and learning has also been examined by others, for example, Carmeli and Gittell (2009). Carmeli and Gittell (2009) found that team psychological safety is directly linked to the ability of the individual to learn from failures through its mediating effect on the relationship between high-quality relationships and the ability to learn from failures. Schaubroeck et al. (2011) further postulates that team psychological safety can enhance members’ willingness to share their knowledge and skills, making them better at identifying performance strategies and contributing more effectively towards team tasks. The aggregation of these outcomes provides for a potentially fruitful path for individual growth and learning for the individual team member at work. By initiating positive learning behaviours, the individual team member will most likely generate new perspectives, and in the long-term, may develop new ways of thinking and acquiring knowledge. Altogether, it seems that team psychological safety plays both a direct and indirect role with regards to how individuals perceive their well-being, and how learning behaviours can be enabled or disabled at work.

**Team psychological safety and individual well-being**

Being employed is in itself positively associated with individual well-being (Helliwell & Putnam, 2004). However, individual well-being will most likely be affected by several other variables, among which is psychological safety at work. Feeling able to trust one’s colleagues is strongly associated with a higher reported level of subjective well-being (Helliwell & Putnam, 2004; John & Shun, 2011). Renee Baptiste (2008) found that promoting trust at work had a positive effect on individual well-being.
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Costa (2003) examined how team psychological safety was associated with member satisfaction and work engagement. Costa’s (2003) findings suggest that trust was related to team satisfaction and employee commitment to the organization, as well as perceived team performance. This implies that intra-group trust is beneficial for performance at all three performance levels, and especially for the individual team member which experiences more organizational commitment and intra-team satisfaction.

Simons and Peterson (2000), found that team trust works as a mediator between task conflict and relationship conflict; meaning that in teams where trust is high, task conflict does not negatively affect interpersonal relationships among team members. The researchers pinpoint ‘trust’ as an important component in gaining benefits of task conflict without suffering the cost of relationship conflict, a likely scenario as team size increase. Furthermore, an environment which positively promotes engagement in task conflicts and the solving of problems through discussion, will most likely positively affect team performance.

In summary, team psychological safety seems to be positively associated with a wide range of behaviours and perceptions related to individual well-being and growth. Therefore, I hypothesize:

*Hypothesis 4: Team psychological safety mediates the effect of team size on individual well-being and growth.*

**Method**

**Sample, Procedure and Design**

Data from 215 management teams was collected through the questionnaire “*effect*”, measuring diverse aspects of management team functioning and effectiveness, based on Bang and Midelfart’s (2012) work. The questionnaire was sent to all participants via email, with a one-week deadline to reply. Out of the 215 management teams that took part on the study, 40% of the management teams were asked to respond to “*effect*” as a part of a management team development program and the remaining 60% of the management teams were asked to respond in the role of participants in a research project. Post data collection, all participating management teams were provided with written feedback, sent via email, providing questionnaire scores for their specific management team and diverse feedback based on the questionnaire results. The overall response rate from the management teams was 96.9%.
In total, the study comprised 1332 respondents, with a relatively equal gender distribution, where 44.9% of the respondents were female and 55% were male. Tenure of respondents was categorized according to specific time periods, i.e. “less than one year” (19.1%), “1-2 years” (18.3%), “2-4 years” (20.6%), “4-6 years” (19.9%) and, “more than 6 years” (5.7%). 16.4% of respondents did not enter their tenure period.

The participating teams were either Danish (n=80) or Norwegian (n=135). All teams were categorized according to one of the three following organizational levels; 1. top management teams (24.7%), 2. middle management teams (35.3%), and 3. lower-level management teams (40.0%). The teams were relatively equally distributed with regards to sectors, with 50.2% being part of the governmental or municipal sector and the remaining 49.2% belonging to either the private sector or public enterprises.

Finally, the teams varied in size, ranging from 2 to 23 members. The average team size was seven members, and the majority of teams comprised between four to six members.

**Measures**

“*effect*” is a web-based questionnaire and was developed by Bang and Midelfart (2015), to measure factors considered important for an effective and well-functioning management team. The questionnaire measures a total of 27 factors and 124 items. All measures except for team size were measured through scales comprising a number of items. All items were rated based on a Likert-scale, ranging from 1-7, where a rating of 1 represented “totally disagree”, 4 represented “neither disagree nor agree” and a rating of 7 represented “totally agree”. To adequately score their management team, participants usually answered between four to eight items for each factor.

For the purpose of this thesis, four out of a total of 27 measures were used for data analyses. These four variables were:

*Team size.* Team size represents the actual number of team members that make up the management team, measured by numeric values.

*Team psychological safety.* Team psychological safety was measured according to seven items, which were all based on the work of Edmondson (1999), and then revised to optimally fit the data collection context. Estimated reliability of the scale was $\alpha = .89$.

*Individual well-being and growth.* Individual well-being and growth was measured according to five items, all based on the work of Hackman (2002), concerning team member satisfaction. Cronbach’s alpha was estimated, suggesting $\alpha = .86$. 
Task performance. As for individual learning and satisfaction, measures were based on Hackman’s (2002) work. The scale for this variable consisted of eight items, and had a reliability estimate of $\alpha = .89$.

All items belonging to each of the different measures can be found in Appendix 1. Cronbach’s alpha was estimated for all measures, and all estimates surpassed the recommended cut-off criteria of .70 (DeVellis, 2012).

Data Analyses

All data analyses were conducted using the software SPSS v24. The macro “PROCESS” for SPSS by Preacher and Hayes (2004), was applied to the analyses to investigate indirect effects in the mediation analyses.

Aggregation

The collection of data through individual responses to a questionnaire, is one of the most common data collection approaches in organizational research, independent of level of data analyses (van Mierlo, Vermunt & Rutte, 2009). However, since the emphasis of this study is to examine variables at a team level and to observe differences between management teams, data aggregation of the individual responses was necessary to gain insight at the team-score level. For this study, all items were measured at the individual level, and therefore aggregation was necessary to conduct analyses at the team level. To aggregate data adequately, individual scores for each measure (except for team size) were aggregated up to team-level, and then calculated as the mean of the individual responses within each team.

Each item within the “effect” questionnaire was designed specifically to aid the aggregation process. All worded statements were presented as observations of the team, rather than how the individual perceived oneself with regards to their personal relationship to the other team members. Hence, when answering the questionnaire, the focus was on what happened between members of the team, as opposed to how the individual experienced other team members in relation to themselves, enhancing perceptions of group climate. Following are a number of item examples that clearly reflect the focus on team observation: “It is easy to query any issues in the management team” and “It is safe to take a risk in this management team”.

To ensure that statistically satisfactory aggregation of data was conducted, the guidelines for aggregation as defined by Biemann, Cole and Voelpel (2012), and Bliese and Halverson (1998) were followed to transform lower-level data to higher-level data. Firstly, to
justify data aggregation, one needs to estimate how much of a variable’s total variance is attributable to the group-level properties of the data (Bliese & Halverson, 1998). It is assumed that strong underlying group processes will be reflected in data that possess strong group level properties, and conversely, weak underlying group processes are assumed to comply with weak group-level properties (James, 1982).

To explore variance between the management teams, a one-way ANOVA was performed. One-way ANOVAs is frequently used to estimate the proportion of between-groups variance. For this study, variance between teams was found to be sufficient, with the eta squared-coefficient being $\eta^2 = .33$ for team psychological safety, $\eta^2 = .31$ for individual well-being and growth, and $\eta^2 = .37$ for task performance (Field, 2013).

Since it was established that a sufficient level of variance existed between the teams, the next step in the data aggregation process was to ensure a certain level of agreement amongst the individual respondents of a team. If a satisfactory inter-rater agreement was found, averaged out individual scores should further provide valid constructs at the team-level (Biemann et al., 2012; van Mierlo et al., 2009). Note that inter-rater agreement should not be confused with inter-rater reliability, which is a third criterion for justifying aggregation. This will be elaborated on later.

If agreement amongst team members is considered too low, aggregation cannot be statistically justified. One approach to determine sufficient inter-rater agreement is to estimate $r_{WG}$. $r_{WG}$ is estimated by “comparing the observed variance to the variance expected when there is complete lack of agreement among raters” (Biemann, et al., 2012, p. 68). The $r_{WG}$ is compared to a threshold value to settle whether there is adequate agreement between the individual responses provided. James, Demaree and Wolf (1984), suggest an acceptable threshold value for $r_{WG}$ is .70, but Lance, Butts and Michels (2006) propose that .70 is an inappropriate criterion, based on a misinterpretation of James et al.’s (1984) paper. This assumption is further supported by LeBreton and Senter (2007), postulating that .70 is an arbitrary criterion. According to LeBreton and Senter (2007), an adequate cut-off for $r_{WG}$ should be determined based on the nature of the research conducted, as well as theoretical underpinnings of the research and purpose of the research.

Hence, range levels of a single cut-off criteria may be useful, for example, a range of 00-.30 represents “lack of agreement”, .31-.50 represents “weak agreement”, .51-.70 represents “moderate agreement”, .71-.90 represents “strong agreement”, and .91-.100 represents “very strong agreement”. This proposition also corresponds with Brown and Hauenstein (2005).
In cases of research where general trends for a phenomenon are of interest, a moderate agreement between individual respondents would be sufficient, indicating a cut-off criterion of .50 (Biemann et al. 2012 & LeBreton & Senter, 2007). Therefore, due to the nature of this thesis, a moderate level of agreement will be considered sufficient. It is reasonable to assume that some variance between team members will occur for all perceptions of team processes, team states (in this case, team psychological safety) and the two levels of performance.

In a sample comprising several groups or teams, it is likely that some groups will have a higher level of agreement and others will have a lower level of agreement. However, groups with a lower level of agreement should not necessarily be excluded from the sample. Even though group agreement level might be low, these groups may contribute with important material for the data analyses, and observed variance may simply be due to natural variance between the groups, rather than measurement error. To determine whether to include or exclude low agreement teams, two approaches can be applied.

Biemann et al. (2012), encourage conducting sensitivity analyses, both including and excluding the low-agreement teams, and comparing the outcomes. If the two analyses do not differ greatly, the low-agreement teams should still be included in the sample. Potential important data could be lost by removing data points, which again could affect quality and validity of statistical outcomes.

Another way of determining whether to include low-agreement groups or not, is offered by LeBreton and Senter (2007). They propose that all $r_{WG}$-values should be calculated for all teams, followed by examining how many of these $r_{WG}$-values exceeds the cut-off criteria of .70. If a high percentage of the scores are found to be above the .70 cut-off, none of the low-agreement groups should be removed. When using this approach to determine level of inter-rater agreement, the mean $r_{WG}$-score should be above the cut-off point, which for this thesis is set to .50 (moderate level of agreement and above).

Lastly, to complete the justification of aggregation process, reliability between team member scores and management team scores must be estimated. This can be done through estimating the intra-class correlation coefficient, ICC(2), aligning with recommendations provided by Biemann et al. (2012) and LeBreton and Senter (2007). ICC(2) provides an indication of whether it is meaningful or not to aggregate scores from the individual level to the team level, by examining which proportion of the scores can be attributed to between-team variance, and are considered an estimate of reliability. As for $r_{WG}$-scores, the cut off-criterion for ICC(2) has been debated. According to Lance et al. (2006), the purpose and
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nature of the research should be considered. For reliability estimates such as Cronbach’s alpha, .70 is often suggested as cut-off criterion (DeVellis, 2013), but LeBreton, Burgess, Kaiser, Atchley and James (2003), suggest that for organizational research, there will often be lower reported values of ICC(2). This may be as a result of restriction in measures for certain variables, rather than individual respondents disagreeing to a large extent on the same matter. As this applies to the case of this study, a cut-off criterion of .50 for all measures will apply.

Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Alpha</th>
<th>rWG</th>
<th>rWG-%2</th>
<th>ICC(2)</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team psychological safety</td>
<td>.89</td>
<td>.69</td>
<td>79.5</td>
<td>.60</td>
<td>.33</td>
</tr>
<tr>
<td>Task performance</td>
<td>.89</td>
<td>.74</td>
<td>87.4</td>
<td>.68</td>
<td>.37</td>
</tr>
<tr>
<td>IWB-G1</td>
<td>.86</td>
<td>.62</td>
<td>70.2</td>
<td>.58</td>
<td>.31</td>
</tr>
</tbody>
</table>

1 Individual well-being and growth
2 Percentage of teams with an rWG-value above .50

Statistical Analyses

Measures of normality and linearity were calculated for all variables, and none were violated. To conduct bivariate correlations and standard linear regression, calculations of Pearson’s r were conducted (Howell, 2012). The macro “PROCESS” by Preacher and Hayes (2004) for SPSS was added, to test for indirect effects in the mediation analyses.

Control Variables

Gender, management team level and sector (both private and public), are all variables that may affect team performance. As stated in CEM, diversity in a management team is likely to affect management team performance negatively. One of the many sources of diversity is gender. In organizational research, conclusions regarding effects of gender on team performance are inconsistent, providing unclear indications as to what the effects of gender diversity might be (Krishnanh & Park, 2005). Klenke (2003) suggests that it is the effects of gender, not gender itself, which affect processes such as decision making through mediating effects of power, political savvy, conflict management and trust. Due to this uncertainty and lack of evidence regarding the effects of gender on team performance and team psychological safety in an organizational setting, gender was tested for as a potential control variable.
Data was gathered from management teams at different organizational levels; top level, middle level and lower level, within different organizations. Research suggests that the individual manager’s role and role of the management team varies with level allocation in the organization (Edmondson, 1999; Floyd & Lane, 2000). Floyd and Land (2000) propose that a top-management team’s main role is to be decision makers and that middle management teams have an important role concerning communication between the different levels of management teams, and finally, that lower level management teams should be mainly concerned with reacting to information from several different instances, e.g. customers and other management teams. Although all three management team levels include aspects of all the roles and tasks mentioned above, the type of information processed is fundamentally different according to level, and knowledge and insights within the organization will most likely vary. As discussed previously, management teams and especially those at the top of the organizational hierarchy, tend to comprise independent, department-oriented managers, working to strict deadlines and with limited time for meeting attendance. Again, it is reasonable to assume that some of these characteristics may lead to varied performance requirements and influence on team dynamics. Working according to restricted available time allocated for meetings can limit the opportunity to develop interpersonal relationships and create a climate of team psychological safety. In summary, management team level could affect performance and perceptions of team psychological safety, and hence, be considered a confounding variable. As such, the impact of management team level will be tested and considered included as a control variable.

A third potential confounding variable is sector allocation of the management teams. In general, organizations belonging to the private sector are more goal and performance oriented due to rapidly changing demands from clients and changes in the market in general, while public sector organizations are often seen as more stable and routine-oriented in their work approach, and not necessarily primarily driven by performance and an immediate need for results. Hence, sector might affect both performance and team psychological safety, through different perspectives on performance goals and work procedures.

Because of the potential influence of these variables on the outcome variable of team performance, all three variables, i.e. gender, management team level and sector, have been controlled for in the data analysis. Gender was measured according to the percentage of women in the teams, management team level was measured along an ordinal scale with three levels, i.e. top management team– level 1, middle management team – level 2, further down
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in the hierarchy – level 3, and sector was measured as a dichotomous variable, i.e. either private or public/municipal sector.

**Results**

Calculations of means, standard deviations and bivariate zero-order correlations for all variables are presented in Table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Team size</td>
<td>7.37</td>
<td>3.79</td>
<td>.71</td>
<td>-.36**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. TPS1</td>
<td>5.83</td>
<td>.71</td>
<td>-.25**</td>
<td>.70**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. TP2</td>
<td>10.70</td>
<td>1.30</td>
<td>-.23**</td>
<td>.70**</td>
<td>.70**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. IWB-G3</td>
<td>5.45</td>
<td>.77</td>
<td>.06</td>
<td>.01</td>
<td>.05</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Gender</td>
<td>42.58</td>
<td>26.65</td>
<td>.13</td>
<td>.01</td>
<td>-.07</td>
<td>.11</td>
<td>-.12</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6. Sector</td>
<td>2.26</td>
<td>.82</td>
<td>.22**</td>
<td>.26**</td>
<td>.10</td>
<td>.06</td>
<td>.24**</td>
<td>.08</td>
<td>-</td>
</tr>
<tr>
<td>7. Level</td>
<td>2.15</td>
<td>.79</td>
<td>.96</td>
<td>.23**</td>
<td>.70**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Team psychological safety
2 Team performance
3 Individual well-being and growth

** p ≤ .01

To examine the potential impact of the three control variables, i.e. sector allocation, gender and management team level, a correlation analysis was performed including all variables in the study. Results are presented in Table 2. Sector allocation and gender were not significantly correlated with either the predictor, mediator or the two outcome variables. However, management team level showed a significant association with the mediator and the predictor variable. Management team level correlated \( r = -.22 (p \leq .01) \) with team size, and \( r = .26 (p \leq .01) \) with team psychological safety – suggesting that the lower in the hierarchy the management team is located, the higher the team psychological safety. Due to the significance of the correlations, management team level is included as a control variable in the subsequent regression and bootstrap analyses.

1 Note that management team level is coded as "3=lower level management teams, 2 = middle management teams and 1=top management teams."
Hypothesis 1a and 1b predicted a negative relationship between team size and two outcome variables; task performance and individual well-being and growth. Analyses showed that there was a significant negative correlation between team size and the two measures of team performance. The correlation between team size and task performance was $r = -0.25$ ($p \leq 0.01$), and between team size and individual well-being and growth, the correlation was $r = -0.23$ ($p \leq 0.01$). When controlling for management team level, the correlation between team size and task performance was $r = -0.24$ ($p \leq 0.001$), and between team size and individual well-being and growth $r = -0.22$ ($p \leq 0.01$). Therefore, hypothesis 1a and 1b were both supported.

Hypothesis 2 predicted that there is a negative relationship between team size and team psychological safety. The two variables were negatively associated, $r = -0.36$ ($p \leq 0.01$), also when controlling for management team level: $r = -0.32$ ($p \leq 0.01$). The hypothesis was therefore supported.

To investigate hypotheses 3 and 4, I chose to apply Baron and Kenny’s (1986) four step model of mediation and perform Preacher and Hayes’ PROCESS-macro in SPSS.

*Figure 1.* Illustration of the four-step mediation model by Baron and Kenny
Hypotheses 3 predicted that team psychological safety mediates the effect of team size on task performance, and hypotheses 4 predicted that team psychological safety mediates the effect of team size on individual well-being and growth. Following Baron and Kenny’s model (1986), four conditions must be met to demonstrate mediation effects. All steps are visually demonstrated in Figure 1.

In step 1, it is necessary to demonstrate a significant relationship between the predictor variable and the outcome variable, illustrated as the c-path in Figure 1.

In step 2, there must be a significant relationship between the predictor variable and mediation variable, illustrated by path a in Figure 1.

In step 3, there must be a relationship between the mediator and the outcome variable, when controlling for the predictor variable, illustrated by path b in Figure 1.

In step 4, there should be a substantial reduction in the relationship between the predictor variable and the outcome variable, when controlling for the mediator, illustrated in path c´. The relationship could disappear completely (full mediation) or be reduced (partial mediation).

However, Baron and Kenny’s approach to mediation has been criticized, mainly due to the argument that the 4-step-model includes some unnecessary steps and lacks significance testing for indirect effects (Hayes, 2004; Hayes, 2009). Furthermore, by relying solely on these four steps, it is difficult to determine if there is a substantial reduction in the X-Y relationship, due to the lack of significance testing for indirect effects (MacKinnon, Lockwood & James, 2004). This is problematic in two ways.

Firstly, the probability of committing a type I-error is likely if there is only a minor change in the absolute value of the regression coefficient. For example, a drop in the regression coefficient from .28 to .27 might lead to the coefficient becoming insignificant, while a drop from .75 to .35 may still maintain the coefficient as significant (Holmbeck, 2002). In such cases, it is difficult to determine whether the regression coefficient has been significantly reduced, i.e. if the significance of the direct effect is a result of including the mediator in the model. In practice, this means assuming a full mediation is present when there is no mediating effect present in the population. In such a case, a type I-error has been committed, erroneously rejecting the null hypothesis.

Second, including a mediator in Baron and Kenny’s model could lead to a large change in the X-Y relationship (c´-path), but without observing a substantial change in the statistical significance. This indicates that a type II-error is committed, by erroneously accepting a false null hypothesis. This is likely to occur when sample sizes are large, due to
the increased possibility of small regression weights remaining statistically significant under such circumstances (Preacher & Hayes, 2004). In practice, this means that it cannot be determined whether a mediating effect is present or if the change in beta-coefficients is observed merely by chance.

Bootstrapping was applied to the analyses as suggested by Preacher and Hayes (2004) and MacKinnon et al. (2004). This was carried out in order to test the significance of indirect effects in the mediation model. Bootstrapping is a non-parametric procedure, developed to formally estimate the size and significance of the indirect effects based on repeated sampling from the sampling distribution, typically repeated 1000-5000 times (Field, 2013).

Hypothesis 3 predicted that team psychological safety would mediate the relationship between team size and task performance. The findings indicate support for this hypothesis. When controlling for the effect of team psychological safety, the relationship between team size and task performance decreased from $\beta = -.25 (p \leq .001)$ to $\beta = -.017 (ns)$. It is therefore reasonable to assume that a full mediation has taken place. When including the mediator in the model, the significance of the total effect dropped to close to zero. To support this assumption, bootstrapping was conducted by using the SPSS-macro “PROCESS”. A significant indirect effect was found: $B = -.078$, $LLCI = -.1143$ and $ULCI = -.0492$, where LLCI and ULCI represent respectively lower and upper limits of a 95 % confidence interval, as standardized for bootstrapping. This result supports and strengthens the regression analysis, indicating statistical significance of the indirect effect. Also note that $B$ as provided by the bootstrap analysis, represents the unstandardized beta coefficient.

For hypothesis 4, which predicted that team psychological safety would mediate the effect of team size on individual well-being and growth, similar results were found. When controlling for the effect of team psychological safety, the relationship between team size and individual well-being and growth decreased from $\beta = -.23 (p \leq .001)$ to $\beta = -.01 (ns)$. These results support the mediation hypothesis, and also suggest that a full mediation has taken place due to the direct effect not being significant when controlling for team psychological safety. Furthermore, bootstrap analysis was conducted, showing a significant indirect effect, where $B = -.0476$, $LLCI = -.0670$ and $ULLCI = -.0315$, with the confidence interval set at 95% similar to the previous bootstrap analysis. Hence, hypothesis 4 was supported, indicating that team psychological safety fully mediates the relationship between team size and individual well-being and growth.
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Table 3
Standardized beta-coefficients for the four step-mediation model

<table>
<thead>
<tr>
<th>Steps</th>
<th>Team Psychological Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TP¹</td>
</tr>
<tr>
<td>1. a-path</td>
<td>-.36**</td>
</tr>
<tr>
<td>2. b-path</td>
<td>.70***</td>
</tr>
<tr>
<td>3. c-path (total effect)</td>
<td>-.25***</td>
</tr>
<tr>
<td>4. c´-path (direct effect)</td>
<td>-.02</td>
</tr>
</tbody>
</table>

¹Task performance
²Individual well-being and growth
**p ≤ .01 ***p ≤ .001

Discussion

The objective of this study was to examine the relationship between team size, team psychological safety and team performance in management teams. Team performance was operationalized according to two types of outcomes: task performance and individual well-being and growth. Findings of the study indicate that there is a negative relationship between management team size and team performance, and between team size and team psychological safety: large management teams are associated with lower team psychological safety and team performance, compared to smaller management teams. Team psychological safety is positively associated with team performance, and mediates the relationship between team size and team performance. Hence, a possible explanation for the negative relationship between team size and team performance could be the lowered level of team psychological safety that is associated with increased management team size.

Based on these results, larger teams tend to be less effective in terms of productivity and individual well-being and growth, due to the lowered level of team psychological safety associated with increased team size. This highlights the importance of thorough consideration when considering when to increase the size of a management team or determine the size of a newly formed team.

So, why is there a negative relationship between team size and team psychological safety? As proposed in the theoretical framework for this thesis, aspects of social categorization and interpersonal relationships can be of explanatory value. Firstly, larger groups will, due to the number of team members, experience higher levels of diversity, both
related to work behaviours such as skills and knowledge, but also concerning attributes such as gender, age, ethnicity, personalities and attitudes. When team size increases, the effort needed from each team member to get to know one another, also increases. When interpersonal relationships amongst team members are based solely on the interactions which occur when attending task work and formal occasions, creating a climate of team psychological safety can be difficult. This will often be the case for larger management teams, as their meetings are characterized by time constraints and the need for efficiency. Furthermore, this perceived lack of psychological safety may trigger relationship conflict, lower team cohesion and inhibit efficient team work.

Members of small teams are more likely get to know each other better and perceive a safer group climate than members of large groups. Smaller teams provide a more positive environment for the forming of closer interpersonal relationships, easier coordination of team members and team tasks, a consistent group identity, and also higher levels of team psychological safety (Wheelan, 2009; Edmondson, 1999; Parker, 2003).

Implications for theory

This study found that team size is negatively associated with team psychological safety and team performance, and that team psychological safety is strongly positively associated with team performance. Furthermore, a significant mediating effect of team psychological safety was found on the relationship between team size and team performance.

Therefore, when exploring the effects of team size on different outcome measures in the future, team psychological safety should be included and controlled for. Team size and team psychological safety seems to be associated, and by neglecting team psychological safety, valuable explanatory variances in outcome variables may be left out. From the literature review carried out, it appears that there is limited research that has explored how mediators such as team psychological safety may influence the relationship between team size and team performance. As well as including team psychological safety, other potential mediators should be considered. For example, Espedalen (2016), found a mediating effect of team cohesion for the size-performance relationship. It would be interesting, for example, to include team psychological safety and team cohesion in the same model, as well as adding more similar constructs related to group climate, team composition and management team member attitudes, such as behavioural integration, balanced diversity or focused communication.
This study also contributes towards better understanding the relationship between management team size and performance. The correlation between team size and team performance was moderate and significantly negative, providing support for the assumed negative association between these two variables. Note that this finding applies to management team performance. Haleblian and Finkelstein (1993) suggest that larger teams might be beneficial for firm performance, implying that larger teams can also have a positive effect on some dimensions of performance.

Implications for practice

One interpretation of the study’s results is that it is easier to achieve high quality team performance, both when it comes to task performance and individual well-being and growth, within small management teams compared to large management teams. Due to the positive correlation between team size and team psychological safety, it might be more difficult to maintain high levels of team psychological safety when team size increases. It is therefore advisable to make careful consideration when deciding whether it is necessary to increase team size, and what, if anything, can be done to prevent a decrease in the level of team psychological safety that is associated with increased team size. This also applies when forming a team and determining team size.

Some actions can be taken to maintain or create a group climate of team psychological safety. First and foremost, however, is team size. For larger teams, it will be more difficult to both develop and maintain such a group climate, i.e. of psychological safety. Furthermore, awareness of the concept of team psychological safety should be raised, focusing on desired behaviours and actions that are positively associated with team psychological safety, such as: being open to new ideas and concepts, responding constructively, being task-focused with regards to questions and suggestions and answering questions regardless of how obvious they may seem. By providing team members with a clear introduction to relevant concepts and behaviours associated with psychological safety, it is more likely that they will experience such a climate. To maintain a climate of psychological safety over time, it may be beneficial to have a team leader both initiate and reward favourable behaviours (Nembhard & Edmondson, 2006).

For members of small teams, it is easier for team members to get to know one another, understand each other’s perspectives and develop a common shared group identity, which may lead to the sensation of a psychologically safe group climate. For larger teams, it might be beneficial to arrange social activities in addition to the regular management team
meetings, to allow interpersonal relationships to be better established and to contribute towards creating a group identity. However, one should not forget that management teams commonly operate within tight time schedules both with regards to their meetings and working hours in general. Spending time on social activities can be seen as a long term investment, by building a foundation of respect and mutual understanding among team members, potentially enabling a group climate of team psychological safety also for larger teams.

**Methodological considerations**

Several limitations should be highlighted with regards to the methods used in this study. These limitations will now be discussed in accordance with three types of validity: construct validity, internal validity and external validity (Shadish, Cook & Campbell, 2002).

Construct validity concerns whether the indicators used for measuring higher-order concepts represent what they are meant to measure (Lund & Haugen, 2006; Shadish, Cook & Campbell, 2002). According to Shadish et al. (2002), construct validity faces a twin problem; firstly, how to understand the different constructs and secondly, how to measure them. For this study, the only straightforward measure criterion is team size, which is measured by a single numeric value representing the actual number of management team members. The remaining variables, i.e. team psychological safety, individual well-being and growth and task performance, are all phenomenon which require thorough operationalization, which again will differ according to context and theoretical perspective. Here, it is relevant to question the validity of the “effect” questionnaire and to determine to what extent the scales measure the theoretical constructs they are intended to measure.

To measure team psychological safety, seven items were applied, reflecting behaviours and perceptions. Some examples of these items related to openness in the group, the fear of negative sanctions and asking questions. These are all components of team psychological safety, according to Edmondson’s (1999) definition of the construct. Concerning task performance, the validity of the measure could be strengthened by adding objective measures of task performance instead of basing values solely on self-report data. This argument also applies to the measures for individual well-being and growth.

Internal validity concerns the extent to which conclusions on the causality between the variables examined in the study can be drawn (Shadish et al., 2002; Lund & Haugen, 2006). Statistical validity is also included. Due to the nature of the data analyses (a correlation study), one cannot draw conclusions about causal inference.
Podsakoff, MacKenzie, Lee and Podsakoff (2003), postulate how common method variance, i.e. variance that is attributable to the measurement method rather than to the construct the measure represents, is a potential problem in all behavioural research, and a major threat to validity.

For this study, data was collected from a defined informant group, all from within a similar context, at a given time. All study participants responded to the same questionnaire and to the same items. Such characteristics are common concerning methods for behavioural research, but this does not mitigate the potential risk for committing methodological or measurement errors (Podsakoff et al., 2003). Another problem with collecting data from the same informants in the same context at the same time is how to assess the extent to which the present situation of the management team may influence the general tendency of rating statements and items. If team members are generally satisfied at a given time, a g-factor may influence their answers in a positive fashion and team members may rate statements more positively overall than they would if rating them in retrospect. Likewise, if team members were generally feeling more dissatisfied at the time of answering the questionnaire, statements would most likely be rated more negatively. Furthermore, some of the participating teams in this study were very small, i.e. comprising 2-3 members, and because written feedback was provided on the team results, some might have answered in a more socially desirable fashion, so as to not be recognized or confronted for expressing their honest opinions (Donaldson & Grant-Vallone, 2002).

External validity concerns the generalizability of the results (Shadish et al., 2002). Can these findings be applied to other management teams across context, time, place and people? Even though the study sample is relatively large, it comprises only Norwegian and Danish management teams, who were not randomly assigned to the data collection. Both Norway and Denmark are part of the “Scandinavian Work Culture” (Grenness, 2003; Theis, 2013), characterized by egalitarianism and commitment to autonomy and independence (Mole, 1995). This may inhibit generalizability, for example within an American working context, as well as other European, Asian or African work contexts. Lastly, it is likely that different management teams, including those that participated in the study, face different challenges. They will engage in several projects and ways of working, and they have to continuously adapt to changes and processes within their respective organizations. Therefore, by measuring all variables at one single point of time, the scores may not be an accurate representation of the general group climate within the team, and thereby limit transferability to management teams in general.
**Future research**

Future research should take into consideration the limitations of this study. To better understand the dynamics between team size, team psychological safety and team performance, one suggestion is to conduct a longitudinal study. By doing so, one could test the relationship between the study variables over time, and allow for testing causal inference. A longitudinal study will most likely provide a more accurate reflection of the actual group climate within a team, and offer a deeper understanding of the relationship between team size, team performance and team psychological safety – as well as other relevant variables which could be included in such a study. To further enhance the validity of future studies, a validation process of the items and scales used for data collection should be performed.

Although the result of this study indicated a full mediation of the relationship between team size, team psychological safety and task performance and individual well-being and growth, it is likely that other variables might influence this relationship as well. For example, there are discrepancies in research regarding the effect of task conflict, relationship conflict and team performance (De Dreu & Weingart, 2003; Bradley et al., 2012; Kostopoulos & Bozionelos, 2011), and what role team psychological safety might play in these relationships. Studies including different control, mediation and moderator variables must be conducted in order to fully understand team dynamics and their relationship to team performance.

As previously discussed, few studies have used mediators to explore and explain the relationship between team size and team performance. Here, team psychological safety turned out to be of explanatory value and several other process variables should be examined. Espedalen (2016) found team cohesion to be a mediator in this relationship and it is also reasonable to assume that other similar variables such as behavioural integration, trust in leaders and dialogue, may explain the relationship as well. I therefore encourage further studies that include some of these variables.

**Conclusion**

The aim of this study was to examine the relationship between team size, team psychological safety and team performance. To my knowledge, no previous research has tested the mediating effect of team psychological safety on the relationship between team size and team performance.
Results of the study indicate support for the study hypotheses, suggesting a negative association between team size and team performance, indicating that in general, as team size increases, there will be a decrease in team performance. When team psychological safety was included as a mediator, the negative association between team size and individual well-being and growth and task performance, was reduced to close to zero, and a significant amount of the variance in both outcome variables was explained through the impact of team psychological safety.

These findings highlight the importance of team psychological safety within management teams, especially when explaining how team size might influence task performance and individual well-being and growth. It is most likely beneficial for management teams to strive for a group climate that is perceived as psychologically safe for all members, due to its positive association with team performance. However, team size might provide an obstacle for team psychological safety. Due to the important role management teams play in an organization, one should strive to create a group climate where conditions are set for optimum performance to ensure high-quality decision making and well considered strategies and visions for the future, all for the greater good of the organization.
References
TEAM SIZE AND PERFORMANCE IN MANAGEMENT TEAMS


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### Appendix 1

**Items for all measures.**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team psychological safety</td>
<td>If you make a mistake in this management team, it is often held against you (reversed).</td>
</tr>
<tr>
<td></td>
<td>It is easy to bring up problems and controversial issues in this management team.</td>
</tr>
<tr>
<td></td>
<td>It is safe to take a risk in this management team.</td>
</tr>
<tr>
<td></td>
<td>It is difficult to ask other management team members for help (reversed).</td>
</tr>
<tr>
<td></td>
<td>It can easily go against you if you openly express your opinions in the management team (reversed).</td>
</tr>
<tr>
<td></td>
<td>It is easy to query any issues in the management team.</td>
</tr>
<tr>
<td></td>
<td>There is little room for expressing your uncertainty in the management team (reversed).</td>
</tr>
<tr>
<td>Task performance</td>
<td>Our management team is very successful in its efforts.</td>
</tr>
<tr>
<td></td>
<td>Our management team does not perform well as a team (reversed).</td>
</tr>
<tr>
<td></td>
<td>You are given useful input when you bring up an issue in the management team.</td>
</tr>
<tr>
<td></td>
<td>We receive positive feedback on our performance as a management team.</td>
</tr>
<tr>
<td></td>
<td>It is difficult to see what added value the management team contributes to our organization (reversed).</td>
</tr>
<tr>
<td></td>
<td>We consistently make high quality decisions in our management team.</td>
</tr>
<tr>
<td></td>
<td>The vast majority of decisions made by the management team turn out to be beneficial for the organization.</td>
</tr>
<tr>
<td></td>
<td>Those affected by the decisions of the management team are generally very satisfied with the decisions we make.</td>
</tr>
<tr>
<td>Individual well-being and growth</td>
<td>I develop my professional competencies by participating in this management team.</td>
</tr>
<tr>
<td></td>
<td>Working in this management team contributes to my learning.</td>
</tr>
<tr>
<td></td>
<td>Being part of this management team has had little impact on my development as leader (reversed).</td>
</tr>
<tr>
<td></td>
<td>I really enjoy working together with my management team colleagues.</td>
</tr>
<tr>
<td></td>
<td>I get a lot of energy from our management meetings.</td>
</tr>
</tbody>
</table>