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Do we all agree? A mixed-methods study of the impact of climate strength on psychological safety, team learning, and team performance

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DO WE ALL AGREE?: A MIXED-METHODS EXPLORATION OF THE IMPACT OF
CLIMATE STRENGTH ON PSYCHOLOGICAL SAFETY, TEAM LEARNING
BEHAVIOR, AND TEAM PERFORMANCE

by

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ABSTRACT

The majority of today's organizations rely on teamwork to drive innovation and achieve success. Evidence suggests that two constructs—psychological safety and team learning behavior—demonstrate significant predictive power on performance. Existing research posits that the more psychologically safe a team feels, the more it can learn, which enhances its performance. While organizational literature has established links among psychological safety, team learning, and team performance, the conditions under which these relationships are enhanced or diminished are less clear.

Recent studies indicate that climate strength is a factor that significantly influences the relationship between climate variables and outcomes. *Climate strength* refers to the degree of consensus of individuals' perceptions of aspect of a climate, such as psychological safety. When a climate is strong, team members tend to agree on their perceptions of the climate. When climate is weak, team members tend to hold divergent perspectives of the climate. A knowledge gap exists regarding the moderating role of psychological safety (PS) climate strength on psychological safety, team learning, and team performance. In addition, little is known about the factors that affect PS climate strength in a team.

This study addressed these issues by employing an explanatory sequential mixed-methods approach at a multinational technology company. In the first phase, 94 individuals from 22 teams responded to a 40-item survey measuring the four dimensions in this study. In the second phase, 22 team members from three teams participated in interviews. Findings revealed that higher levels of psychological safety generated increased team learning behavior, which led to greater team performance. When teams

had strong climates, they were more likely to exhibit higher learning behavior. When teams had weak climates, team learning behavior became less predictable. In addition, the findings led to the development of a model that illustrates five nested dimensions of influence on psychological safety climate strength. Despite a number of limitations, this study's findings contribute to our knowledge of the significance of psychological safety climate strength, and they provide a model for scholars and practitioners to understand the factors that inhibit and enhance psychological safety, and ultimately, lead teams that thrive.

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CHAPTER ONE

BACKGROUND OF THE STUDY

The majority of today's organizations rely on teamwork to drive innovation and achieve performance results. In order to collaborate effectively, teams must generate the conditions that enable creativity, knowledge sharing, and collective learning. However, the reality is that some teams work well together, and some do not (Hackman, 1990). The costs of teamwork dysfunction can range from decreased employee well-being to poor financial performance of the organization (González-Romá, Fortes-Ferreira, & Peiro, 2009; Afsharian, Zadow, Dollard, Dormann, & Ziaian, 2017). When the stakes are high, such as in surgical teams or Airforce squadrons, failures in teamwork could have fatal effects (Edmondson, 2003). Research spanning decades has aimed to understand the relational dynamics that strengthen teams' propensities to succeed.

Among the multitude of variables examined in the team literature, evidence suggests that two constructs—psychological safety and team learning behavior— demonstrate significant predictive power on performance (Frazier, Fainshmidt, Klinger, Pezeshkan, & Vracheva, 2017). *Psychological safety* is defined as the belief that the environment is safe to take interpersonal risks (Kahn, 1990; Edmondson, 1999). Team learning behavior include actions such as vocalizing concerns, discussing mistakes, and proposing new ideas (Edmondson, 1999; 2002). The relationship proposed by the existing research posits that the more psychologically safe a team feels, the more it can learn, which enhances its performance. Surprisingly, a recent worldwide survey revealed that only 47% of individuals perceive their workplace as "a psychologically safe and healthy environment to work in" (Ipsos, 2012, p. 5). This staggering finding likely has

significant negative ramifications for organizations across the world. While

organizational literature has established links among psychological safety, team learning,

and performance, the conditions under which these relationships are enhanced or

diminished are less clear (Edmondson & Lei, 2014). This study will examine the

relationships among these variables and investigate the conditions that impact them in

order to advance theoretical understanding and provide practical insight for teams in

organizations.

Psychological Safety

Psychological safety has emerged as arguably one of the most essential factors

that enables team learning and effectiveness (Edmonson, 1999; Frazier et al., 2017).

Categorized as a variable of climate, *psychological safety* is defined as the belief that

taking interpersonal risks, such as admitting mistakes, offering feedback, or asking

questions, will not result in criticism, rejection, or embarrassment from one's team

members (Kahn, 1990; Edmondson, 1999). Before acting in a team, an individual

considers "whether others will give me the benefit of the doubt when I have made a

mistake" (Edmondson, 2003, p.7). If the answer is affirmative, research suggests that the

environment will likely provide the security needed for teams to overcome the "learning

anxiety" that arises when confronted with organizational change (Schein & Bennis,

1965).

Psychological safety is measured at the individual, team, and organizational levels

of analysis. Kahn (1990) originally conceptualized psychological safety as an

individual's perception that can vary widely among members of a group. In contrast,

Edmondson (1999) contends that psychological safety is primarily a group-level

phenomenon because it varies significantly between groups within the same organization. She speculates that this is because team members experience similar environmental characteristics (e.g. exposure to the same boss). Although the group-level assumption has dominated contemporary literature on the topic, recently, dissenting scholars argue that homogenous perceptions cannot be assumed just because individuals on a team experience similar contextual factors (Roussin, MacLean, & Rudolph, 2016). This continues to be a central debate within the research on this topic.

Although psychological safety has existed in organizational literature for nearly half a century (Schien & Bennis, 1965), the construct did not capture scholarly interest until Edmondson (1999) published her seminal paper, which found that psychological safety in surgical healthcare teams was positively related to higher reported rates of medical errors. Initially, these findings seemed contradictory, but Edmondson (1999) discovered that the increased reporting rates were not an indicator of poorer performance than other teams, but rather a result of employees feeling safe enough to admit mistakes that could potentially have life-or-death consequences. The psychologically safe teams engaged in feedback seeking, help seeking, speaking up about concerns or mistakes, innovation, and boundary spanning, which are behaviors that indicate the presence of team learning (Argyris & Schon, 1978; Edmondson, 1999; 2002). Further research showed that, in psychologically safe teams, individuals were more likely to voice suggestions (Liang, Farh, & Farh, 2012), exchange knowledge and information (Siemsen, Roth, Balasubramanian, & Anand, 2009), and engage in organizational learning (Carmeli & Gittell, 2009). After nearly two decades of extensive research on psychological safety and its complex nomological network, consistent evidence indicates that psychological

safety plays a role in enabling team learning behaviors and performance outcomes (Bell, Kozlowski, and Blawath, 2012; Edmondson & Lei, 2014).

Psychological Safety, Team Learning Behavior, and Team Performance Outcomes

The positive link between psychological safety and team performance outcomes, mediated by team learning behavior, is consistently supported in the literature (Bell et al, 2012; Newman et al., 2017). Studies measure *performance outcomes* in terms of subjective measures (e.g. self-report ratings of work product) and objective measures (e.g. total revenue from sales) (Wall et al., 2004). Performance outcomes can also be measured at the individual, team, and organizational level of analysis. *Team learning behavior* is conceptualized as a process of experimentation, reflective communication, and knowledge codification that occurs among interdependent team members (Argyris & Schon, 1978; Kolb, 1984; Gibson & Vermeulen, 2003). As the proposed model suggests, psychological safety creates the environmental conditions for team learning behavior to occur, and the collective acquisition of new behaviors, skills, and knowledge enhance performance outcomes. For example, a two-year study conducted by Nembhard & Edmondson (2006) found that intensive care units whose staff demonstrated extensive learning behavior regarding patient care had lower risk-adjusted mortality rates. In addition, a recent meta-analysis found evidence to suggest that team learning behavior mediates the relationship between psychological safety and performance outcomes (Sanner & Bunderson, 2015). This meta-analysis supports the argument that psychological safety only influences team performance outcomes through the process of team learning; in other words, if team learning is not present, no relationship exists between psychological safety and team performance.

Interestingly, other studies indicate that psychological safety demonstrates a direct relationship with performance (Baer & Frese, 2003; Schaubroek, Lam, Peng, 2011). In the most extensive meta-analytic review to date, Frazier and colleagues (2017) examined 136 independent samples representing nearly 5,000 groups to assess the antecedents and outcomes of psychological safety, and found that psychological safety directly predicted incremental variance of task performance over and above all of the other antecedent variables in the analysis (i.e. personality characteristics, positive leader relations, work design characteristics, and supportive work context). Theoretically, this challenges the claim that team learning behavior is an essential mediating variable between psychological safety and performance. Indeed, according to Bell and colleagues (2012) it is possible for performance to change without learning occurring. Additional research is needed in order to address this discrepancy among the findings. Regardless of this issue, the undeniable impact that psychological safety has on performance outcomes remains clear. Still, further research is needed to uncover the boundary conditions that affect this relationship and the role that team learning plays between psychological safety and team performance.

Climate Strength as a Moderator

One variable in team research that has recently garnered scholars' attention is *climate strength. Climate strength* refers to the degree of within-group agreement of individuals' perceptions of a climate (Schneider, Salvaggio, & Subirats, 2002). When a climate is strong, team members tend to agree on their perceptions of the climate. When climate is weak, team members tend to hold divergent perspectives of the climate. Specific types of climate strength correspond to the climate variables they describe. For

example, *psychological safety climate strength* refers to how strong a psychological

safety climate is, or in other words, the degree to which individuals agree on their

perceptions of psychological safety. When climate is strong, members tend to agree on

their perceptions of climate. When climate is weak, members hold divergent perspectives

of the climate. It is important to note that although climate variables and their climate

strength measures are related (e.g. psychological safety and psychological safety climate

strength), they are two distinct constructs (Chan, 1998).   Therefore, studies suggest that

teams with the same overall climate level may show quite different measurements of

climate strength (DeRue, Hollenbeck, Ilgen, and Feltz, 2010).

Although, research on the impact of climate strength is still in its infancy, recent

evidence indicates that climate strength moderates the link between climate variables and

outcomes, which provides significant insight into the conditions that effect the

relationships among these variables (Schneider et al., 2002; Afsharian et al., 2017).

Colquitt et al. (2002) conducted the first study that investigated whether procedural

justice climate strength moderated the relationship between teams' procedural justice

climate and the outcome variables, team performance and absenteeism. Results indicated

that teams with stronger climates showed a stronger relationship between climate and

performance outcomes. More recently, Koopman et al, (2016) found that psychological

safety climate improved team member task performance and creative performance only

when the psychological safety climate was strong. Indeed, as growing evidence indicates

that climate variables and climate strength demonstrate an interactive effect on outcomes,

studies measuring climate strength can conceivably add relevant insight regarding the

boundary conditions under which the relationship between team psychological safety, team learning, and performance thrive.

Problem Statement

Despite extensive research on psychological safety and its relationship to team learning behavior, and performance outcomes, as well as the increasing attention on climate strength research, the current literature has yet to investigate the relationship among all of these concepts (Newman, Donohue, & Eva, 2017; González-Romá et al., 2009). This study seeks to address two primary gaps in the literature: 1) understanding the moderating role of psychological safety climate strength (PS climate strength) on the relationship between team psychological safety, team learning behavior, and team performance outcomes, 2) identifying factors that affect PS climate strength in teams. Each of these issues will be further explored in this section.

While the relationships among psychological safety, team learning behavior, and performance outcomes have been discussed (Newman et al., 2017), a knowledge gap exists regarding the moderating role of PS climate strength on psychological safety, team learning behavior, and team performance outcomes. This is problematic because little is known about the outcomes for teams whose members hold divergent perspectives of psychological safety, or in other words, teams characterized by a weak climate (Roussin et al., 2016; Schulte, Cohen, & Klein, 2012). Given the recent studies that suggest types of climate strength act as moderators to the relationship between team climate and various outcomes, it is reasonable to hypothesize that PS climate strength would also moderate the link between psychological safety and team learning behavior and performance outcomes (Newman et al., 2017; González-Romá et al., 2009). However, to

date, no studies have been conducted to support or deny this claim. Figure 1 depicts the

conceptual model to be tested in this study.
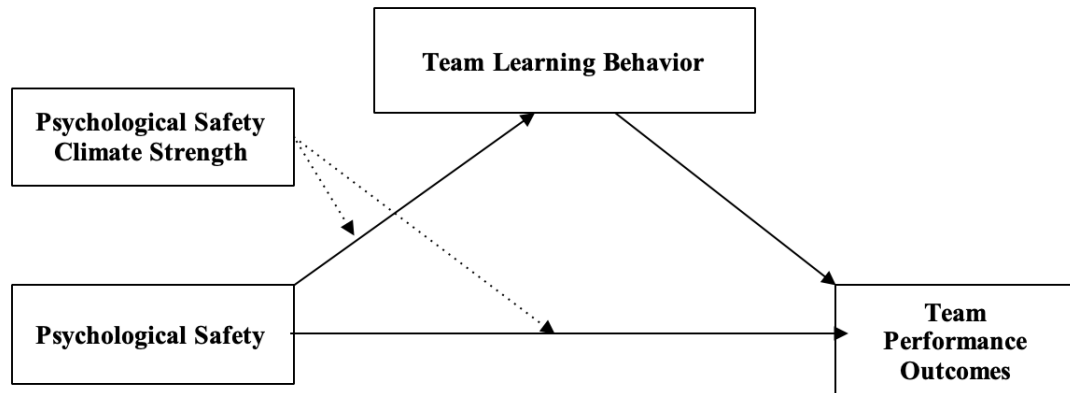
Figure 1. Conceptual model of variable relationships.

In addition, due to the lack of attention to PS climate strength in the literature,

little is known about the factors that enhance or inhibit PS climate strength within a team

(Koopman et al., 2016). Previous research indicates that social interaction, leader-

member interaction, and task interdependence foster within-team agreement of climate

perceptions, which constitutes as a strong climate (González-Romá, Peiró, & Tordera,

2002; Klein, Conn, Smith, & Sorra, 2001). However, scant empirical evidence exists that

identifies the factors that lead to a *weak* psychological safety climate in which there is

high disagreement in members' perceptions. This is problematic because evidence shows

that weaker climates tend to diminish the strength of the relationship between climate and

outcome variables (Gonzalez-Roma, 2009; Koopman et al, 2016). A greater

understanding of factors that weaken the PS climate could offer practical insight to

manager and leaders as well as generate new avenues of future research. The limitations

of quantitative survey methods make it difficult to conduct exploratory research on

phenomena that are not well understood, such as PS climate strength. Qualitative

methods would allow researchers to explore the complex relational dynamics that could be contributing to the psychological safety climate strength. Thus, researchers call for quantitative and qualitative methods so that the strengths of each approach can be leveraged to create a more comprehensive understanding of these relationships (Edmondson & Lei, 2014; Newman et al., 2017).

Purpose of the Study and Research Questions

The purpose of this study is to investigate the influence of PS climate strength as a moderating variable on the relationship between psychological safety, team learning behavior, and performance outcomes. In addition, this study explores the factors that impact PS climate strength in work teams. This study employs a three-phase explanatory sequential mixed methods approach to answer the following questions:

1. How does PS climate strength affect the relationship between psychological safety, team learning, and performance?

    a. To what extent is there a direct relationship between psychological safety and performance?

    b. To what extent is there an indirect relationship between psychological safety and performance through the mediating variable of team learning?

    c. To what extent does climate strength moderate the relationship between psychological safety and team learning?

2. What factors influence PS climate strength in teams characterized by:

    a. A strong positive climate?

    b. A strong negative climate?

    c. A weak climate?

CHAPTER TWO

LITERATURE REVIEW

Since the 1990s, organizations have shifted to rely on teams rather than individual jobs to address challenges and complete tasks (Devine, Clayton, Philips, Dunford, & Melner, 1999). As a result, team science literature has exploded in recent decades (Decuyper, Dochy, & Van den Bossche, 2010) even though theoretical frameworks on team functioning date back to the 1960s (McGrath, 1964).   Researchers have sought to explain the complex relationships among the variables that impact team functioning, and significant gaps in understanding still exist.

First, this review will provide a summary of the nature of teams and the predominant theoretical frameworks on team functioning. Next, literature on the four variables of interest in this study and their interrelationships with each other will be examined and critiqued.   Finally, the gaps in existing research will be identified, and a rationale for this study will be provided.

Theoretical Frameworks of Team Functioning

Team research has proliferated in recent decades as their effectiveness has become a crucial determinant of thriving organizations. Different than groups, a collection of individuals must fulfill certain criteria to be considered a team. *Teams* are defined as:

> Collectives who exist to a) perform organizationally relevant tasks, b) share one or more common goals, c) interact socially, d) exhibit task interdependencies, e) maintain and manage boundaries, and f) are embedded in an organizational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity. (Kozlowski and Bell, 2003, p. 334)

Given the multitude of activities that affect teams' success and the ever-changing

environment, teamwork is complex. A recent literature review estimates that researchers

have proposed more than 130 models and frameworks to explain team functioning, and

this number continues to grow (Burke et al., 2006). Some models offer more generalized

conceptualizations of teamwork (e.g. Hackman, 1987), while others outline specific

contexts or functions (e.g. Marks et al., 2001). Despite the variation among these models,

they build upon core conceptual frameworks that have shaped researchers' understanding

of teams.

The first attempt to explain the relationship among the team variables was the

Input-Process-Output (IPO) model as seen in Figure 2. (McGrath, 1964). This

framework assumes that input variables at the individual level (e.g. skills), team level

(e.g. leader influence), and organizational or contextual level (e.g. company policy)

influence team outcomes through processes. *Processes* refer to team member interactions

(e.g. feedback-seeking behaviors) that enhance or diminish a team's ability to

accomplish tasks (Mathieu, Maynard, Rapp, & Gilson, 2008). *Outcomes* are the results

of team activity, which include constructs such as performance and members' attitudes

(e.g. satisfaction) (Mathieu, Salas, Goodwin, Heffner, & Cannon-Bowers, 2002). This

model influenced a body of research that further explored the *input-process* link and the

process-outcome link, which yielded useful findings that sought to explain the

relationships among variables that make some teams more effective and viable than

others. (Hackman, 1987). However, the IPO framework received criticism. Some

researchers stated that the model fails to capture the nature of teams as complex adaptive

systems, whose parts respond in order to adapt to a changing environment (Ilgen, Hollenbeck, Johnson, & Jundt, 2004).

First, the IPO framework implies a single-cycle unidirectional sequence of inputs, processes, and outcomes. While this is useful for examining a snapshot of team functioning at a specific point in time, this conceptualization ignores that team functioning is cyclical and iterative (Bell, Kozlowski, & Blawath, 2012). The presence of feedback loops influences future team behavior (Cohen & Bailey, 1997; Klein & Kozlowski, 2000; Ilgen et al., 2004). For example, teams that experience performance failure as an outcome tend to demonstrate more conflict in their future interaction processes than teams who accomplish their goals, which indicates that performance outcomes become influential causal factors in future team interactions (Staw, 1975; Hackman, 1987).

Second, the IPO framework does not illustrate the nested, multilevel nature of teams, where the individual parts are distinct, yet still within the greater whole. Multilevel theory states that individuals simultaneously shape and are shaped by the larger team entity – "it is about the interplay between and within the levels," (Kozlowski & Bell, 2001, p. 8). The IPO framework acknowledges that multiple levels of variables exist, but it does not elaborate on the relationship among them, which reduces the model's explanatory capacity.

Third, the IPO framework labels all mediating variables as *processes,* when in fact, some mediators are not processes (e.g. behavioral interactions) at all. Rather, they are *emergent states* that develop and evolve over the lifetime of a team (Marks, Mathieu, & Zaccaro, 2001). According to Klein and Kozlowski (2000), "a phenomenon is

emergent when it originates in the cognition, affect, behaviors, or other characteristics of individuals, is amplified by their interactions, and manifests as a higher-level, collective phenomenon,'' (p. 55). The delineation between processes and emergent states inspired further research that found significant interactions between the two constructs (e.g. Colquitt et al., 2002, Edmondson, 1999), which led researchers to confirm that processes and emergent states are distinct constructs. The limitations of the IPO conceptualization prompted researchers to develop alternative models to explain the dynamic and complex nature of team functioning.

In response to the critiques of the IPO framework, researchers proposed additional models of team functioning. Ilgen and colleagues (2004) coined the IMOI (input-mediator-output-input) framework (Figure 3). The 'mediator' term intends to encompass process variables and emergent state variables while simultaneously suggesting that they are not the same construct. Also, adding the 'input' term at the end of the acronym implies the presence of cyclical causal feedback loops previously missing in the IPO model. In order to address the temporal dynamics associated with team functioning, researchers proposed a series of developmental models and episodic models. *Developmental models* demonstrate how teams evolve over time and aim to identify the factors that influence teams at various stages in their development (Klein & Kozlowski, 2000). *Episodic models* illustrate team functioning as a series of performance episodes punctuated by transition periods. They emphasize that the skills and processes necessary for effectiveness vary depending on whether teams are engaging in a task episode or transition period (Marks et al., 2001). Finally, Salas and colleagues (1992) discovered

that organizational and contextual elements (e.g. economic downturn) affect the entire

team functioning process.
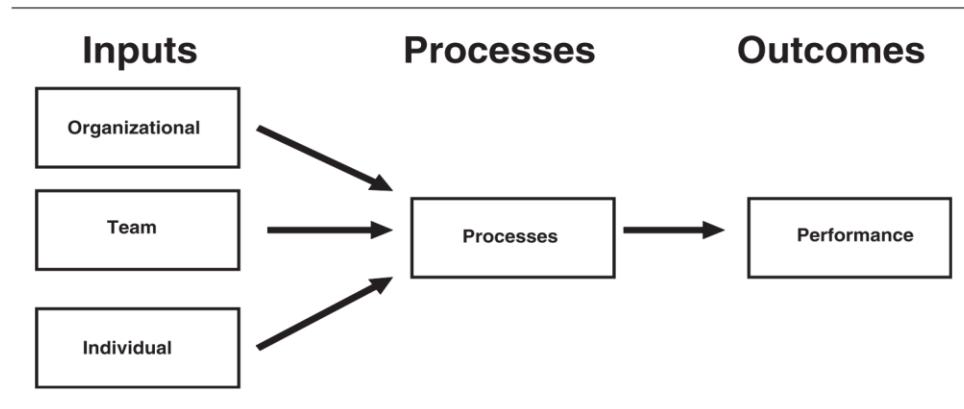
Figure 2. Input-Process-Output (IPO) Framework. Reprinted from 'Team effectiveness

1997-2007: A review of recent advancements and a glimpse into the future' by J.

Mathieu, T. Maynard, T. Rapp, and L. Gilson, 2008, *Journal of Management, 34,* p.413.
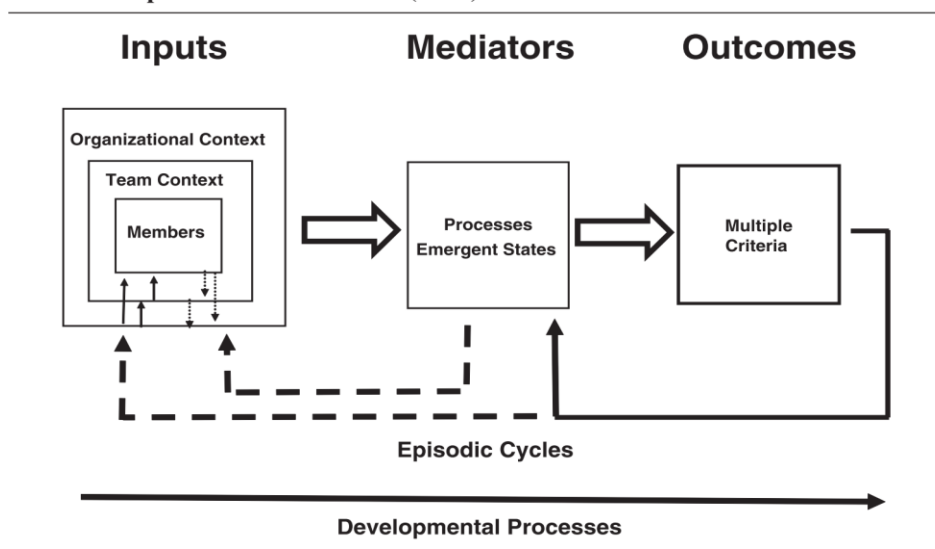
Figure 3. Developmental-Episodic IMOI Framework. Reprinted from 'Team

effectiveness 1997-2007: A review of recent advancements and a glimpse into the future'

by J. Mathieu, T. Maynard, T. Rapp, and L. Gilson, 2008, *Journal of Management, 34,*

p. 413.

Taken together, Figure 3 depicts a framework created by Mathieu and colleagues (2008) that addresses contemporary critiques of the IPO model. On the left side of the model, multi-level input variables are more accurately illustrated as nested within one another (rather that stacked separately as shown in Figure 1), with the arrows suggesting a bidirectional influence of variable relationships. In addition, processes and emergent states are correctly differentiated from one another and labeled as 'mediators' (Ilgen et al., 2004). The lines labeled as 'episodic cycles' indicate that feedback loops occur after each performance episode, with the dashed lines suggesting smaller effects (Marks et al, 2001). Finally, the single line labeled 'developmental processes' signifies the evolutionary process that teams experience over their lifespan. Although numerous models of team functioning exist in the literature at different levels of granularity (Decuyper et al., 2010), this model attempts to consolidate concepts from a variety of findings. As new findings emerge, researchers continue to refine and adapt aspects their frameworks to more accurately depict relationships among team variables.

Now that the nature of teamwork has been outlined, the following sections examines the four variables of interest in this study: psychological safety, team learning behavior, team performance outcomes, and climate strength. First, I outline each variable as separate constructs and highlight relevant theoretical underpinnings. Then, I explain their relationship to one another as demonstrated by the literature. Finally, I articulate this study's hypotheses as they relate to the current evidence.

Psychological Safety

Psychological safety describes the perception that a group environment is safe to take interpersonal risks, such as offering feedback, reporting errors, admitting a mistake,

or asking questions, without fear that such behaviors will result in rejection or embarrassment from one's colleagues (Edmonson, 1999; Kahn, 1990). Before deciding to act, team members engage in an implicit evaluation by questioning whether or not their actions will illicit negative social consequences. This is not to say that a psychologically safe climate is always harmonious or unconditionally comforting. It simply means that the climate is safe enough so that team members are not triggered to activate self-protective behaviors that could instigate negative group outcomes.

In the last 25 years, 78 published studies have explored the antecedents and consequences of psychological safety at the individual, team, and organizational levels mostly through survey methods (Newman, Donohue, & Eva, 2017). However, because psychological safety is a dynamic emergent state that evolves throughout the lifecycle of a team, cross-sectional surveys fail to provide nuanced conclusions about how the construct unfolds (Edmondson, 2003). Preconditions that foster psychological safety have been identified at the individual, group, and organizational levels, such as member openness (Detert, & Burris, 2016), high-quality relationship networks (Schulte et al., 2012), and supportive organizational diversity practices (Abraham Carmeli & Tishler, 2004) respectively.

Psychological safety has been widely observed and studied in the fields of clinical psychology and adult development literature (Wanless, 2017). However, it emerged in organizational science in the 1960s when Edgar Schein and Warren Bennis observed that psychological safety provided the necessary stability and security for individuals to overcome the "learning anxiety" that arises when new behaviors are required to respond to organizational change (Schein & Bennis, 1965). Following a groundbreaking study

linking psychological safety to performance in surgical teams in four hospitals by

Edmonson and her colleagues (1999), psychological safety has become one of the most

studied enabling conditions in team learning and performance research (Edmondson &

Lei, 2014). As a result, it is necessary to distinguish psychological safety from other

related constructs.

Psychological Safety vs. Trust

Psychological safety is often conflated with trust, and understandably so. Both

involve the calculation of vulnerability and risk in relationships, and they impact

individuals' propensity to act. Although trust and psychological safety are

complementary intrapsychic states, they are conceptually distinct (Edmondson, 1999;

2003). Trust focuses on *others'* behavior while psychological safety focuses on *self*

(Edmondson, 2003). While the literature on trust fails to agree on one conceptual

definition (Kramer, 1999), one of the most widely accepted characterizations of trust is

the "expectations, assumptions, or beliefs about the likelihood that another's future

actions will be beneficial, favorable, or at least not detrimental to one's interests"

(Robinson, 1996, p. 576). Here, the focus is on evaluating the actions of *others*.

Conversely, psychological safety has a greater focus on *self* by managing risk through

monitoring one's own actions. Edmondson (2003) simplifies the distinction by clarifying

that, "People often equate trust with giving others the benefit of the doubt…in discussing

psychological safety, the question is instead whether others will give *me* the benefit of the

doubt when, for instance, I have made a mistake (p.7)." This distinction is important

because it impacts how psychological safety is operationalized, and therefore, measured.

Measuring Psychological Safety

Psychological safety is measured at the individual, team, and organizational levels of analysis. Based upon her seminal work, Edmondson (1999) created a seven-question survey to assess psychological safety through individual self-reports, from which scores are aggregated to form a team-level variable. The instrument has been used to measure psychological safety at an individual level of analysis (e.g. Carmeli, Reiter-Palmon, & Ziv, 2010; Kark & Carmeli, 2009) and the team level of analysis (Edmondson, 2002; Kostolpoulous & Bozionelos, 2011). Although the instrument measures individual perceptions of team climate, Edmonson (2014) contends that psychological safety is primarily a group-level phenomenon because it varies significantly between groups within the same organization, most likely because teams are exposed to similar environmental characteristics such as the same boss (Edmondson, 1999; 2003).

Even though Edmondson's (1999) instrument is widely utilized, it has several shortcomings. Some scholars suggest that the team level of analysis alone actually ignores variations in psychological safety within teams that are present and impactful. (Roussin et al., 2016; Schulte et al., 2012). An ongoing debate among organizational scholars exists regarding the prerequisites for data aggregation. Some scholars argue that constructs such as psychological safety cannot be aggregated unless within-team agreement occurs, which is determined by aggregation indices such the intraclass correlation coefficient (ICC) (Bleise, 2000, Chan, 1998). The ICC measures how similar measurements in a group are to one another. If the ICC value exceeds a threshold value, which indicates that variance of individual ratings is low, then scores will be aggregated and considered in the data analysis. Conversely, the scores that show high variance in individual ratings are omitted from further analysis (Roussin et al., 2016; Bleise, 2000).

This is problematic because it prevents us from understanding patterns of functioning within teams that have more incongruent perceptions. The implications of this issue will be explored further in a later section of this paper.

In addition to the issue stated above, Edmondson's instrument is a self-report measure, so it is prone to social desirability bias. The sensitive nature of the topic could lead respondents to skew their reports if they are concerned that their answers will not remain confidential. In addition, this tool lacks the capacity to capture trends of psychological safety development in longitudinal studies because it only measures perception at one moment in time. This does not take into account attrition, learning effects, or the dynamic nature of psychological safety as an emergent state (Hoenderdos, 2013). Furthermore, the behaviors that are enhancing or harming the team climate are difficult to pinpoint utilizing this survey alone.

In order to address the issue of aggregating individual level data, Roussin, MacLean, & Rudolph (2016) proposed a multi-level psychological safety index (mPSi), which is a new measurement technique that draws upon social network analysis to measure dyadic PS 'ties' among members to predict team learning and performance. Roussin et al. (2016) state that mPSi measurement is ideal for teams that are likely to contain subgroups because within-team agreement is not necessary in order to aggregate the data. In addition, social network analysis provides a visual representation of the team's relationships, which can make for richer pattern analysis. This new methodology has the potential to provide valuable insights, but no literature has been published utilizing the technique, likely because the paper is relatively recent. Other researchers are also attempting to capture a more complex understanding of psychological safety in

teams beyond survey methods. Regardless of the limitations mentioned above,

Edmondson' (1999) psychological safety instrument remains the gold-standard for

measuring the construct. When psychological safety is established in teams, it has been

linked to one critical process that significantly affects team functioning: team learning

(Sanner & Bunderson, 2015).

Team Learning

The research on team learning has exploded in recent decades. Between 1970-

1979, 11 references on team learning existed in academic literature. Then, in the 1990

classic, *The Fifth Discipline,* Peter Senge declared that "teams, not individuals, are the

fundamental learning unit in the modern organization" (1990, p. 10).   Following this

text, 178 academic papers on team learning were published between 1990-1999, and

another 214 academic papers on the topic were produced between 2000-2007 (Decuyper

et al., 2010). Consequently, the nomological network of antecedents and outcomes

connected to team learning is vast. One systematic literature review recorded 486

variables related to or central to team learning (Decuyper et al, 2010). This entire

repertoire of studies is beyond the scope of this review, so this section will focus on

predominant models of team learning in the literature as well as the relationship of team

learning to psychological safety and team performance outcomes.

The Nature of Team Learning

Despite the continued interest in team learning, the interdisciplinary nature of

research on the topic has led to inconsistency in defining it. In a literature review by

Edmondson, Dillon, & Roloff, (2007), they identified three categories that illustrate the

various ways in which team learning has been conceptualized in the research: team

learning as *outcome improvement*, team learning as *task mastery,* and team learning as *group process.* Considering team learning as an outcome improvement or a mastered task, such as enhanced knowledge or an expansion of a team's repertoire of potential behaviors (e.g. Argote, Gruenfeld, & Naquin, 2000), can be useful in that outcomes tend to be easily measured. Therefore, one can determine the occurrence and the success of the team learning. However, some scholars argue that learning can occur even if the desired outcome is not accomplished (Kolb, 1984). This stream of research argues that team learning is a *process* that involves a cycle of reflection and action to adapt or improve (e.g. Argyris & Schon, 1978; Edmondson, 1999; Edmondson, 2002).

Numerous models exist that illustrate team learning as a process (Edmondson, 1999; DeCuyper et al., 2010; Kayes, Kayes, & Kolb, 2005). Of these models, Edmondson's (1999) was the first to venture beyond team learning as a collective cognitive process and explore the impact of interpersonal beliefs. Building on the work of Argyris (1978) and Kolb (1984), Edmondson (1999) proposed a model of team learning in which, after a performance event occurs, teams engage in reflection, which are behaviors (e.g. feedback seeking) that enhance teams' understanding about its processes or performance. Kozlowski and Ilgen (2006) clarify that although individual learning forms the foundation of team learning, in order for the process of team learning to occur, individual knowledge must be discussed, shared, and reflected upon at the team level. Therefore, the process of team learning has occurred when shared insights are translated to inform decisions and actions that result in enhanced team effectiveness (Argyris & Schon, 1978; Edmondson, 1999).

Decuyper and colleagues (2010) sought to unbundle the behavioral categories in Edmondson's model (experimentation, reflection, and action) and proposed an integrative team learning model, which is considered one of the most comprehensive frameworks to date. This model condenses 486 variables associated with team learning into seven behavioral dimensions that link together as both a dynamic, cyclical process. Widmann and colleagues (2016) summarize Decuyper et al.'s (2010) integrative team learning model as a:

> Set of dynamic communication and facilitation processes that are fed by inputs at the individual, team, and organizational level, which lead to change and improvement as outputs at these three levels, and through which emergent team states (e.g., shared mental models) are evolving and progressing constantly. (p. 434)

The team learning processes in DeCuyper's model consist of seven behaviors: sharing, co-construction, constructive conflict, team reflection, team activity, boundary crossing, and storage and retrieval. *Sharing* involves communicating expertise, knowledge, information and opinions to other team members. *Co-construction* refers to generating shared mental models about goals, tasks, responsibilities, context, etc. Team members build on, shape, and extend individual contributions to create shared meaning that did not previously exist. *Constructive conflict* explores divergent beliefs, ideas, and opinions in a way that promotes a compromise or integration of mental models rather than polarization. *Team reflection* occurs when a team collectively examines its objectives, strategies, relationships, and underlying assumptions. *Team activity* is the actual engagement in the work tasks by team members. This action allows individuals to 'learn by doing,' through which they acquire tacit knowledge and develop routines for completing their work. Team activity includes planned, coordinated work or

experimentation, and unplanned, chaotic work, as all types of activity could provide valuable insight. *Boundary crossing* refers to collecting or disseminating pertinent information across various types of boundaries (e.g. role, function, team, or organization). *Storage and retrieval* involve storing the team's learned information, knowledge, and processes in a repository so that it can be retrieved at a later time. Storage may take place in 'software,' which are non-material places (e.g. shared mental models), or storage may occur in 'hardware,' which are physical objects (e.g. a database). Each of these behaviors has been correlated separately with enhanced team performance across a number of studies (Hoegl & Parboteeah, 2006; Liu, Schuler, & Zhang, 2013; Van den Bossche et al., 2006; Van der Haar, Koeslag-Kreunen, Euwe, & Segers, M, 2017). Recent evidence has also provided some support for DeCuyper's (2010) model, which will be discussed in the following section.

Measuring Team Learning

The approaches to measuring team learning depends upon whether the construct is operationalized as an outcome improvement, task mastery, or a group process. This study focuses on team learning as a group process, so the exploration of instruments is constrained to this conceptualization of the construct. A group process is created through actions from team members. Therefore, team members' behaviors are examples of the team learning process (Marks, Mathieu, & Zacarro, 2001).

Building on this operationalization of team learning, Edmondson (1999; 2002; 2003) created a team learning behavior assessment based upon extensive qualitative interviews and observations of teams in a manufacturing company and in hospitals. The instrument contains 17 questions that measure the dimensions of experimentation,

knowledge sharing, constructive conflict, reflection, and boundary spanning at the team-level of analysis. While other instruments exist that measure team learning as outcome improvements or task mastery, Edmondson's (1999; 2002; 2003) instrument is the most widely used and validated instrument that measures team learning *behavior*, which adheres to the idea of team learning as a process.

Savelsberg and colleagues (2009) created a psychometric instrument to measure team learning behavior that expanded the categories of Edmondson's (1999) team learning assessment. Savelsberg et al.'s (2009) instrument included eight behavioral dimensions with the intent to gain more clarity about what specific behaviors are most central in driving team performance. Interestingly, of the eight behaviors tested in the confirmatory factor analysis, only two team learning behaviors were significantly positively related to team performance, which were constructive conflict and co-construction of meaning (Savelsbergh, van der Heijden, & Poell, 2009). Therefore, the evidence partially supported this theoretical framework. This instrument was only tested on 19 teams, so more research is needed to improve its statistical validation. In addition, due to the small sample size, the instrument tested individual-level of analysis, and therefore, did not attempt to create a team-level variable. Research at the team-level of analysis is necessary to provide more meaningful insights about the validation of this new instrument. Taken together, these instruments have captured the construct of team learning as a process, and as a result, numerous studies have been able to demonstrate a positive relationship between team learning behavior and another primary variable in this study: team performance (Edmondson & Lei, 2014).

Team Performance

In most organizations, teams exist to perform tasks that provide value and advance organizational goals (Argote & McGrath, 1993). For this reason, "performance is the most widely studied criterion variable in organizational behavior and human resource management literature" in order to determine if teams are accomplishing their intended functions (Bommer, Johnson, Rich, Podsakoff, & Mackenzie, 1995, p. 587). Importantly, the organizational psychology field emphasizes the distinction between *performance* and *performance outcomes*. *Performance* refers to goal-oriented behavioral or cognitive actions of team members, while *performance outcomes* are the consequences of those actions (Salas et al., 2008). Performance, as defined here, is often conflated with group process behaviors, which causes a lack of clarity and consistency in measurement (Mathieu et al., 2008). Therefore, this study will focus attention on *performance outcomes* as the primary variable of interest.

Measuring Team Performance Outcomes

In accordance with multilevel theory in organizational studies, performance outcomes can be measured at three levels of analysis: the individual, the team, and the organizational level (Kozlowski & Bell, 2001). While each level of analysis provides important insight into performance outcomes, this section will focus on team performance outcomes (TPOs) because the individual and organizational levels are beyond the scope of this study. Team performance outcomes (TPOs) are one of several factors that contribute to overall team effectiveness (Cohen & Bailey, 1997; Hackman, 1987). The literature on team performance outcomes is vast. According to a broad

review of the studies, TPOs can be measured in three ways: as an objective measure, a subjective measure, and a composite measure.

Objective measurements of TPOs refer to concrete metrics that are relevant to a team's purpose.   Organizational context shapes how TPOs are defined and measured (Salas et al., 2008). For example, an objective performance metric of a sales team at a financial institution may be the total revenue that the team generated in a quarter, whereas the objective performance metric of a medical emergency room team may constitute as the team's number of medication errors. Objective measures of TPOs are useful because they are not subject to the perceptions of others, and therefore, they provide an undisputable result. Unsurprisingly, organizations appreciate objective TPO measures because they provide absolute evidence of teams' work (e.g. profit generated per sales employee) (Wall et al., 2004).

As useful as objective measures can be, there are limitations to utilizing objective measures to performance. First, many team tasks do not have a "right" or "wrong" answer or quantitative metrics by which to judge success (Hackman, 1987). In this case, subjective measures, such as supervisor ratings, must be used to determine performance outcomes. In addition, depending on the nature of the team's purpose, objective performance measures may not necessarily provide the most meaningful metrics by which to rate a team's success (Wall et al., 2004). For this reason, researchers also employ subjective measurements of TPOs .

Subjective measurements of TPOs are evaluation metrics that are based upon perceptions of quality of the teams' work (Wall et al., 2004). For instance, clients may provide an evaluation of an organization based upon the client's satisfaction with the

results. While the client's ratings are subjective, because the organizations' business depends upon client satisfaction, this would perhaps be a more meaningful metric on which to measure performance. In addition, subjective measures tend to focus on overall performance, while objective measures generally hone in on one aspect of performance (Dess & Robinson, 1984). One challenge of subjective measures is their susceptibility to response bias, especially when assessing the performance of one's own team (Wall et al., 2004). To mitigate response bias, some researchers suggest a multisource performance measurement approach in which two groups of raters—the team members and the team supervisors—assess the team. (Smither, London, & Reilly, 2005).

Other researchers contend that subjective and objective performance measures should be assessed to generate a composite score in order to obtain a more comprehensive understanding of the team's outcomes (Wall et al., 2004). While this thorough assessment of outcomes would be ideal, the types of team performance outcome measures that one can obtain largely depend upon the organizational context and the type of tasks completed by the team. If a team does not perform tasks that produces objective outcomes that are relevant to the team, researchers must rely on subjective measures to assess performance outcomes.

Thus far, this review has outlined the definitions, theoretical origins, and approaches to measuring psychological safety, team learning, and team performance outcomes. The next section explores the relationships among the variables and proposes hypotheses that address the research questions in this study.

Psychological Safety, Team Learning Behavior, and Team Performance Outcomes

The existing literature suggests two primary relationships among these variables: (1) psychological safety positively enhances team performance, mediated by team learning processes (see Edmondson & Lei, 2014; Sanner & Bunderson, 2015 for a review), and (2) psychological safety enhances team performance through a direct relationship (e.g. see Frazier, Fainshmidt, Klinger, Pezeshkan, & Vracheva, 2017 for a review). The literature provides evidence for both relationships.

A strong body of evidence suggests that team learning mediates the relationship between psychological safety and team performance outcomes (e.g. Carmeli & Gittell, 2009; Kostolpoulous & Bozionelos, 2011; Nembhard & Tucker, 2016; Newman et al., 2017; Ortega, Van den Bossche, Sanchez-Manzanares, Rico, & Gil, 2013; Sanner & Bunderson, 2015). As the proposed model suggests, psychological safety creates the conditions for team learning behavior to take place, and teams' acquisition of new behaviors, skills, and knowledge enhance performance outcomes. This relationship among these variables was first proposed in Edmondson's (1999) seminal paper that suggested psychological safety in surgical healthcare teams was positively related to higher reported rates of medical errors. Initially, these findings seemed contradictory, but Edmondson (1999) discovered that the increased reporting rates were not an indicator of poorer performance than other teams, but rather a result of employees feeling safe enough to admit mistakes. The psychologically safe teams engaged in feedback seeking, help seeking, speaking up about concerns or mistakes, which are behaviors that indicate the presence of team learning (Argyris & Schon, 1978; Edmondson, 1999; 2002). Further research demonstrated that on teams exhibiting high psychological safety, individuals

were more likely to engage in team learning behavior, such as voicing suggestions (Liang, Farh, & Farh, 2012) and exchanging knowledge and information (Siemsen, Roth, Balasubramanian, & Anand, 2009). In line with these results, a meta-analysis conducted by Sanner and Bunderson (2015) based on 2,147 teams found that the correlation between psychological safety and team learning was .58 at a 95% CI. The strength of the relationship varies across studies, implying that moderators may be present (Sanner & Bunderson, 2015). Therefore, this study proposes the following hypothesis:

Hypothesis 1: Psychological safety is positively related to team learning behavior.

Once the link between psychological safety and team learning became well-established, researchers extended the investigation to include performance as an outcome variable, thus suggesting a mediating role of team learning. Huang and colleagues (2008) conducted a survey with 60 research and development teams in an information technology department, and found that communication about experimentation, challenges, and decision-making issues mediated the relationship between psychological safety and team performance. Performance was measured as an outcome using Anacona and Caldwell's (1992) validated instrument that assesses the adherence to deadlines, quality of deliverables, and client satisfaction. In another study, Ortega et al. (2014) surveyed 107 healthcare teams across public hospitals and discovered that team learning behavior mediates the relationship between psychological safety and team performance. Psychological safety and team learning behavior were measured using Edmondson's (1999) instruments, and team performance was measured using subjective manager ratings of a 5-item scale. These findings support the line of thinking that when teams

feel psychologically safe, they are more likely to engage in team learning processes (e.g.

sharing information, asking for help, discussing errors), which is necessary in order to

improve performance (Edmondson, 1999, 2002; Kostopoulos & Bozionelos, 2011; Liang,

Farh, & Farh, 2012). Sanner and Bunderson (2015) corroborate the findings that theorize

psychological safety enhances team performance outcomes via team learning behavior in

their meta-analysis of 53 studies involving these three variables. Importantly, Sanner and

Bunderson (2015) add that team context is critical for determining the strength of the

relationship among these variables. Their meta-analysis concluded psychological safety

is more strongly linked to team learning behavior and team performance in knowledge

intensive settings that involve creativity, complexity, and sensemaking. In other words, if

the teams' tasks do not require learning or creativity, the presence of psychological safety

will either be irrelevant or insufficient to motivate learning to occur. Given this evidence

presented, this study proposes the following hypothesis:

> *Hypothesis 2:* Team learning behavior mediates the relationship between
>
> psychological safety and team performance outcomes.

While strong evidence suggests that team learning mediates the link between

psychological safety and team performance, another body of literature proposes a direct

link between psychological safety and team performance (Baer & Frese, 2003; Frazier et

al., 2017; Huang et al., 2008; Schaubroek, Lam, Peng, 2011). Contrary to Edmondson's

(1999; 2002; 2003) claim that team learning is necessary for enhanced performance, a

study conducted by Baer and Fresne (2003) suggested otherwise. In a study of 47

companies, Baer and Fresne (2003) found that psychological safety was positively related

to two performance outcomes—return on assets and firm goal achievement. Different

than the majority of studies in this review, this study measured psychological safety and performance at the organizational level of analysis, so it is unclear whether or not a direct relationship would exist at the team-level of analysis.

More recently, Schaubroek and colleagues (2011) sampled 102 teams from bank branches to test a model that examines if team psychological safety or team potency mediated the relationship between leader trust and team performance. They found that psychological safety and team potency both mediated this relationship, but psychological safety explained more than twice the variance in team performance over team potency. This finding provides strong evidence that a direct relationship between psychological safety and team performance may exist.

Frazier and colleagues (2017) corroborated this conclusion in a meta-analysis of 136 independent samples representing nearly 5,000 teams that assessed the antecedents and outcomes of psychological safety. Results indicated that psychological safety directly predicted incremental variance of task performance over and above all of the other antecedent variables in the analysis (i.e. personality characteristics, positive leader relations, work design characteristics, and supportive work context). Given that it was a meta-analysis, the definition of task performance was broad, so it is difficult to tell if mediators would better explain this relationship if performance was defined in more specific terms. For example, evidence indicates that more knowledge intensive tasks require learning to show high performance (Sanner & Bunderson, 2015), yet this meta-analysis did not distinguish between studies that contained knowledge intensive tasks versus less intensive tasks (Frazier et al., 2017). Taken together, studies indicate that

psychological safety and team performance may share a direct link. Therefore, this study presents the following hypothesis:

> *Hypothesis 3:* Psychological safety is positively related to team
>
> performance outcomes.

Climate Strength

Within the last two decades, researchers have developed a growing interest in climate strength, which is a distinct construct that has emerged from research on team climate (Schneider, Salvaggio, & Subirats, 2002).   In organizational research, *climate* refers to patterns of collective beliefs that emerge from individuals' interactions with their physical and social environment (Kahn & Katz, 1978). Distinct from culture, which is based on the underlying values and assumptions that determine behavior, climate provides a snapshot of the explicit perceptions that individuals have about their work context (James & James, 1989). Climate can be measured at the individual level (e.g. psychological climate), team level (e.g. team safety climate), or the organizational level (e.g. organizational justice climate). *Climate strength* refers to the degree of within-group agreement about perceptions of a team or organization's climate (Schneider et al., 2002). Given that this study is focused on the team level of analysis, this literature will focus on team climate strength. In teams where members tend to share the same perceptions, the climate is considered strong. In teams where members have a wide variation of perceptions, the climate is considered weak. Importantly, evidence indicates that teams can demonstrate similar overall climate levels but vary widely in terms of climate strength, which indicates that climate and climate strength are distinct constructs

(DeRue, Hollenbeck, Ilgen, & Feltz, 2010). The following section outlines two significant theoretical domains from which conceptions of climate strength originated.

Theoretical Background of Climate Strength

The recent rise of climate strength as a variable of interest in organizational research emerged from two relevant domains of theoretical research: Chan's (1998) explanation of *compositional models* and Mischel's (1977) theory of *situational strength.*

Compositional models. In organizational science, *compositional models* are analytical models that explain how a construct should be represented at different levels of analysis (Chan, 1998). Chan (1998) delineated five types of compositional models, two of which are relevant to this review: direct consensus models and dispersion models. In *direct consensus models,* "the meaning of the higher-level construct is in the consensus among lower level units" (Chan, 1998, p. 236). For example, a measure of organizational climate is created by combining individual psychological climate scores. Importantly, in direct consensus models, the agreement of perceptions is a prerequisite for grouping the individual-level scores to create a higher-level variable. Higher-level constructs are created only after aggregation has been justified by demonstrating high within-group agreement using an agreement index (e.g. ICC) (Schneider et al., 2002). If within-group variability is present, which indicates a lack of shared perception among group members, then the higher-level construct is said not to exist (Klein, Conn, Smith, Sorra, 2001). Despite the popularity of the direct consensus model among researchers, it cannot be used in cases where within-group variability is a primary focus of the study.

In contrast, *dispersion models* posit that the "meaning of the higher-level construct is in the dispersion or variance among the lower level units" (Chan, 1998, p.

236). In dispersion models, within-group variability is the focal construct instead of a statistical prerequisite for aggregating individual-level scores. Therefore, within-group agreement of individual-level scores is not a prerequisite for aggregation. Instead, it is possible to assess individual climate perceptions and transform lower-level variables into the higher-level constructs that measure dispersion (Chan, 1998). One of these higher-level dispersion constructs is climate strength.

Situational strength. The conceptual development of climate strength as a construct is based upon Mischel's (1977) theory of *situational strength*, which states that environmental cues provide explicit and implicit messages to team members about the most appropriate behavioral response to a situation. In 'strong' situations where the environmental cues are obvious, members tend to perceive the context in a similar manner and take more uniform action. In this case, individual differences in how one might respond are minimized. In 'weak' situations, environmental cues are more ambiguous, which leads to varying perceptions and expectations of appropriate behaviors. In this case, individual differences tend to determine behavioral responses to a situation.

Extrapolating the explanatory mechanism of situational strength onto the idea of climate strength, it follows that in organizations with strong positive climates, individuals would interpret environmental cues as clearly positive, and therefore, they would consistently exhibit positive behavior. Strong positive climates have been found to make employees feel safe and comfortable (Dickson, Resick, & Hanges, 2006). In contrast, in organizations with strong negative climates, individuals would interpret environmental cues as clearly negative, and they would be more likely to demonstrate consistent

negative behaviors. In organizations with weak climates where perceptions of the environment vary, behavioral responses are less predictable (Schneider et al., 2002). Weak climate strength has been correlated to increased interpersonal conflict, enhanced emotional exhaustion, and diminished work engagement (Lindell & Brandt, 2000). Given the evidence, it is clear that climate strength acts as a predictor variable for significant outcomes in organizations, but recently, researchers have begun to shift focus to examining climate strength as a moderator.

Climate Strength as a Moderator

Empirical evidence suggests that climate strength moderates the relationship between team climate variables and team-level outcomes (Afsharian, Zadow, Dollard, Dormann, & Ziaian, 2017; Colquitt, Noe, & Jackson, 2002; González-Romá, Fortes-Ferreira, & Peiro, 2009; González-Romá et al., 2002; Schneider et al., 2002). Early studies explored the impact of climate strength on a variety of team climate variables and team outcomes. For instance, Gonzalez-Roma et al. (2002) found that climate strength moderated the relationship between innovation climate and the outcomes of team satisfaction and commitment in the expected direction: strong positive climates enhanced the relationship between innovation climate and the outcome variables.

Despite the growing interest of climate strength on team variables, only several studies could be found that explored the impact of climate strength on psychological safety, team learning, and team performance outcomes (e.g. Coquitt et al., 2002; Gonzalez-Roma et al., 2009; Koopman et al, 2017). Given the importance of team performance in organizations, the earliest studies on the moderating role of climate strength investigated its impact on team climate variables and team performance.

Colquitt and colleagues (2002) sampled 88 teams from an auto manufacturing firm to test the moderating relationship of climate strength on procedural justice climate and team effectiveness, which was measured by team performance and absenteeism. Team managers provided objective and subjective ratings of team performance based upon seven dimensions relevant to the organization (e.g. productivity, safety, quality). Colquitt and colleagues found that strong positive climates enhanced the relationship between procedural justice and team effectiveness. Gonzalez-Roma et al. (2009) found supporting evidence in a study that sampled 155 bank branches to examine the impact of climate strength on four climate dimensions and team performance, which was measured by subjective manager and team member ratings and objective financial performance indicators. The study demonstrated the expected findings: strong positive climates enhanced the team climate and team performance relationship while weak climates diminished it. These findings further strengthened the argument that climate strength acts as a moderating variable between team climate variables and team performance.

Even fewer studies could be found that investigate the moderating role of climate strength on the relationship between psychological safety climate and other outcome variables. One study conducted by Afsharian and colleagues (2017) surveyed 249 hospital employees to examine the effect of climate strength on the link between psychosocial climate and work engagement. As expected, strong positive climates increased this relationship, and weak climates diminished the relationship. Psychosocial climate is distinct from psychological safety climate in that psychosocial climate is an organizational level variable that refers to how employees' psychological health is affected by policies, procedures, and practices of an organization (Afsharian et al., 2017).

However, both constructs share an orientation towards the psychological and social perceptions of individuals, which offers evidence that climate strength may moderate the relationship between psychological safety climate and other outcome variables.

Only one study could be found that tests the moderating role of climate strength between psychological safety and performance. In a multilevel study, Koopman and colleagues (2016) surveyed 115 research and development teams to assess the impact of climate strength on psychological safety and two performance domains: task performance and creative performance. Both performance measures were given by supervisor ratings. The findings found that the interaction between climate strength and psychological safety climate was not significantly related to creative performance, but the interaction was significantly related to task performance. As expected, the relationship between psychological safety and task performance was enhanced in strong climates and became unrelated in weak climates. Importantly, this study measured performance as an average of individual scores. This measurement technique ignores the systemic nature of teams. Additionally, the measurement was based upon in-role task performance; employees could individually succeed at their work tasks, but still fail to produce valuable outcomes due to failed team processes. Furthermore, high individual performance does not necessarily predict high team performance (DeShon, Kozlowski, Schmidt, Milner, & Wiechmann, 2004). To date, no studies exist that test the impact of climate strength on the link between psychological safety climate and team learning or psychological safety climate and team performance, which is a gap that this study attempts to fill. Considering the evidence presented by the existing literature, this study proposes the following hypotheses:

Hypothesis 4a: The positive relationship between psychological safety and team learning behavior is moderated by psychological safety climate strength, such that when psychological safety climate strength is high (vs. low), the positive relationship is stronger.

Hypothesis 4b: The positive relationship between psychological safety and team performance outcomes is moderated by psychological safety climate strength, such that when psychological safety climate strength is high (vs. low), the positive relationship is stronger.

Antecedents of Psychological Safety Climate Strength

As the benefits of psychological safety gain attention in academic research and mainstream organizational literature, a critical question among scholars and practitioners is how to generate this positive climate and what factors lead to different perceptions of psychological safety. This section explores the antecedent conditions that facilitate the emergence of psychological safety climate strength in teams.

Leader behaviors. The presence of a formal authority figure in a work team raises the stakes for taking interpersonal risks. Research indicates that individuals with less power in a social group are more likely to demonstrate avoidance behaviors, such as refraining from speaking or acting, especially if they feel that they will receive criticism or punishment (Keltner, Van Kleef, Chen, & Kraus, 2008). Therefore, team members calculate the risk of acting by observing the leader's behavior and attempting to predict her responses. As a result, team members are particularly aware of leader behaviors (Tyler & Lind, 1992), and leader behaviors have been found to be a core determinant of perceptions of psychological safety in teams (Nembhard & Edmondson, 2006).

Specifically, *leader inclusiveness,* defined as "the words and deeds by a leader or

leaders that indicate an *invitation* and *appreciation* for others' contributions," was found

to be correlated to the presence of psychological safety in 44 NICU healthcare teams

(Nembhard & Edmondson, 2006, p. 941). This study was especially significant in

demonstrating how leader inclusiveness can mitigate the relational effects of structural

status differentials among employees (e.g. between doctors and nurses). When low

status individuals were prompted for their input and acknowledged, it affirmed that their

opinion was valued and encouraged similar future behavior. Several additional studies

have also suggested that that inclusive leadership behaviors, namely accessibility and

openness, are critical in generating psychological safety (Carmeli et al., 2010; Walumbwa

& Schaubroeck, 2009).

Research also supports this theme among teams who are demographically diverse.

A study of 39 multinational teams in a large corporation found that *leader openness*,

partially mediated by psychological safety, is correlated with leader-directed voice in

members with different national backgrounds than their leader (Tröster & Van

Knippenberg, 2012). Taken together, these studies indicate that inclusive leader

behaviors can transcend variables, such as ethnic differences between the leader and

members, which may otherwise hamper psychological safety.

Team member relationships. High-quality relationships have been found to

enable psychological safety among teams (Abraham Carmeli & Gittell, 2009).

Specifically, high-quality relationships are composed of shared knowledge, shared goals,

and mutual respect (Carmeli & Gittell, 2009). In these relationships, task conflict can

still occur—and in fact, it may be encouraged—without diminishing psychological safety

(De Wit, Greer, & Jehn, 2012). If relationship conflicts occur, which is not uncommon following a task conflict, psychological safety can become threatened (Choi & Cho, 2011). However, if team members have skills in emotional perception and management (Harper & White, 2013) and employ problem-focused coping strategies (Pluut & Curşeu, 2013), they can recover from conflict and even gain positive insight from it. While a significant stream of literature is dedicated to understanding the impact of conflict on team climate, that discussion is beyond the scope of this paper.

In addition, taking into account the evolutionary nature of relationships and team climate, one study utilized social network analysis to conduct a longitudinal study on team friendship ties and their effects on of psychological safety (Schulte et al., 2012). This study found that individual perceptions of psychological safety differed within a team, and those with higher psychological safety initiated more friendship gestures than low safety individuals. Furthermore, individuals tend to build relationships with those who have similar levels of psychological safety and adopt similar perceptions of team psychological safety as those to whom they feel connected (Schulte et al., 2012). This finding provides insight into the alliance formation in teams and the aspects of relationships that enhance or diminish psychological safety. Finally, this study was particularly important because it was the first of its kind to examine psychological safety's relationship to additional variables through a social network analysis framework, which highlighted the complex relationships among members. The few qualitative studies (e.g. Kahn, 1990) on psychological safety indicate that unconscious forces may influence relations among team members.

As team members tacitly negotiate power and status in their relationships, unconscious informal roles may be assigned to certain members that affect the perception of one another and their environmental context. In a notable ethnographic study, Kahn (1990) described the team as taking on familial roles in which the "father figure," an older male, led the group while one of the younger men played the role of the "good son"—a role which led him to believe that his ideas are valued in the group. Another young man, who often made jokes and dressed unconventionally, took on the role of the "bad son" and felt that the other team members did not give his input adequate consideration. Once these roles are assigned, individuals tend to have a difficult time shedding their behavioral expectations, so their actions tend to reinforce the role occupation (Kahn, 1990). In this way, power hierarchies become more ingrained in team interactions, which can lead to differing perceptions of psychological safety. Taken together, this research demonstrates that psychological safety depends not only on the leaders' behaviors, but on team members' interactions as well. At the organizational level, context must also be explored as a significant antecedent of psychological safety.

Organizational context. The organizational context has been found to influence team psychological safety (Hackman, 1987) although only several studies exists that explore this dimension. Faraj & Yan (2009) discovered that when task uncertainty and resource scarcity in organizations are high, the elevated ambiguity can negatively impact psychological safety. However, other research suggests that despite organizational barriers, such as receiving inadequate task information from external individuals in the organization, teams can still demonstrate openness and cohesion (Edmonson, 1999). This is not surprising considering external threats have a well-documented bonding effect on

groups with defined boundaries (see Chiocchio & Essiembre, 2009 for a review). As it stands, few studies exist that integrate the organizational and the team level of analysis. Of the three levels of analysis, the organizational level has been the least explored. This is identified as a potential area of contribution for future researchers.

Summary of the Literature

Despite extensive research on psychological safety and its relationship to team learning behavior, and team performance outcomes, as well as the increasing attention on climate strength research, the current literature has yet to investigate the relationship among all of these concepts (Newman, Donohue, & Eva, 2017; González-Romá et al., 2009). Considering the existing literature on these variables, this study hypothesized that psychological safety would demonstrate a positive relationship with team learning behavior (H1), and that team learning behavior mediates the relationship between psychological safety and team performance (H2). In addition, this study posited that a direct relationship exists between psychological safety and team performance (H3). Moreover, due to the dearth of research on psychological safety climate strength, this study also investigated its impact as a moderating variable. This study hypothesized that the relationship between psychological safety and team learning behavior is moderated by PS climate strength, such that when psychological safety climate strength is strong (vs. weak), the relationship between psychological safety and team learning is stronger (H4a). Finally, this study hypothesized that the relationship between psychological safety and team performance outcomes is moderated by PS climate strength, such that when psychological safety climate strength is strong (vs. weak), the positive relationship is stronger. Figure 4 summarizes the hypotheses being tested in this study.
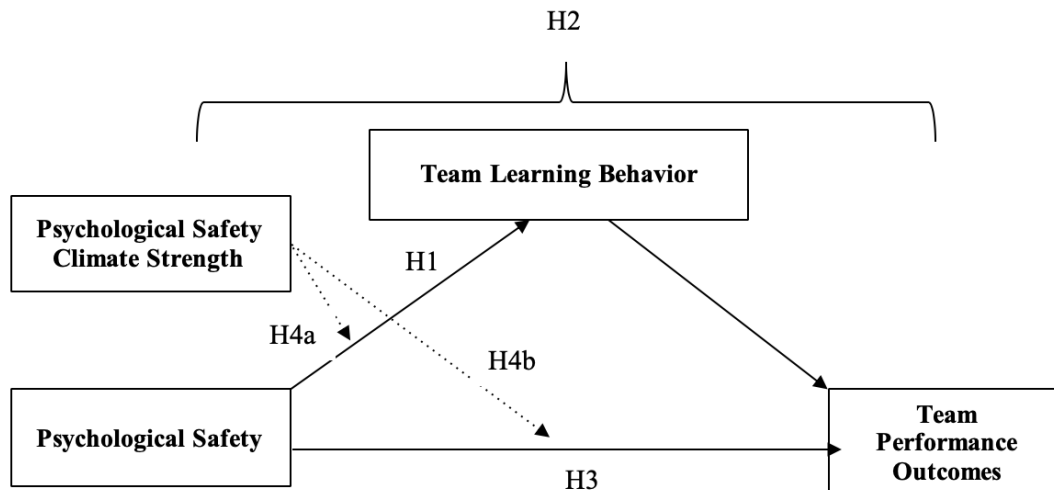
Figure 4. Conceptual model of hypotheses among variable relationships.

In addition, there is a lack of knowledge about the factors that affect the

psychological safety climate strength in teams, or more specifically, teams whose

members hold divergent perspectives of psychological safety. (Roussin et al., 2016;

Schulte et al., 2012). Evidence shows that weaker climates tend to diminish the strength

of the relationship between climate and outcome variables, which can make predicting

team behavior challenging (Gonzalez-Roma, 2009; Koopman et al, 2016). Previous

research indicates that social interaction, leader-member interaction, and task

interdependence foster within-team agreement of climate perceptions, which constitutes

as a strong climate (González-Romá, Peiró, & Tordera, 2002; Klein, Conn, Smith, &

Sorra, 2001). A greater understanding of factors that weaken the psychological safety

climate could offer practical insight to manager and leaders as well as generate new

avenues of future research. In addition, researchers call for quantitative and qualitative

methods so that the strengths of each approach can be leveraged to create a more

comprehensive understanding of these relationships (Edmondson & Lei, 2014; Newman et al., 2017).

      This literature review provided an explanation of the nature of teams and the predominant theoretical frameworks on team functioning. It outlined psychological safety, team learning, team performance, and climate strength.   Finally, it summarized the gaps in the literature and provided a rationale for this study. The following section will outline this study's methodology.

CHAPTER THREE

METHODOLOGY

This study examined the relationships among psychological safety, psychological safety climate strength, team learning behavior, and team performance.   It also explored the relational dynamics that affect psychological safety climate strength.   To achieve the study's objectives, I utilized an explanatory sequential mixed methods research design. This chapter provides an outline of the study's methodology.   First, it explains the rationale for the three-phase mixed methods design.   Then, it describes the research site and the participant selection procedures. Finally, this chapter concludes with the data collection and analysis procedures for each phase of the study.

Overview of Research Methods

This study employed a three-phase explanatory sequential mixed methods research design (Creswell, 2013).   In the first phase, I collected quantitative data from participants utilizing survey methods. I analyzed the survey responses to determine the relationships among the variables of interest and identify statistically significant levels of within-team agreement or disagreement regarding the psychological safety climate among members. I utilized the results from the first phase of data analysis to identify a subset of participants to take part in the second phase of the study. The second phase used qualitative methods of data collection and analysis to further explain and interpret the quantitative findings. In the third phase, I integrated the results from the quantitative and qualitative phases to enrich the data interpretations (Creswell, 2013).

The mixed methods design had two primary purposes for enhancing the quality of this study: *development* and *expansion* (Greene, Caracelli, & Graham, 1989). According

to Greene et al.'s (1989) conceptual framework describing the purposes of mixed-methods studies, *development* utilizes the results from one method to inform the other by employing sequential implementation of each distinct method. In this case, the quantitative results will inform the participant selection and interview protocol development for the qualitative phase. In addition, because this study sought to understand how psychological safety strength affects the relationship between psychological safety, team learning behaviors, and team performance, this question was most easily answered using survey methods in order to determine the statistical relationships between the predictor, moderator, and outcome variables. Therefore, quantitative methods were necessary for this portion of the study. Once these relationships were identified, the results were used to select interview participants for the qualitative phase of the study.

The qualitative phase fulfilled the purpose of what Green et al. (1989) call *expansion. Expansion* intends to enhance the scope and range of the study's exploration utilizing a variety of methods. Since psychological safety is a dynamic, emergent, relational process (Edmondson, 2003), qualitative methods were needed in order to explore the nuances in teams' interactions, which was the subject of inquiry in my second research question. These reasons justified mixed-methods research design in order to fully explore the research questions guiding this study. Table 1 provides an overview of research design, including the phases of data collection and analysis.

Table 1

Overview of Research Design Phases

Phase	Procedure	End Product
Phase 1: Quantitative Data Collection	Qualtrics survey	Numeric data
Phase 1: Quantitative Data Analysis	Correlation analyses, Mann-Whitney Tests	Descriptive and inferential statistics
Phase 2: Case selection, Interview protocol development	Selecting sample based upon climate strength (N=3)	Interview protocol
Phase 2: Qualitative Data Collection	Semi-structured individual interviews	Interview transcripts
Phase 2: Qualitative Data Analysis	Coding and thematic analysis	Codes and themes
Phase 3: Integration of Methods	Interpretation and explanation	Discussion and implications

Research Site and Participant Selection

The research site for this study was a large multinational telecommunications company based in Southern California. Although the company has campuses across the globe, the participants were selected from the Southern California campus for convenience purposes. Participant teams for this study were selected from one department in the organization through purposeful and convenience sampling methods. Purposeful sampling involves the selection of participants with rich information about the phenomenon of interest (Patton, 2002). Therefore, the selection criteria for participant

teams consisted of several guidelines. First, participant selection was guided by

Kozlowski and Bell's (2003) definition of a team as:

> Individuals who (a) exist to perform organizationally relevant tasks, (b) share one or more common goals, (c) interact socially, (d) exhibit task interdependencies (i.e., work flow, goals, outcomes), (e) maintain and manage boundaries, and (f) are embedded in an organizational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity. (p. 334)

As noted in the literature, interdependence is a necessary prerequisite to make

psychological safety a salient condition in team learning behaviors and performance

(Edmondson, 2003). As a result, these selection criteria were essential in order to study

the intended phenomena. Furthermore, the teams had to consist of at least three and no

more than nine members. Studies suggest that with fewer than three members,

interpersonal dynamics are not as complex, and with more than nine members, sub

groups begin to form which adds a further layer of complexity that is beyond the scope of

this study (Greer & Dannals, 2017).

In order to coordinate the data collection for this study, I enlisted the support of a

Senior Executive and a member of the HR People Analytics team. As the topic and

findings of this study were of particular interest to their internal organizational goals, they

agreed to mobilize the company's mangers and teams to participate in this study. The

support from these organizational employees was helpful in acquiring participants.

Phase One: Quantitative Data Collection and Analysis

The first phase of this study involved survey data collection from participants to

measure psychological safety climate, team learning behaviors, and team performance.

The survey instrument contained measures from existing scales that have previously

demonstrated reliability and validity. The survey instrument will be discussed further in the section below.

In preparation for distributing the survey, the HR People Analytics team compiled a list of 84 teams in the IT department, which included 503 employees that fit the criteria for participation in this study. I drafted an email (Appendix A) to be sent to the participants by an HR executive of the organization. The email included the Qualtrics survey link, explaining the purpose and potential benefits of the study. The email assured the participants that the survey results would remain confidential but not anonymous because I needed identifying information in order to contact the selected teams for their participation in the second phase of this study. This distinction was important because the sensitive nature of the topic could potentially deter individuals' inclination to participate. Once the email was approved by the research site's senior management and legal team in April 2019, the Senior Executive sent the survey to the managers and employees of the 84 teams (503 employees) selected for this study. The survey remained open for two weeks, which was intended to provide enough time for participants to complete the survey while minimizing the potential for time-lagging effects.

Survey Response Rates and Participant Demographics

Of the 503 employees that received the email invitation, 125 (24.8%) individuals responded to the survey. However, only 94 (18.6%) individuals provided complete responses, which included 77 (82%) direct reports and 17 (18%) managers. These responses represented 43 (51%) teams of the original 84 teams surveyed. Each team consisted of an average of six individuals. Participants included 59 (63%) males, 14 (15%) females, and 21 (22%) preferred not to disclose their sex.

Table 2

Sample Demographics (n=94)

		Direct Report (n=77)		Manager (n=17)	
Demographic		Number	Percentage	Number	Percentage
Race/Ethnicity	Hispanic or Latino	9	11.7%	0	0
	White	30	39%	12	70.6%
	Black or African American	0	0%	0	0
	Native Hawaiian or Pacific Islander	0	0%	0	0
	Asian	7	9%	2	11.7%
	Native American or Alaska Native	0	0%	0	0
	Two or more races	2	2.6%	1	5.9%
	Prefer not to disclose	29	38%	2	11.7%
	Total	77	100%	17	100%
Sex	Male	46	60%	13	76%
	Female	10	13%	4	24%
	Prefer not to disclose	21	27%	0	0%
	Total	77	100%	17	100%
Organizational Tenure	0 - 5 years	18	23%	2	12%
	6 - 10 years	20	26%	5	29%
	11 - 15 years	14	18%	3	18%
	16 - 20 years	10	13%	3	18%
	21 - 25 years	5	6%	4	24%
	26 - 30 years	1	1%	0	0%
	Prefer not to disclose	9	12%	0	0%
	Total	77	100%	17	100%
Team Tenure	0 - 5 years	45	58%	11	65%
	6 - 10 years	19	25%	5	29%
	11 - 15 years	7	9%	1	6%
	16 - 20 years	2	3%	0	0%
	21 - 25 years	0	0%	0	0%
	26 - 30 years	1	1%	0	0%
	Prefer not to disclose	3	4%	0	0%
	Total	77	100%	17	100%

Regarding the organizational tenure of the direct reports, 18 (23%) reported 0-5 years, 20 (26%) reported 6-10 years, and 16 (20%) reported more than 10 years, while 9 (12%) preferred not to disclose. Of the managers' organizational tenure, 2 (12%) reported 0-5 years, 5 (29%) reported 6-10 years, and 10 (42%) reported more than 10 years. Regarding the team tenure of direct reports, 45 (58%) had 0-5 years of membership, 19 (25%) had 6-10 years of membership, 10 (13%) had more than 10 years of membership, and 3 (4%) preferred not to disclose. Of the managers' team tenure, 11 (65%) reported 0-5 years, 5 (29%) reported 6-10 years, and 1 (6%) reported more than 10 years. The frequency and percentages of the demographic variables are presented in Table 2.

Survey Instrument

The survey instrument was composed of 41 items taken from existing validated instruments that measure the constructs of interest. Each instrument discussed in this section has shown validated psychometric properties, as will be highlighted next.

Psychological safety. Psychological safety was assessed using six items from Edmondson's Team Psychological Safety instrument (1999). The questions utilized a 5-point Likert scale and range from "Strongly Disagree" to "Strongly Agree." Examples of the scale's items include statements regarding the team climate such as, "In this team, it is safe to discuss problems and difficult issues"; "It is safe to express opinion and make suggestions for improvement even when others disagree." This scale is the most widely used instrument to measure psychological safety in the organizational science literature, and its reliability and validity have been confirmed (Cronbach's alpha = .86).

Climate strength. Following Chan's (1998) dispersion composition models, psychological safety climate strength was determined by the variance of the psychological safety climate scores of the group members (i.e. the within-group variability). This variance was calculated using the standard deviation (SD) (Allison, 1978). Lower standard deviation values denote stronger climates (see also Walumbwa, Wu, Orwa, 2008; Colquitt et al., 2002).

Team learning behavior. Team learning behavior was assessed using Edmondson's (1999) 17-item Team Learning Behaviors instrument. The questions utilize a 5-point Likert scale and range from "Strongly Disagree" to "Strongly Agree." Examples of the scale's items include statements regarding learning behaviors like, "Members of this team help others understand their special areas of expertise" (Cronbach's alpha = .85).

Team performance. Team performance can be assessed by using subjective measures, objective measures, or by combining both into a composite score of performance (Wall, Michie, Patterson, Wood, Sheehan, Clegg, & West, 2004). Due to the nature of the research site teams' projects, the organization did not have clearly defined objective performance measures. Therefore, this study examined subjective team performance measures. The subjective measures included team members' performance ratings of the team and managers' performance ratings of the team. Each measure was assessed using 3-items adapted from Jehn, Northcraft, and Neale's (1999) Group Performance Scale. The questions utilized a 5-point Likert scale and range from "Strongly Disagree" to "Strongly Agree." The items were "My team's performance meets organizational standards?", "My team produces high quality of work", and "My

team accomplishes its goals consistently, (see also González-Romá, Fortes-Ferreira, & Peiro, 2009). Team members and team leaders both reported on these items.

Control variables[1]. I collected data for several team-level constructs that could potentially affect the relationships among the variables of interest. Team tenure has been shown to positively affect team performance (Smith, Smith, Olian, Sims, O'Bannon, & Seully, 1994; Wallmark, Eckerstein, Langered, & Holmqvist, 1973). In addition, task interdependence has been suggested as a prerequisite for moderating effects of climate strength on work outcomes (González-Romá et al., 2002). Therefore, six items from Morgeson and Humphrey's (2006) Work Design Questionnaire were utilized to assess task interdependence (i.e. "My job cannot be done unless others do their work"). Finally, leader behavior has been found to significantly affect perceptions of psychological safety (e.g. Edmondson & Lei, 2014), so two items were added to assess perceptions of leader openness from the Top Management Openness Scale (Ashford, Rothbard, Piderit, & Dutton, 1998). I also collected data for age, sex, education level, and organizational tenure of the participants.

Summary of survey instrument. In total, this survey consisted of 40 close-ended questions. It took respondents between 15-20 minutes to complete. The complete survey instrument can be found in Appendix B. Table 3 (p. 52) provides a summary of the survey instrument that I used in this study.

Quantitative Data Analysis

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[1] The original data analysis approach intended to use regression analysis, for which control variables are necessary in order to run the statistical model. However, due to a small number of respondents, the data [1] The original data analysis approach intended to use regression analysis, for which control variables are necessary in order to run the statistical model. However, due to a small number of respondents, the data were analyzed using a non-parametric test, in which control variables were no longer needed. Therefore, I included the control variables in this section, but they were not utilized in the main data analysis procedure.

The quantitative analysis of this study served two purposes: a) to answer the first research questions of this study, and b) to determine the three teams to interview for the second phase of this study based upon the teams' psychological safety (PS) climate strength scores. To conduct the quantitative data analysis techniques, I used Excel and Stata 15. First, I cleaned the data. Then, I performed a preliminary analysis to determine descriptive statistics, climate strength measures, and aggregate the data. Finally, I conducted the main analysis using statistical tests to address the each of the hypotheses presented in the previous chapter.

Table 3

Survey Instrument Summary

Variable of Interest	Existing Survey Instrument	Number of Items	Types of Questions
Psychological safety	Psychological Safety Scale	6	5-point Likert scale (Strongly disagree to strongly agree)
Team Learning Behaviors	Team Learning Behaviors Scale	17	5-point Likert scale (Strongly disagree to strongly agree)
Team performance	Group Performance Scale	3	5-point Likert scale (Strongly disagree to strongly agree)
Control variables (task interdependence, leader openness, team ten., team size)	Work Design Questionnaire, Top Management Openness Scale	14	5-point Likert scale (varied response options)

Data Cleaning

The data were cleaned in Excel before inputting the dataset into Stata. With regards to missing data, I excluded from the data all cases in which respondents failed to fill out one or more scales of the primary variables (psychological safety, team learning, team performance). For these cases, the survey responses were missing too many responses to justify replacing the missing data with the mean or median values of the dimensions in question. This narrowed the sample size from 125 respondents to 94 respondents. Of the 94 respondents who had completed the majority of the survey, any additional missing data were coded with a period ("."。).

Preliminary Analysis

After cleaning the data, I calculated the PS climate strength measures. This provided the information needed to identify the interview participants in Phase Two of the study, as well as identified the last variable needed in order to test the study's hypotheses. To obtain the PS climate strength measures, I grouped the survey responses by manager to determine how many team members from each team responded to the survey. Twenty-three out of 43 teams had at least two or more team members respond to the survey. The remaining 20 teams only had one team member respond to the survey. Since PS climate strength is a measure of variance between scores, I could only calculate PS climate strength for the 23 teams that had two or more responses. Therefore, the remaining 20 teams were removed from the dataset.

To determine the PS climate strength for each team, I computed the additive composite score of each respondent's psychological safety scale scores. Since the six items could be answered on a scale from one to five, the possible PS composite scores

ranged between six and thirty. Then, I calculated the standard deviation among the

psychological safety composite scores in each team. The standard deviations ranged

from 0, indicating high agreement among perceptions of psychological safety (i.e. no

variance among scores), to 11.3, indicating weak agreement among perceptions of

psychological safety (i.e. substantial variance among scores). I recorded the standard

deviation scores as the climate strength measures for each team, which were utilized in

statistical testing further on in the data analysis. Then, I transferred the data set to Stata

to run further analyses.

Using Stata, I performed an analysis to determine the descriptive statistics and

correlations among the variables, which are reported in the next chapter. I also generated

histograms of the primary variables, in which the responses demonstrated negative

skewness of psychological safety, team learning, and team performance variables. The

negative skewness confirmed a non-normal distribution of the data.

Finally, I aggregated the individual-level variables to the team-level by collapsing

the individual scores into one median team score. I chose to use median instead of mean

because the median as a measure of central tendency is preferred when outliers exists,

and the negative skewness of the data provides evidence of such (see Table 4.1 for

summary statistics). The data aggregation process generated one score for each team's

psychological safety, team learning behavior, team performance, and PS climate strength.

Main Analysis

I used the Mann-Whitney test to analyze the hypotheses in this study for several

reasons (Mann & Whitney, 1947). First, the Mann-Whitney is the non-parametric

equivalent to a two-sample t-test, which means that it does not assume normal

distribution of a sample. In addition, this test is appropriate for small sample sizes where n < 30 (Mann & Whitney, 1947; Nachar, 2008). This study's data set meets these two criteria.

A series of Mann-Whitney tests were conducted to assess the relationship between team learning on psychological safety and team performance, as well as test the moderating role of climate strength. When psychological safety and team learning functioned as the independent variable of the tests, the data were grouped into two categories (high/low psychological safety and high/low team learning). The cutoff values were determined by the grand median scores of psychological safety (*M=23)* and team learning *(M=66)*, with scores that fell at or above the cutoff value were considered to be in the 'high' category and scores that fell below the cutoff value were in the 'low' category. Furthermore, PS climate strength had to be collapsed into two groups of weak climates and strong climates. Teams that had climate strength scores between 0 and 2 were considered strong climates and teams with climate strength scores above 2 were considered weak climates. The cutoff value for climate strength was determined using the general rule of thumb that when measuring standard deviation (e.g. climate strength) 96% of the data falls within two standard deviations of the mean.

Phase Two: Qualitative Data Collection and Analysis

The purpose of the second phase of this mixed methods study is to provide a deeper investigation of the quantitative results from the first phase of this study. This section describes the methodological design of this phase, the participant selection process, and the data collection procedures.

Comparative Case Study Design

This phase employed a comparative case study approach to explore the factors that affect psychological safety strength in three teams that comprise a subset of participants from the survey responses (Merriam & Tisdell, 2016). Comparative case studies involve data collection from multiple cases, which can potentially capture greater variation across cases and lead to more convincing interpretations (Miles, Huberman, & Saldana, 2014; Merriam & Tisdell, 2016). Consistent with the existing theoretical conceptualization of the team as a bounded relational system (Edmondson, 1999), the team is the unit of analysis for this portion of the study.

Participant Selection

The participants for this phase of the study were selected through purposeful sampling methods based upon the results of the quantitative data analysis, specifically, the teams' scores on their PS climate strength measure. The second research question of this study asks, "What factors influence psychological safety climate strength in teams characterized by strong positive climates (e.g. high agreement that the team is safe), strong negative climates (high agreement that the team is not safe), and weak climates (e.g. low agreement about team PS safety)?" Therefore, one team from each category, as determined by their PS climate strength measure, was selected as a case for interviews (Table 4). In order to identify eligible teams to interview, I calculated the PS climate strength scores (i.e. standard deviation) through the process mentioned in the previous section. PS climate strength scores ranged from 0, indicating high agreement in perceptions of psychological safety, to 11.3, indicating weak agreement in perceptions of psychological safety.

To determine the strong positive climates and strong negative climates, I identified the teams with the lowest standard deviations and then calculated the mean PS composite score of each with low standard deviation. The team with the highest average PS composite score combined with the lowest standard deviation (*SD=1.79),* indicating most respondents agreed that the team was a safe environment, was marked as the preferred team to interview for the "strong positive climate" case. The team with the lowest average PS composite score combined with a low standard deviation (*SD*=1.29), indicating most respondents agreed that the team was not a safe environment, was marked as the preferred team to interview for the "strong negative climate" case.

To determine the team with the weakest climate, I examined the scores from teams with the three highest standard deviations and calculated the range of each team's composite scores. Although the two teams that exhibited the highest ranges in scores (16 and 18) also had the highest standard deviations, they each only had two respondents out of a possible nine team members. As a result, I removed them from eligibility because I did not have enough information to determine if a wide range of perceptions existed. The third team had a range of 14 along with a high standard deviation (*SD=5.64)* and five out of nine team members responded, so I was able to see that substantial variation in perceptions existed among the team members. Therefore, this team was marked as the preferred team to interview for the "weak climate case."

Once I identified the preferred teams to interview, I provided the three managers' names to a third-party human resources employee so that she could coordinate the interview dates and times. Importantly, this employee had not been present in any of the planning meetings, so she had no information about the research study. The research site

planning team and I decided that using a third-party coordinator for the interviews would

assist in maintaining the participants' confidentiality for this phase of the study.

Table 4

Psychological Safety Climate Strength Summary Statistics

Team Climate Strength	Number of Members	Mean	SD	Range
Strong Positive Climate	9	29	1.73	27 - 30
Strong Negative Climate	7	18.3	1.29	18 - 20
Weak Climate	8	19.6	5.64	13 - 27

Since each team member's perspective is necessary to understanding the teams'

relational dynamics, it was crucial that all members of each team agree to participate in

the interviews. Therefore, it was a requirement that I obtain agreement to participate

from all, or nearly all, team members on a team before finalizing the team selection and

proceeding with interviews. Of the three teams that I chose, 22 out of 24 individuals

agreed to participate in the individual interviews. One member from the "strong negative

climate" team and one member from the "weak climate" team declined participation.

While I aimed for 100% participation in the interviews, having only two members'

perspectives missing would still allow me to obtain a relatively clear understanding of the

team's climate based on other team members' interviews. Therefore, I proceeded with

data collection.

Data Collection Procedures

Semi-structured interviews. This study used semi-structured interviews to

collect data from the participants. Semi-structured interviews provided a framework of

questions to guide the conversation but offered flexibility for probing questions and

further exploration on certain topics (Patton, 2002). This allowed me to compare team

members' individual responses to specific items on the interview guide. The interview

guide consisted of seven questions that were used to probe each team members'

experience of their team process, their roles, relationships, and interactions, and how they

experienced psychological safety in their teams. Each interview lasted between 25 – 30

minutes. All twenty-two interviews were voice-recorded and transcribed. In addition, I

also took notes and recorded voice memos during the interviews to capture my thoughts

and interpretations. A copy of the interview guide can be found in Appendix C.

Data Analysis

I used cross-case pattern analysis techniques to compare and contrast the three

cases to one another. First, the individual cases were analyzed using two distinct

approaches as outlined by Polkinghorne (1995): *narrative analysis* and *analysis of*

narrative. During this phase, three cycles of coding occurred. I inputted and analyzed

the data using MAXQDA, a qualitative data analysis software tool. The first cycle of

initial coding (Charmaz, 2006) captured and synthesized the individual interviews into

coherent team narratives that tell a story with details of the beginning, middle, and end.

This narrative analysis technique allowed me to analyze the similarities and differences in

how each team member describes their story, including critical events that have shaped

their experience. Goldstone (1997) argues that constructing a narrative also helps to hold

on to the essence of the case during the cross-case analysis.

Once I synthesized the teams' narratives, I shifted to analysis of narrative, also

known as thematic analysis (Saldana, 2015). Within the initial coding cycle, I used In

Vivo coding to capture the voices of the participants as well as process coding to begin to understand the actions and interactions among the team members (Saldana, 2015). In the second cycle of coding, I used pattern coding to sort the initial codes into categories (Miles & Huberman, 1994). As I conducted coding and analysis, I also wrote analytical memos as a way to manage my subjectivity (Wolcott, 1990) and note emerging hypotheses or themes. In the final round of coding, I condensed the existing categories into overarching themes.

Once I analyzed each case, I investigated the relationships across cases using two primary cross-case analytic techniques: process-tracing and stacking. Process-tracing outlines the progression of events that lead to a single outcome (e.g. psychological safety strength) in a case (George & Bennett, 2005). This technique employs narrative to chart paths that yield outcomes and the conditions under which they occur. Given that each case represents a different manifestation of psychological safety strength, I also examined convergent and divergent themes among them using Miles & Huberman's (1994) stacking technique. Stacking arranges comparable cases in a matrix based upon relevant themes, which allows for data visualization and comparison across cases. This technique focuses less on the narrative and more on the existing themes. Taken together, process-tracing and stacking provided a comprehensive analysis of the cases.

Integration of Methods

After the second phase of data analysis, I integrated the quantitative and qualitative findings to develop meta-inferences about the data (Tashakkori & Teddlie, 2008). I examined how the qualitative data helped to explain the quantitative data results. In order to analyze the findings together, I organized the data in a three-column table that

shows the key quantitative findings (column 1), the coinciding qualitative explanatory data (column 2), and the meta-inferences that can be generated (column 3). I also highlighted any contradictory findings between the methods that might provide richer insight into the research questions. The next chapter outlines the findings generated from this study.

CHAPTER FOUR

FINDINGS

Thus far, I have provided background information to the research problem, reviewed relevant literature, and explained the methods used in conducting this study. This section delineates the findings from the data analysis. The research questions that guided this study are as follows:

1. How does psychological safety (PS) climate strength affect the relationship between psychological safety, team learning, and team performance?

    a. To what extent is there a direct relationship between psychological safety and team performance?

    b. To what extent is there an indirect relationship between psychological safety and team performance through the mediating variable of team learning?

    c. To what extent does climate strength moderate the relationship between psychological safety and team learning behavior?

2. What factors influence PS climate strength in teams characterized by a strong positive climate, a strong negative climate, and a weak climate?

I investigated the research questions using an explanatory sequential mixed methods approach. I address the first research question by presenting the results of the quantitative analyses on survey data from 43 teams. I address the second research question by presenting the findings that emerged from interviews with twenty-three participants. First, I provide a narrative analysis of each team to illustrate the teams' development and highlight contextual details of the teams' collaboration. Next, I present

the findings from the cross-case analysis to illustrate the factors that affect psychological

safety climate strength within and across the teams.

Research Question 1: How does PS climate strength affect the relationship between

psychological safety, team learning, and team performance outcomes?

The relationships among this study's variables were tested utilizing several

methods of analysis. First, I used Pearson's correlation analysis to determine the

relationships among the variables. Table 5 presents the summary statistics and

correlations among the variables of interest[2]. The majority of the variables demonstrated

significant correlation coefficients. Most notably, psychological safety was positively

correlated with team learning behavior ($r=.77$, $p<.01$), team performance ($r=.60$, $p<.01$),

and leader openness ($r=.73$, $p<.01$). Team learning behavior was positively correlated

with team performance ($r=.65$, $p<.01$) and leader openness ($r=.63$, $p<.01$). Finally, team

performance was positively correlated with leader openness *($r=.72$, $p<.01$).*

A series of Mann-Whitney tests were conducted to determine the relationships

between the psychological safety, team learning, team performance, and climate strength

(Table 6). Results indicate that there was a difference in team learning behavior in teams

with high psychological safety (PS) and low psychological safety (PS) ($z=-3.04$, $p<.01$)

where teams with high PS demonstrated greater team learning than teams with low PS. In

addition, the results suggest that teams with high learning behavior exhibit greater team

performance ($z=-3.04$, $p<.01$) than teams with low learning behavior. Taken together,

these results support Hypothesis 1, which states that psychological safety is positively

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[2] Since the study's methodology had to shift from regression analyses to a series of Mann-Whitney tests
due to a small sample size, the control variables that are included in the correlation analysis could not be
taken into account in the main data analysis.

related to team learning behavior. Hypothesis 2 states that team learning behavior

mediates the relationship between psychological safety and team performance outcomes.

Since the Mann-Whitney test does not formally test mediation, Hypothesis 2 can neither

be confirmed nor denied.

Table 5

Summary statistics and intercorrelations for individual-level data (N=94)

	Min	Max	Mean	SD	1	2	3	4	5	6
1. Psychological safety	9	30	22.93	4.83						
2. Team learning behavior	30	80	63.11	11.04	.77**					
3. Team performance	9	15	12.9	1.82	.60**	.65**				
4. Leader openness	5	10	8.3	1.45	.73**	.63**	.72**			
5. Team interdependence	10	25	20.23	3.65	.05	.31*	.18	.16		
6. Organizational tenure in years	2	28	10.5	6.65	-.01	-.02	-.12	.14	.11	
7. Team tenure in years	1	26	5.76	4.86	.01	-.07	-.12	.06	0	.45**

*$p<0.05$
**$p<0.01$

Once the statistical significance was confirmed between psychological safety,

team learning behavior, and team performance, the moderator, climate strength, was

introduced into the Mann-Whitney test. Given the requirements of the Mann-Whitney

test, climate strength had to be divided into categorical groups of 'strong climate' and

'weak climate' and tested as two separate moderators. Because this study was primarily

interested in the difference between strong and weak climates, it was not necessary to

divide the 'strong climate' category into 'strong *positive*' and 'strong *negative*' climates.

Therefore, two Mann-Whitney tests were conducted to examine the potential moderating

role of 'strong climates' and 'weak climates' on the relationship between psychological

safety and team learning behavior.

Table 6

Summary of Mann-Whitney test statistics

Variable Relationships	*z-score*	*p-value*
Psychological safety—team learning	-3.48	0.000***
Team learning—team performance	-3.04	.002***
Psychological safety—team learning (strong climate)	-2.12	.034**
Psychological safety—team learning (weak climate)	-2.619	.009***
Psychological safety—team performance	-3.04	.002***
Psychological safety—team performance (strong climate)	-1.85	.064*
Psychological safety—team performance (weak climate)	-2.05	.040**

*p<0.1
**p<.05
***p<0.01
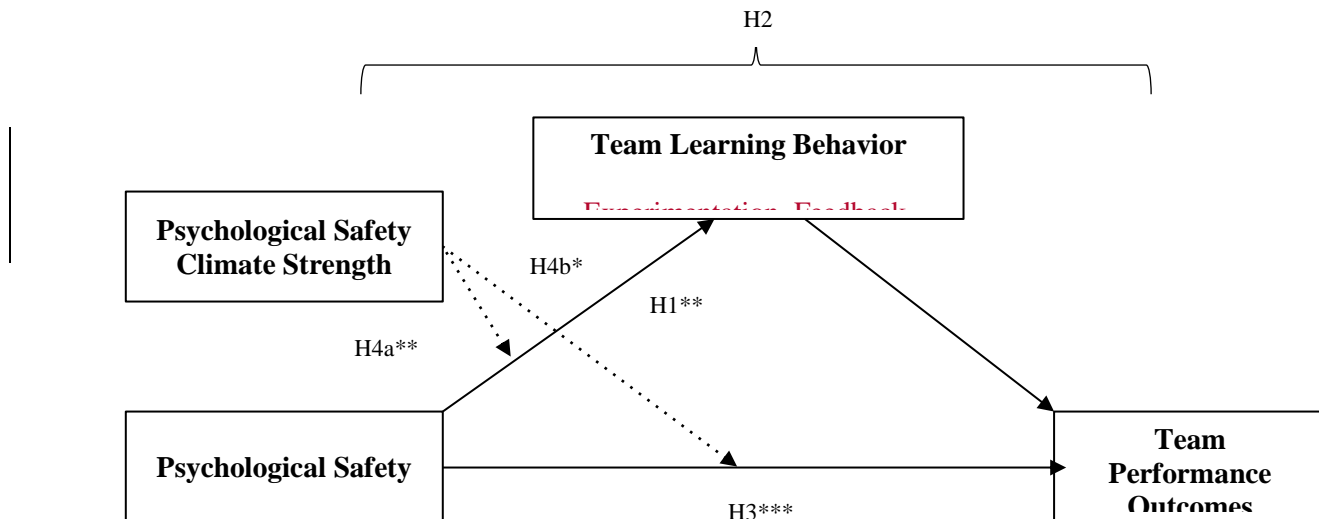
Figure 5. Significance of hypotheses among variable relationships.
*p<0.1
**p<.05
***p<0.01

Results indicate that in teams with strong climates (n=11), the teams with high PS demonstrated higher team learning than teams with low PS (z=-2.12, p<.05). In teams with weak climates (n=11), it was found that high PS teams also showed higher team learning scores than teams with low PS (z=-2.69, p<.05). Interestingly, there is an important distinction between the strong climate teams and the weak climate teams. In teams with a strong climate, the high PS team had a rank sum = 57 while the low PS team had a rank sum = 9. The wide range in rank sum scores suggest that the high PS teams have a greater probability of exhibiting higher team learning scores than the low PS teams. In teams with a weak climate, the high PS team had a rank sum = 42 and the low PS teams had a rank sum = 24. The shorter range suggests that the high and low PS groups are slightly more alike in their team learning scores, which means that predicting team learning scores in a weak climate is more challenging. It should also be noted that the strong climate category does not differentiate between strong positive and strong negative climates, so it is not possible to conclude the impact that strong positive climates have versus strong negative climates Taken together, these findings support Hypothesis 4a that states climate strength moderates the relationship between psychological safety and team learning behavior such that when climate strength is high (vs. low), the relationship is stronger.

Hypothesis 3 proposed that teams with higher PS versus lower PS would demonstrate greater team performance, and results support this hypothesis (z=-3.04, p<.01). Once statistical significance was established for this relationship, climate strength was introduced into the Mann-Whitney test calculations. Results suggest that in teams with strong climates (n=11), there is no statistically significant difference in team

performance between teams with high PS and low PS. However, in teams with weak climates (n=11), evidence supports the conclusion that teams with high PS demonstrate higher team performance than teams with low PS. Therefore, Hypothesis 4b is partially supported. Figure 5 summarizes the statistical significance of the hypothesized variable relationships determined in this study. The interpretations of these findings will be discussed in the following chapter.

Research Question 2: What factors influence psychological safety climate strength?

In the following section, I present the findings to the second research question: What factors influence psychological safety climate strength in teams characterized by: a strong positive climate, a strong negative climate, and a weak climate? First, I offer an overview of the existing organizational context. Then, I provide a narrative of three teams, with each one corresponding to one of the three climate strength dimensions in the research question. Then, I present the themes that emerged in the thematic and cross-case analysis that illustrate the factors that affect variations in climate strength across teams.

Organizational Context: A Difficult Past and an Uncertain Future

The three teams that participated in the interviews are situated under the Information Technology (IT) hub of the organization. While the organization employs nearly 30,000 people globally, the IT hub located in southern California, contains 84 teams with nearly 700 members that collaborate with one another to serve the organization internally and address the needs of external stakeholders. Some teams are responsible for creating new programs and procedures while other teams focus on optimizing existing technology.

In the last five years, the organization has faced several substantial layoffs that have significantly impacted employees. The most recent layoff occurred in early 2018, which prompted an internal reorganization of the IT hub. Teams lost long-standing, respected colleagues, and now they are faced with additional constraints on resources. One participant said that the layoffs have "almost kind of jailed people who are here. It's either we have a common sadness of seeing people being laid off and go, and when that's not happening, we are busy trying to figure out where to cut costs and where to save money." Other participants expressed a similar anguished sentiment, indicating that the layoffs have negatively impacted the morale of the entire department.

Interestingly, during the most recent layoff in early 2018, each team that I interviewed experienced restructuring (i.e. they lost some members and gained other members), which means that the current membership configurations in each team have existed for the same time period—nearly one year. In a sense, the layoff provided a uniform "starting point" for the teams, which allowed me to consider how each team addressed challenges associated with this critical event (e.g. integrating new members, taking on new roles, etc.). None of the three teams that I interviewed experienced a complete disbanding of their previous team, but all three teams lost some members and two teams gained new members. The impact of this transition is explored further in the sections below, as I now turn the focus to each teams' individual narrative.

Team Narratives

This section provides narratives about three teams who exhibited a strong positive PS climate, a strong negative PS climate, and a weak climate, as indicated by the quantitative survey analysis in phase one of this study. The narratives provide an origin

story of the teams and illustrate the organizational context in which they operate. The narratives also highlight team members' relationships as relevant to the teams' development over time. Any names mentioned in this section have been changed to protect the confidentiality of the participants.

Strong positive climate. This team worked together for nearly three and a half years before the layoffs occurred in October 2018. The team is composed of eight individual contributors, seven men and one woman, and their manager, Max. Initially, the team formed through combining two teams and hiring several outside individuals. During the layoffs, the team lost two members, but did not gain any new members. The members in this team all have at least three years of experience at the organization. Max noted that in the beginning, "there were some difficult dynamics between certain team members, and there wasn't a lot of trust there." In response, Max focused on building trust and assisting team members in managing conflict. He explained, "over time, I noticed that those relationships didn't have the same dynamic as before… It was just like, 'I love that person now.' And so that was different… we built that." In alignment with Max's perception, every team member enthusiastically expressed their respect and deep care for their teammates and their manager. Many teammates praised Max with superlatives such as "the best manager I've ever had," or "the best manager at [the organization]," (Participant 8 & 10, personal communication, May 20, 2019). Furthermore, when asked if the team was a safe place to speak up, ask questions, or express disagreement, every team member emphatically said 'yes.' The survey scores were congruent with the team members' responses to this interview question; this team's

psychological safety composite scores ranged between 27-30 out of a possible 30, which indicates that of those who responded, all reported a high level of psychological safety.

This team is situated in a unique position within the organization. Although team officially resides under the IT hub of the organization, the valuable and technically challenging functions that its members perform for the organization has set it apart from the other teams in the department. One member explained that, "we're wrapped up with IT, but we don't really feel like we are part of IT…I feel like our team is elite. We're the sniper team," (Participant 7, personal communication, May 20, 2019). Others echoed a similar sentiment, lauding the intelligence of their team members and expressing feelings of pride and gratitude to be associated with this team.

The crucial function and specialized skills of the team seemed to also make the team less susceptible to layoffs. One team member speculated, "I don't think we've gotten hit quite as hard…We provide a lot of value. I think IT has seen the value in having those people—people like us—in San Diego. So, we've been a little bit isolated from the sort of things that is affecting morale and the rest of it," (Participant 8, personal communication, May 21, 2019). In three and a half years, the team has only experienced one restructuring in the most recent rounds of layoffs, in which the team lost two members. The team did not receive any new members, so despite losing two colleagues, the rest of the team remained intact. Thus, the team found some comfort in the familiarity of the existing relationships, and they did not have to undergo the challenges that accompany integrating new members into the team.

Strong negative climate: This team formed in October 2018, after the most recent round of layoffs in the organization. The team is comprised of seven male

members, including the manager, Steve. Four of the team members had been working

under Steve for seven or more years. When the organization restructured teams in

October 2018, Steve received three new team members who had been working in other

teams across the department. All of the new members had some previous relationships

with either Steve or other members on the team, but Steve admits that he knows some

members much better than others. In addition, all of the team members are mid to senior

level employees, with tenure ranging from five to fifteen years. When Steve was asked if

he believed members of his team felt safe to speak up or surface concern to the team, he

replied:

> I know what I'd like to say, which is yes. But is it true? Maybe not… I mean, I
> know they'll bring up stuff from other teams. They're all comfortable talking
> about other groups, teams, individuals. But would they call out each other
> publicly? I don't think so. I think they would come to me, but I don't know that
> they would bring the elephant out in the room. They would probably bring it to
> me on the side. (Steve, personal communication, May 22, 2019)

This behavior—the unwillingness to address difficult issues in a group setting—is

symptomatic of low psychological safety, and Steve seems to be aware of it.

Interestingly, it does not occur to him that it is an issue that needs to be addressed; rather,

he seems to see it as a facet of how his team operates. When the team members were

asked if they believe the team is safe to take risks, three members said they did not feel

safe and three stated that they did feel safe. However, the three members who stated

feeling safe provided numerous examples of situations in which they chose not to speak

out or address conflict, which indicates that the direct question may have activated social

desirability bias in their responses. In other words, members may have responded based

on what they thought I would like to hear or perhaps, what is socially acceptable for them

to say about their boss. Furthermore, four out of six members responded to the survey,

and their composite scores on the psychological safety section ranged between 18-20 out of a possible 30, which is the lowest of any team that responded. The discrepancy in survey scores and their in-person answer to the question regarding the degree of psychological safety they feel may also be a symptom of feeling unsafe. In other words, they are more willing to report feeling unsafe if the answers are anonymous rather than if they are directly asked out of possible fear of retaliation and punishment.

In terms of collaboration, members of this team describe it as a "team of individuals," speaking to the siloed nature of the team's work. One team member described it as, "it's almost like each one of us is a team of one. We are very subject matter expert divided." When probed further, the team members confirm that their work is interdependent, meaning they rely on one another to complete different parts of a project. In other words, the team's projects require collaboration despite the differences of subject matter expertise, so the individualized nature of the teamwork may more likely stem from an established relational dynamic rather than the nature of the taskwork. In addition, after the layoffs, a significant portion of their taskwork was outsourced to teams in India. Therefore, they often need to collaborate with Indian colleagues to execute their projects, which can be a challenge.

Weak climate: This team formed in October 2018 after the most recent round of layoffs. It is composed of seven men, including the manager Robert, and two women. Robert and five of the team members have been working together for at least two years, and three of the members joined the team after the restructuring in October. The new team members did not have any previous relationships with each other or with anyone else on the team. Furthermore, several of the new team members were also new to the

organization, while other members had spent as many as fifteen years with the organization.

This team collaborates frequently on projects and tends to share responsibility for task execution. Several members indicated that due to their role function, they work with some colleagues more frequently than others. Robert has also been known to work on projects with certain members of the team on a more regular basis, while at other times he will be completely absent from team meetings, leaving a senior employee to stand in his place and facilitate the meetings. In addition, after the layoffs and restructuring, some of the team's projects were outsourced to colleagues in India, and according to members, this created challenges in executing their work.

Of the three teams that were interviewed, the members of this team showed the most variation in their perceptions of psychological safety. Some members felt that the team is completely psychologically safe, while others reported the team to be a toxic environment. When asked if they felt safe to speak up about mistakes or issues, two members wholeheartedly agreed, three members reported feeling unsure, and two members stated that they did not. These findings are consistent with the survey results. Although only four out of seven team members responded to the survey, psychological safety composite scores ranged from 13, to a middle range score of 21, to a high of 27, corroborating the wide variance in members' perceptions that were uncovered in the interviews. Unfortunately, the manager of this team did not respond to my requests for interviews, so it is unclear whether he was aware of this discrepancy in perception.

Themes that Affect Climate Strength Across Teams

The qualitative data revealed five themes that affected the variation in perceptions of psychological safety across the teams: 1) leader-member interactions, 2) leader-team interactions, 3) team interactions during high stakes, 4) organizational context, and 5) the systems intelligence of the leader. The following sections explore these themes and associated sub-themes among the high psychological safety (high PS) team, low psychological safety (low PS) team, and the weak psychological safety (weak PS) team.

Leader-member interactions. The frequency and quality of team members' individual interactions with their manager affected their perception of psychological safety. Interactions between managers and members included formal planned interactions and informal unplanned interactions; both types of interactions held significance in members' perceptions of whether they felt psychologically safe or not. For example, the high PS team had regular one-one-one meetings with their manager to discuss challenges, address interpersonal issues, and build a personal relationship with the manager. This increased team members' sense that the manager "had my back," as one team member stated (Participant 2, personal communication, May 21, 2019). One member of the high PS team recounted:

> It's an [organization] wide thing, but we have what's called a one-on-one every two weeks. You meet with your manager for a small chunk of time to basically check in. But [our manager] was very efficient in making sure that we would talk about any goals that were for the current review period, check status on that, as well as talk about other things that are going well. It's good. Identify those, but also identify what are things that are not going well or where do you feel like you're blocked or having trouble with things. And so it was a very back and forth dialogue, but always very open without feeling like I needed to hold anything back about concerns, whether it was 'Hey I messed up and I did something wrong,' or 'Hey I just I really don't have time for this.' So the discussion was very open. (Participant, 4, personal communication, May 21, 2019)

This team member emphasized the bidirectional nature of the conversation and the breadth of the topics discussed. Most notably, he mentioned the openness to bring up challenges. His remarks indicate that he has a high-quality relationship with his manager. The seven other team members confirmed that they also participate in bi-monthly one-on one meetings with the manager and feel that the meetings create an open, helpful space to have conversations that leave them feeling seen and heard by the manager. In addition, one member observed that the manager "doesn't favor anyone above anyone else. He treats everyone the same," (Participant 14, personal communication, May 21, 2019). When members perceived equal treatment of one another from the manager, it minimized the tendency for social hierarchies to form, which arguably affected psychological safety.

The low PS team had infrequent one-on-one formal interactions with their manager, which left team members feeling ambivalent about their relationship with him and about the team. One team member admitted:

> I haven't interacted with him a whole lot in the last six months in a real supervisor-employee manner. Like, I haven't had a review period with him yet, although that's coming up at the end of summer or early fall. I haven't had a one-on-one with him. He does drive-bys, you know, which is fine. And that seems to be OK. I have scheduled semi-monthly one-on-ones but they are usually cancelled. (Participant 7, personal communication, May 22, 2019)

This statement highlights the lack of consistency in his interactions with the manager and points out that individual planned meetings are non-existent. Other team members on the low PS team verified that most interactions with their managers are informal "drive-bys" where, as one team member recounted, "The manager says 'what are you doing? Let's get a status report together,'" and these interactions left the team member with, "no real directional understanding. It's more of a one-way conversation flowing up to [the manager]," (Participant 8, personal communication, May 22, 2019). This one-direction

communication pattern sends a powerful implicit message to team members about the level of the manager's openness to conversations, especially about any topics beyond the topic of project work updates. This communication arguably had two significant impacts on psychological safety. First, the request for status reports through a "drive-by" approach conveys that brevity is necessary and the content must be focused on project updates. This failed to provide a grounded environment that would encourage one to bring up challenges, concerns, or topics that might fall outside the category of updates. Secondly, the unidirectional communication from the employee to the manager prevented employees from receiving additional information from their manager, which left them feeling unclear about the surroundings in the larger organizational context.

On the weak PS team, where members demonstrated variances in their perceptions of psychological safety, the team members also described different frequencies and qualities of their interactions with the manager. This team's manager would occasionally work on projects with some team members but not others. The members cited the reason as based solely on technical expertise and the needs of the task. However, this configuration of teamwork led to the unequal accessibility to the manager because the manager became more familiar with the team members with whom he worked on projects. Not surprisingly, the team members that felt the safest on this team had more opportunities to interact with the manager either formally, through one-on-one meetings, or informally, while working on a project together. One member, who recounted doing "a fair amount of project work with [the manager]" said that he and the manager, "have a scheduled one-on-one monthly. I probably meet with him one-on-one more…but those are kind of just talk…I don't think there's a regular cadence for it. It's

probably a couple of times a quarter," (Participant 18, personal communication, May 30, 2019). Even though this member insinuated that some irregularity in meetings exist, he stated that one-on-ones still happen at least several times per quarter. In stark contrast, another member, who has roughly the same tenure on the team as Participant 18, disclosed:

> I don't directly report to my manager. I don't directly report to him. This is something he's told me because he said, 'I don't have enough time to do all of this, so you give all your updates to [another team member] that I work with and then I can just sync up with them.' So, everything that I work with just goes through this extra person. And then it goes to my manager, and I don't even get to talk to my manager's managers. That's a little bit of what changed than what I was used to previously. And the fact that even my one-on-one stopped being once a month, which is odd because all my previous managers, I generally met every week or every other week. So just the fact that time cannot be made to meet your direct reportees, it strikes me odd and kind of a little bit alienating. (Participant 17, personal communication, May 30, 2019)

Not only did this team member feel slighted that his one-on-one meetings no longer occurred, but the manager instructed him to report to another peer on the team, which inadvertently created a hierarchy among team members and simultaneously restricted the member's access to the manager even further. His mention of alienation alludes to feelings of isolation and loneliness. In addition, Participant 17 had never been assigned to a project that involved the manager, so there were no additional opportunities for informal interactions.

Furthermore, the members who reported feeling the least safe in the weak PS team noted several grimly hurtful individual interactions with their manager that significantly damaged the fabric of their relationship with him. One of the three female participants that I interviewed tearfully and angrily recounted her first meeting with the manager:

When I initially met him, he had told me...he had said he didn't want to train anyone that was going to come into the department and get pregnant in the next couple years and leave. And to me I've never...to have someone who is an authority figure, who you're supposed to be working very closely with say that to you, I was blown away…That comment set the tone for me for the past you know from October until I'd say March, I was mentally...just...yeah...really stressed and shut down here…it just stripped me of my power. I felt like my internal locus of control was gone. (Participant 20, personal communication, June 11, 2019)

This is a clear instance of gender discrimination. This team member documented the incident with HR, but no action was taken by the organization or by her to address the issue with the manager. In addition, she added that being a woman in a predominantly male field made her feel that she should just "tough it out." Therefore, she resorted to allowing the tension fizzle out. The manager never attempted to repair the relationship after that incident, and given that he never acknowledged his comment, it is unclear whether he was aware of the impact that it had on her psychological well-being. While this is an extreme example, it further illustrates the lack of awareness that this manager has about the effect of his individual interactions with his team members.

In summary, the frequency and quality of individual leader-member interactions shaped how team members felt about their relationship with their manager. In the high PS team and the low PS team, the managers behaved fairly consistently across their interactions with team members. In the weak PS team, the manager seemed to engage more regularly with some members than others, and he also had several critically hurtful interactions with the members during their tenure. Taken together, these actions led to some members feeling more psychologically safe than others.

Leader-team interactions. Different than individual leader-member interactions, formal team meetings provided a collective experience in which each member was exposed to the same environmental stimuli. The data suggest that the frequency,

structure, role of the manager, and nature of the communication in meetings between the leader and the team members shaped group norms and the perceptions of the environment, which impacted members' psychological safety.

In the high PS team, the team met at regular intervals to receive project instructions from the manager. The manager described his approach to the meetings:

> I often engage very early in the project to set direction and say, 'Here's where we need to get to… This is what we're expected to get in the next three months or six months…there's a whole big road between here and there. How we get there…I trust you guys to figure that out. So, you're going try stuff and I want you to work through it.' I'm there very early on to set some direction and goals and strategic objectives. Then, I try to disengage from the day to day and let them work. I'd like the team to figure that out…I like to encourage them basically. I trust you to act to make the decisions… If you're making mistakes, I'm not going to fault you for it because I said like, there's the hard ground rules. We'll work it out. Trying to build an environment where they feel safe to fail, safe to try something. (Participant 12, personal communication, May 21, 2019)

Importantly, this manager clearly articulated his approach to providing vision and direction for the team's projects, scaffold as needed, and then hand off the day-to-day planning to his team members. Several other team members confirmed that this manager is "very strategic and good at communicating the vision and direction for the team, but he also doesn't micromanage," (Participant 8, personal communication, May 21, 2019). The manager established his role as the primary authority figure in the beginning of the meetings and offered a clear direction, while also demonstrating trust in the team members' problem-solving abilities. In addition, he stated his intention for creating the space for team members to feel safe taking risk and failing. By creating this structure for the team, establishing a direction, and creating a group norm that allows failure, he generated a collective perception that the environment was stable and safe to explore options when solving problems.

The high PS team led bi-weekly planning meetings, distributing leadership among the members so that no single individual held the role as facilitator. While these meetings were not driven by the manager's agenda, one team member noted that the manager "does actually sit in on those planning sessions as well. So, he doesn't distance himself from all of the planning. He will actually insert himself into our meetings. And his door's always open as well. So, he knows what's going on," (Participant 14, personal communication, May 21, 2019). The presence of the manager in the meetings communicated that he is accessible and willing to intervene if course correction is needed. Perhaps most importantly, his presence held his place as the authority figure in the room, which made it less likely that another team member would consciously or unconsciously take up this role. This minimized the potential of hierarchies forming among team members, which would create uneven perceptions of psychological safety.

In contrast, in the teams with low PS, the team members noted the low frequency, poor structure, ambiguous role of the manager, and lack of inclusive communication, which led to team members feeling unclear about expectations for behavior. One team member observed that, "It seems like those [team meetings] are fewer, especially over the last couple of years. I mean, the company's been through quite a bit, and I think maybe it's an excuse. I'm not sure. But we haven't really had those team meetings for quite a while…they just kind of went by the wayside," (Participant 4, personal communication, May 22, 2019). The team members were unsure why regular team meetings do not happen. When they do occur, one team member explained:

> There has never been a real idea of direction. Like, 'so here's the things we're going to accomplish. Here's the big problems that we're going to try to tackle.' There's no going from the thought process into execution. It's more of, 'we have all of these priorities. Everything is priority one. And if any one of them falls,

then somebody gets a tongue lashing,' or something to that extent. (Participant 4, personal communication, May 22, 2019)

The lack of clarity from the manager generated frustration and uncertainty in the team members. In addition, several members corroborated the 'tongue lashings' that occur if standards are not met, which created fear and irritation because members are unclear about expectations from the beginning. The manager confirmed his laissez-faire approach to team meetings:

Usually by the time I come in, they're all already talking. They're talking about the recent news, or the stock price, or something that's going on with trying to get stuff delivered and it's not showing up to a site. They're talking about the problems that are going on, and I just kind of let them go. I'll come in, but I don't stop them from talking. I just let them keep going until it ends. I have some things I want to talk about, but it's also just to make sure everybody gets together and talks. So, if it's Monday morning of this week and they're all talking about the Game of Thrones season, go for it. Who knows… (Participant 3, personal communication, May 22, 2019)

This example suggests that he often arrived at the meeting after the designated start time had passed. By simply sitting down, not addressing the team, or transitioning them into the purpose and task of the meeting, the team environment lacked any sense of a holding container in which their interactions and taskwork can take place. From this illustration, the manager's presence seemed to be irrelevant to the team. Different than the manager in the high PS team, who also attended his team's meetings without necessarily directing them, this quote demonstrates that low PS manager did not hold the group accountable to staying on task or ensure that the planning process is aligned with the overall project goals. This manager often justified his laissez-faire approach as a way to avoid micromanaging his team. However, it appears that he conflated micromanaging with providing structure for his team, and in fact, he did his team a grave disservice by not creating this structure because this left the team members reporting that they feel

uncertain about how to cope with the ambiguity in their environment, and thus, diminishing their sense of psychological safety.

The weak PS team met regularly once a month with their entire team—which included their counterparts in India—and daily with the local team. Although the team met with regular frequency, the data indicated that the lack of structure and inclusive communication, and the role of authority in team meetings led to differing perceptions of psychological safety among team members.

During the monthly team meeting, one team member illustrated his perception of the manager's approach as, "'OK let's just get together. I did not prepare for this meeting, but I have notes. Let's just talk," (Participant 16, personal communication, May 31, 2019), suggesting a lack of preparation by the manager, and leaving team members feeling uncertain about the meeting's purpose or goals. Once the monthly meetings began, the manager's approach to communicating about news from senior leadership or project plans made some members feel out of the loop. One member recalled:

> I sense that some of the people in the meeting already know some of the announcements or information, and hence it does not get discussed as much as it should. When you're sitting in the room and you think 'OK it looks like only two or three people don't know about it, but the rest of the people know about the information, so it does not get discussed….The first couple of meetings I tried to kind of interject in a way. I mean like, 'Oh, I've not heard about it.' And then it got into a different tangent instead of like, 'Oh, you did not hear about it? Here's what is happening.' So I didn't want to be like, 'Tell me about it."…I don't want to feel left out. So, I just say, 'OK. I can find out or talk with this person later who seems to have known this issue much before. (Participant 16, personal communication, May 31, 2019)

In this example, this team member felt hesitant to speak up because he did not want to appear ignorant. The fact that others had information that he did not left him feeling that there was an in-group and an out-group. The faulty assumption by the manager—that all

of the team members were familiar with the information he brought forward—created an uneven playing field. According to this team member, this was a recurring pattern in team meetings. Although the manager asked if everyone had the information, admitting that one did not would automatically relegate him or her to the out-group. Rather than single himself out as not being in the know, this team member resorted to collecting information from members after the meetings. One member also noted that, "the hierarchy is defined on who knows what and who's close with whom. So, you don't go and touch or disturb that structure or title," (Participant 16, personal communication, May 31, 2019). This comment identifies a clear and rigid hierarchy is this team. The unequal communication patterns on this team are likely an antecedent and a consequence of the social hierarchy of the team, both creating a reinforcing the status of its members. Once this status difference is established, members with greater status tend to feel more psychologically safe than members with lower status.

In the weak PS team, the manager was also often physically absent from meetings. The manager passively delegated the task of facilitating daily project meetings to a team member who has been in the organization for over two decades. While the team member's tenure made him a natural candidate to take up this role, it was unclear how the rest of the team felt about another peer having so much authority in the team. The facilitating team member said that the decision to have him lead daily meetings was never formalized; it began happening because the manager had other tasks to which he needed to attend. Regardless, this role as the facilitator placed this member at the top of the authority hierarchy in this team. Unsurprisingly, when asked if this team member felt psychologically safe in this team, he replied, "for sure". One difficulty of having a team

member take up a recurring role as a facilitator without formalizing it is that because the role is not formalized, it is more difficult to hold the member accountable for practicing inclusive leadership behaviors. Further exploration would be needed to determine how he understands and takes up this role.

The leader-team interactions are critically important because they are one of the few times in which the entire team meets as a collective. The interactions that occur during these meetings provide rich information for the members about each other, about the leader, and about their place in the team. The meetings provide a stage on which the teams' dynamics play out, specifically the frequency, structure, role of the manager, and nature of the communication between the leader and the team members. These dynamics shape group norms and the members' perceptions of the psychological safety of the teams.

Team interactions during high-stakes situations. Across all three teams, the majority of members emphasized the immense respect they have for their team members' intelligence and competence. Some members describe one another as family (e.g. Participant 20, personal communication, June 11, 2019), and other members said their team is a primary reason that they stay at the organization (e.g. Participant 4, personal communication, June 11, 2019), emphasizing the camaraderie in these relationships. In addition, most members stated that they like their manager as a person, despite troublesome leadership behaviors at times (e.g. Participant 2, 4, 9, 16, 17, personal communication). However, having respect for and 'liking' individuals as human beings does not necessarily translate into feeling psychologically safe. When the teams' environments reached high stakes, such as when mistakes, conflicts, or larger

organizational issues occurred, the teams' interactions with one another had significant

effects on perceptions of psychological safety.

When mistakes arose in the high PS team, the members demonstrated a shared

responsibility for the mistake, and would even interject humor to lighten the tone. One

member described the team's approach to addressing mistakes:

> Let's understand, how do we improve our understanding of this process? Was it just a simple like, we wrote code that was bad? And so, we need to look at how we improve that process and the code behind it to get better. There was never really... I don't think I've ever had a time where I felt like it was a finger pointing exercise. It was just more of usually something we could laugh and be like, 'oh yeah that was a dumb mistake. We're fixing this.' (Participant 8, personal communication, May 21, 2019)

In this example, the members nor the manager blamed one another. They saw the mistake

or failure as an opportunity to learn and work together to find a solution. The other

members of this team confirmed that when concerns arise, the team members are

receptive.

In addition, when the layoffs occurred, the manager of the high PS team

facilitated space to discuss challenging issues so that the team members had the chance to

ask questions and process their experiences. The manager could sense that the

organizational changes generated anxiety among his team members. He recalled that he

was "aware of what people were thinking. And so rather than be like 'I'm not going to

ask that question or address that issue,' I just address it like 'Here's what's going on. Let's

talk about it.' And then we talk about it. I think it really helped," (Participant 12, personal

communication, May 21, 2019). Instead of avoiding the issue, he addressed the situation

directly and allowed team members to voice their experiences. This opening created a

holding environment that could contain and withstand the team's strong emotions, which

generated perceptions of safety among the team members. In addition, this manager invited members to bring their full experience into the meeting—emotions and all—which extended beyond discussions of work tasks and projects. This behavior diverged from the cultural norms of the organization, but the trust that had been built within the boundaries of the team over time superseded the team's adherence to organizational cultural norms.

When mistakes or unmet expectations occurred in the low PS team, the manager tended to respond with bursts of authoritarian behaviors. This was especially challenging for the members to accept because the manager provided little guidance and clarity about their project goals, as discussed in the previous section, so the criticism felt unfair and unwarranted. One member described the manager's criticism as "getting the backhand," which summons a strong image of violent, disrespectful punishment rather than helpful feedback that could be used to address the issue (Participant 4, personal communication, May 22, 2019). This member said that this type of criticism does not occur "so much anymore", but the fear of being the unlucky recipient when it did occur was enough to make him "steer clear" of admitting mistakes so that he can "be prepared rather than being caught unaware or surprised." In this example, the lack of predictability in the manager's harsh responses seemed to elicit avoidant behaviors (e.g. not speaking up or admitting mistakes) from this employee because he could not be certain how the manager would react. In order to minimize the chances of receiving an angry reaction from the manager, the employee felt it best to keep to himself.

This behavior also engendered a culture of blame among team members. One member noted that, "when an issue is resolved and it turns into a postmortem, like,

'Okay, who fucked up? Who messed up? Or what messed up?' That kind of thing, as opposed to 'How do *we* get over this? How do *we* solve it?' (Participant 5, personal communication, May 22, 2019). This statement suggests that the team wanted to find the culprit who made the mistake rather than collectively shoulder the blame and responsibility. Most likely, this dynamic is a reaction to the punitive responses from the manager. Interestingly, the manager noted that, "I try to get people to weigh in and everybody just sits quiet. If their peers bring it up, it's a much more open conversation," (Participant 3, May 22, 2019). When probed about why he believes this happens, after a long pause, he speculated, "Maybe because I'm telling them what the problem is, and I'm telling them what the solution needs to be. And there isn't maybe a lot of room for discussion," (Participant 3, May 22, 2019). This comment indicates that the manager had some awareness of the impact of his behavior but also has done little to correct it. The unpredictable criticism and disregard for others' input created a fairly uniform perception among team members that the team was psychologically unsafe.

Finally, in the low PS team, the manager took a more avoidant approach to addressing larger organizational issues facing the team. When the layoffs occurred and the manager could tell that people were feeling "disconnected" or "morose," he described that he tried to, "keep everyone focused as much as I can. I just try to kind of keep it positive, like there's a light at the end of the tunnel thing… yes, it's bad news, but it's not the end of the world for us. We're still here. We still got jobs. We're still going. Let's just focus on our work." (Participant 4, personal communication, May 22, 2019). While it was admirable that the manager attempted to boost morale by encouraging positivity and gratitude, failing to acknowledge a difficult situation and provide space to process the

experience as a team communicated that these challenging conversations did not have a place in the work environment. The team members abided by the unwritten rule to refrain from talking about the layoffs and kept their concerns to themselves.

In the weak PS team, members experienced the act of addressing mistakes differently, which contributed to the variance in perceptions of psychological safety. One member who indicated that he felt safe on the team noted that, "there's generally a kind of camaraderie and 'how do we fix this? How do we fix this holistically?' Which I appreciate," (Participant 17, personal communication, June 11, 2019). He continued on to emphasize that members handle mistakes without placing blame, which allowed the team to recover quickly. His stance insinuates that the team addressed problems cordially and notes his appreciation for the process. In contrast, another team member described, "There is no sense of directness if you have a disagreement or discontentment with anything at all. So, it kind of…transfers to the other person or it reaches the higher level, but eventually a decision will get made. Then everyone will know about what is happening," (Participant 16, personal communication, May 21, 2019). This member felt frustrated that conflict was rarely addressed, and he believed that this approach was ineffective. Taken together these two quotes illustrate two conflicting perspectives of this process in the same team. One possible reason for the conflicting perspectives could be that this team tends to work with smaller subgroups of the team, so the mental model for how mistakes or concerns are handled may originate from participating in different contexts. Moreover, Participant 16 has given evidence that he falls at a lower position in the team's hierarchy than Participant 17, who works closely with the manager. The differences in status may contribute to how they are involved in the problem-solving

process in that Participant 17 may receive more information when solving problems due to his proximity to the manager.

Finally, when the layoffs occurred, the weak PS team lost several members and gained new members who had less experience. The negative interactions among several team members in conjunction with the manager's failure to intervene significantly impacted the psychological safety of the new members. One member recounted a particularly painful interaction:

> I had a lot of negative comments expressed to me when I first joined the team and got here…One of the developers said to me. 'Oh, so they got rid of two of our top performing guys to replace them with interns who aren't at the same skill level?' I remember when he said that, I just looked at him and I'm all, 'I didn't have a say. If it makes you feel any better, I had no idea…. Like, I can't do anything about it. If this is such an issue, you can go escalate it.' (Participant 20, personal communication, June 11, 2019).

This interaction occurred in a team meeting and the developer's comment was directed at the manager, who was present. Instead of condemning the harsh comment and defending the new team member, the manager did nothing and allowed the conversation to continue. By choosing not to intervene, the manager implicitly communicated that the member's comments were acceptable behavior, and this left the new member feeling isolated and helpless.

The ever-present threats in a high-stakes situation activate natural self-preservation reactions among individuals. The degree to which a team—the members and the leader—can regulate its emotional responses to a challenging situation will determine how its members interact (Rock, 2008). These interactions can either reinforce perceptions of psychological safety, or they can diminish them. This section illustrated the differences in and impact of team interactions across the high, low, and weak PS

teams. The next section will examine how the larger organizational context that impact how team members perceive the safety of their environment.

Organizational context. The organizational context—namely the function that teams provide for the organization, their position in the organization, and organizational changes—has impacted the team members' perceptions of psychological safety. The most significant differences in psychological safety existed between the high PS team and the low and weak PS teams.

The high PS team resides under the IT hub of the organization just as the other two teams do, but it provides highly specialized and technically challenging functions, which has set it apart from the other teams in the department and protected it from several rounds of layoffs. One team member speculated:

> We've been very well insulated from it…we've, to an extent, been protected but it's also because we don't serve that same general role that a lot of other I.T. organization teams fill. It's been nice because we are well protected. There's no one else in the organization that can do that job. So, you have to keep a bare minimum, and we are that bare minimum that helps keep the wheels turning and everything going and innovating. (Participant 8, personal communication, May 20, 2019)

Undoubtedly, this team's role in the organization has generated a feeling of safety, at least in the sense that the members expressed comments that they are not likely to lose their jobs if layoffs occur. When external threats are diminished, members are more likely to feel safe in their environment. Of the nine members that interviewed, only two explicitly brought up the layoffs, as opposed to nearly every member in the low PS team and the weak PS team, which potentially indicated that the subject was not in the forefront of high PS team members' minds as an issue that impacted perceptions of psychological safety. Indeed, the high PS team was not quite as immuned from suffering

losses as the members' comment proclaims. In the last restructuring, the team lost two members. However, the team did not receive any new members, so despite losing two colleagues, the rest of the team remained intact. This is significant because the team's familiar relationships remained intact, which means that they did not have to undergo the challenges that accompany integrating new members into the team.

In contrast, the low and weak PS teams did not enjoy the same privilege of being insulated from challenging organizational changes, and the changes negatively impacted members' perceptions of psychological safety. The low and weak PS teams provide standard operational functions for the organization, and as a result, many of their roles and tasks were outsourced to employees in India following the recent rounds of layoffs. One member from the low PS team speculated about the impact of the layoffs on team members' interactions: "I think there was definitely a shot to the morale with everybody... Everybody leaving or handing in their hat. So, I think… at least that's the way I rationalize that. That had a lot to do with the communication starting to break down a little bit," (Participant 8, personal communication, May 21, 2019). This comment illustrates how the layoffs decreased morale and likely increased individuals' sense of threat in their environment, which can activate reactive behavior and lead to dysfunctional communication.

The layoffs also resulted in restructuring and combining teams, which generated difficulties when attempting to integrate new members while simultaneously managing the emotional reactions of existing members. A lack of skill and attention to this crucial step in team development proved disastrous for the weak PS team, in which the previous section illustrated an existing senior team member lashing out at a new junior employee

who joined the team as a result of the layoffs. Certainly, the lack of psychological safety

that the new member felt after the incident resulted from the leader and team members'

failure to appropriately manage their emotions, but the organizational changes both

generated the conditions for the incident to occur and exacerbated its effects. In this way,

it can be argued that the organizational context negatively impacted members'

psychological safety.

      The lack of stability and certainty in the organization also diminished innovation,

which is a symptom of low psychological safety. One member from the low PS team

confided that the most frustrating part of his work was that he felt he could not propose

and develop his ideas, so he would rather begin his own start-up. When probed if he felt

this way because he did not believe that his skills were valued by the team or the

organization, he corrected:

> It's not about the skillset value in the team…It's not about just about the team members. It's about a lot of different factors, taking the organization as a whole. So, can you really go propose an idea and get it on board with all the mess that's happening? With the kind of financial constraints and the lack of resources that we have? We have more and more work with less resources. We lost like 50 percent to 60 percent of the team. …And the ongoing problems that we've got to look into from the infrastructure standpoint. So multiple things playing come into the play when I want to propose an idea. (Participant 6, personal communication, June 11, 2019)

This member cited organizational factors, such as resource constraints and the chaotic

infrastructure as the primary barriers to speaking up about ideas rather than

characteristics of his team. The organization framed the layoffs as the result of

insufficient financial resources, and this narrative began to diminish the possibility of

new ideas in team members' minds. Instead, the possibility of having one's idea rejected

was not only possible; it was likely. Therefore, members decided to keep their ideas to themselves and find other avenues through which their ideas can flourish.

One could argue that an organizational variable, such as layoffs, would be considered affecting psychological safety at an organizational level of analysis rather than a team level, and therefore outside the scope of this study. However, it is the membership to a particular team and all of the facets that accompany that team's identity that make the organizational level changes meaningful to the individuals. In other words, the members of the high PS team only felt safer amidst the layoffs because they belonged to an elite *team*. If these individuals belonged to a different team, they might not feel as psychologically safe as they currently do. This was the case in the low and weak PS teams. The function that the team provided for the organization impacted the team's perceived status, and ultimately these factors determined which teams were most affected by the layoffs. Each of these contextual factors in the organization affected team members' perceptions of psychological safety.

Systems intelligence of the leader. Thus far, the data suggest that four primary themes impact individuals' perception of psychological safety: leader-member interaction, leader-team interaction, team interactions in high stakes, and organizational context. The final theme was generated from observing a cluster of behaviors the high PS team's leader during the interview that, taken together, can best be described as Systems Intelligence. Systems Intelligence is an idea coined in 2002 that describes one's capacity to demonstrate, "intelligent behavior in the context of complex systems involving interaction and feedback," (Hämäläinen & Saarinen, 2007, p. 39). Systems intelligence, distinct from its near cousin, systems thinking, takes into account the subjective

dimensions of human systems and requires that one see herself as part of the system

rather than an outside observer (Hämäläinen & Saarinen, 2007). Leaders with systems

intelligence recognize and interpret the emotional 'felt' sense of the system as well as the

rational dimensions and intervene in these feedback loops to adjust behavior and shape

the system. Systems intelligence underpins the first four themes in that when leaders

embody systems intelligence, they generate behaviors and structures that foster

psychological safety.

Of the three teams that I interviewed, I was only able to meet with the managers

of the high PS team and the low PS team. The high PS manager could clearly articulate

his approach to leadership, which he based upon his understanding of the team's needs at

different stages of their development. For example, the manager explained his approach

to shaping the team's formation:

> Earlier in the team's lifecycle, the team was being formed…there were some
> difficult dynamics between certain team members, and there wasn't a lot of trust
> there. And so I listened to everyone, kind of through one-on-ones, asking 'what's
> your view, and what are the challenges?' I worked to my best to encourage them
> to talk to each other but where that wasn't working, taking what I heard and
> replaying it for someone else like, 'here's something from their perspective. Here's
> what is going on,' in a way that hopefully provided a little more empathy….Then
> over time, I noticed that those relationships didn't have to come through me and
> didn't have the same dynamic before. (Participant 12, personal communication,
> May 21, 2019)

This example demonstrates his awareness of team processes and his role in shaping them.

He articulated the need for more engagement from him to manage conflict and encourage

perspective-taking in the beginning, and as relationships among team members

strengthened over time, he became less involved in managing team relationships. This

manager continued to explain his approach toward goal-setting with individual members

as well as the collective team, emphasizing the need to align these goals with

organizational objectives. He also shared his philosophies on building trust, promoting

transparency, encouraging autonomy, and being of service to the team and organization.

It is evident that this manager understands that leadership requires attention to tasks as

well as relationships. Taken together, his conceptualizations about his approach to

leadership demonstrated significantly greater complexity, clarity, and robustness than the

manager of the low PS team.

When asked about his leadership approach, the low PS team manager shared a

more brief, general description:

> I'm pretty loose about management. Like they've all gotten here through hard
> work. They're high level employees. They're intelligent people. They shouldn't
> need a lot of handholding. They don't like to be micromanaged. So, it's a lot of
> hands off. When I need to, there's pinging, like 'Hey, where's this thing at?'
> (Participant 3, personal communication, May 22, 2019).

This manager mentioned his 'hands off' philosophy several other times throughout the

interview, suggesting that this is a dominant mental model for practicing leadership.

However, his 'hands off approach' seems to be more of a reaction to the knowledge that

people "don't like to be micromanaged" and perhaps even a result of having no other

skills that would permit other leadership approaches, rather than a thoughtful strategy to

encourage more autonomy and thoughtful decision-making. The high PS team manager

also mentioned "stepping back from the day to day work," but he provided additional

leadership functions that offered structure and guided the team. When probed further as

to whether the low PS manager tries to set direction or encourage goal-setting with the

team, he responded, "We'll obviously talk about projects or items that are being worked

on, and I try to explain to them or discuss with them at a high level where we're trying to

go," (Participant 3, personal communication, May 22, 2019). Interestingly, one of the

primary frustrations from this manager's team members was the lack of direction and

clarity they experience around project tasks beyond the day-to-day deliverables that are

expected of them. Taken together, these data suggest that the manager struggles to link

and communicate the purpose of the team's work in the overall organizational context. In

addition, it appears that the low PS manager sees leadership as primarily task

management and execution. Overall, this manager tended to speak about his leadership

approach in generalities and repeated similar ideas several times, suggesting that perhaps

he did not have as complex or as clear of an awareness of his leadership practice.

The high PS manager also demonstrated systems intelligence in his propensity to

see the team members' behavior as patterns that have causes and effects rather than as

isolated incidences, and he would intervene accordingly so that the team dynamics

produced more helpful outcomes. This could be seen in the language that the high PS

manager used to describe the team, often using the words 'pattern' or 'dynamic' to

provide examples of his team's functioning. For example, he illustrated:

> So, one pattern is they come to me and discuss solutions, and I like discussing
> solutions. But then we have some good discussion, and I send them back. I say,
> 'You go back and think about it. Come back with your recommendation [of what
> to do]. I really let them solve it and work through it. It's showing trust,
> empowering them, encouraging them to come up with solutions and not always
> step in and solve it. (Participant 12, personal communication, May 21, 2019)

The manager recognized that certain behaviors tended to repeat to form a pattern, and he

saw that this pattern occurred among multiple members of the team rather than with only

one or two members who may be more dependent on him. Upon noticing this pattern, he

intervened, instructing the team members to think through the problems on their own and

return with a recommendation. This intervention was based in his desire to develop the

team members' autonomy and problem-solving capabilities, and it prevented members

from developing unhelpful patterns related to dependence on authority. This manager provided several other examples of moments where he noticed a particular dynamic occurring and described his intervention to provide corrective action for the team. He noted that he would assess the effectiveness of his intervention to determine if it had generated the outcome that he intended; if it had not, then he said that he would experiment with a different approach.

The low PS team manager tended to see team members' behavior as isolated occurrences rather than as patterns or dynamics, indicating a lack of systems intelligence. He also struggled to answer questions asking how his team might respond in certain situations, which suggested that he had not considered their typical behavioral patterns. When asked if the team would speak up about mistakes or issues, he hesitated for several seconds and questioned, "I wonder if people would bring things up…" (Participant 3, personal communication, May 22, 2019). When probed further about how the team would respond, he concluded that, "it depends on the person," and proceeded to give examples of how each team member might respond (Participant 3, personal communication, May 22, 2019). While it is true that individual differences affect how one responds in a situation, systems theory contends that each part of a system responds when other parts of the system react and change. The fact that this manager did not conceptually see or articulate the team members' behavior as linked or responsive to one another's actions suggests that he has a lower level of systems intelligence.

In addition, when the low PS manager would intervene to attempt to redirect the team, he did not reflect on the effectiveness of the intervention and did not attempt different leadership approaches even when he realized his current approach was

ineffective. As previously mentioned, when the organization experienced layoffs, this manager sensed his team's anxiety and fear, but decided that instead of addressing the emotion directly, he would "try to kind of keep positive, like there's a light at the end of the tunnel. Like, trying to describe that like, yes it's bad news, but it's not the end of the world for us….Let's just focus on our work. You know try to put the distractions aside as best I can. Doesn't always work," (Participant 3, personal communication, May 21, 2019). In this instance, he did not acknowledge the team's underlying emotions. He finished the thought by noting that his approach is not always effective. When probed further, he disclosed that he believed the reason his approach failed was due to the fact that he did not know some of his team members well. Again, he attributed ineffective interventions to individual differences. This example also demonstrates that he lacks attention to the emotions within the system and their impacts upon the members, which is a key capability of systems intelligence (Hämäläinen & Saarinen, 2007). Finally, this manager neglected to reflect upon the repetitive failure of his intervention and adjust his behavior to be more effective in the situation. At the end of the interview, this manager noted that:

> One of my biggest challenges is trying to get out of the day-to-day and be able to pull back and direct and lead more rather than manage each individual. As much as I try not to do that and let them do their thing, it's still somewhat of a focus just from being in an operational state for twenty-two years. (Participant 3, personal communication, May 21, 2019)

This comment illustrates that the manager acknowledges his struggle to take a systems-perspective, and this is evident in the examples provided of his leadership approach.

The high PS team manager exhibited a high degree of systems intelligence in his capacity to articulate his leadership approach, recognize patterns within the

organizational system, and intervene effectively, while the low PS team manager struggled in these areas. The managers' level of systems intelligence directly impacted the leadership practices that they employed within their teams, which ultimately affected members' perceptions of psychological safety.

Summary of Findings

This mixed methods study generated several significant findings from the quantitative and qualitative data analysis. First, as expected, the survey findings indicated that team learning behavior mediated the relationship between psychological safety and team performance outcomes. Moreover, in teams with a strong climate, the relationship between psychological safety and team learning behavior was more predictable than in teams with a weak climate. In addition, teams with high psychological safety were more likely to demonstrate higher team performance. Surprisingly, in teams with a strong climate, there is no statistically significant difference in team performance between teams with high PS and low PS. However, in teams with weak climates evidence supports the conclusion that teams with high PS demonstrate higher team performance than teams with low PS. The psychological safety climate strength scores from the survey determined the three teams that were selected for interviews to answer the second research question, which sought to determine the factors that generated variances in psychological safety.

The qualitative analysis of interviews from members of the three teams yielded five core themes that affected differences in perceptions of psychological safety. Figure 6 provides a visual representation of the nested relationship among the five themes.

Leader Systems Intelligence

Leader - Member Interaction

Leader - Team Interaction

**High Stakes
Leader - Team Interaction**

Organizational Context
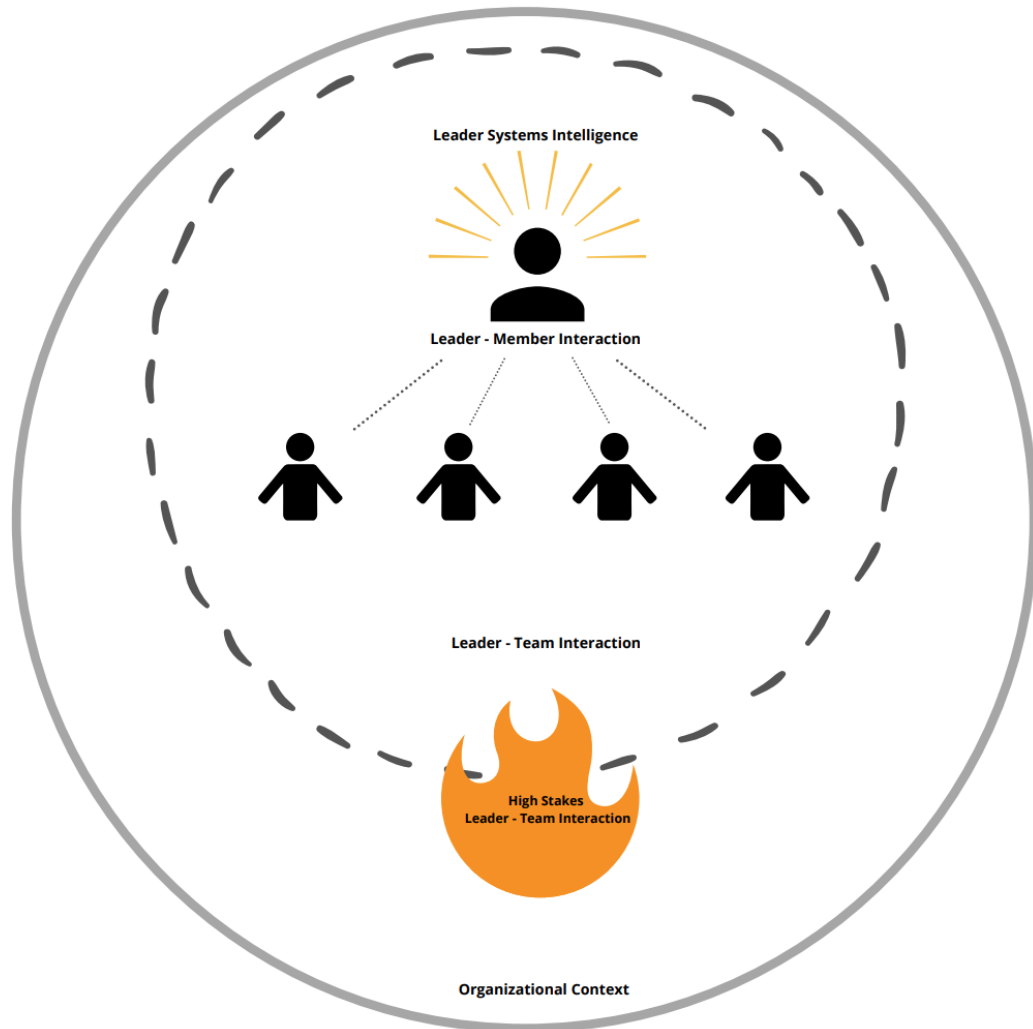
Figure 6

Model of Themes that Influence Perceptions of Psychological Safety

At the individual level, the systems intelligence of the leader formed the foundation of

the factors that affect psychological safety, for the leader with greater systems

intelligence generated more positive outcomes within the other four domains. The

leader's systems intelligence is illustrated in Figure 6 by the beams emanating from the

leaders' head at the center of the model. Next, at the dyadic level, the frequency and

quality of the leader-member interactions created a relational foundation on which the

team members began to understand their relationship with their manager. In Figure 6, the unique relationship between the leader and each team member is denoted by the dotted lines from the leader to the team members. Then, at the team level, the structure, manager's role, and nature of communication in leader-team interactions shaped members' beliefs about psychological safety in their teams. The dashed line surrounding the leader and team members represents the leader's interactions with the entire team as a unit. The dashed line is also intended to indicate that the team boundary is somewhat permeable, meaning that the team environment can be affected by external sources. The fourth domain, high stakes in leader-team interactions, also occurred at the team level. When the stakes rose in the team's environment, the interactions among the leader and team members impacted the members' perceptions of safety as well. The flame situated along the team's boundary signifies that the stakes may rise outside of the team or inside of the team, and both situations will affect the members. Finally, at the organizational level, the organizational context in which the teams were situated constituted as the final factor that impacted members' perceptions of psychological safety. This is shown by the gray circle surrounding the team, with the solid line suggesting a more rigid boundary that creates a clear separation between those inside the organization and those outside of it. The model is intentionally not constructed to suggest a linear occurrence of events in order to avoid insinuating that these factors must unfold in any chronological order. Rather, the model intends to show the nested nature and integration of these dimensions as a whole system. The next section will discuss the connections between and implications of the quantitative and qualitative findings as well as the limitations and significance of this study.

CHAPTER FIVE

DISCUSSION

Teams are the core learning units of modern organizations. If organizations hope to achieve their purposes in society, they must develop and nurture healthy, thriving teams. The purpose of this study was to understand the relationship among several key variables that are instrumental in team success: psychological safety, climate strength, team learning behavior, and team performance outcomes. Previous literature suggested that team learning behavior mediated the relationship between psychological safety and team performance (Newman et al., 2017). On the other hand, a separate stream of research indicated that a direct relationship exists between psychological safety and team performance (Baer & Frese, 2003; Schaubroek, Lam, Peng, 2011). Therefore, more research was needed to address these discrepancies in the literature.

Moreover, climate strength has recently received attention as an important moderating factor when studying climate variables, such as psychological safety. However, there is a dearth of research that investigates the impact of climate strength as a moderator on the relationship between psychological safety and team learning as well as psychological safety and team performance. In addition, this study sought to explore the factors that affected the variation in perceptions of psychological safety among teams. Research on climate strength is still in its infancy, and the literature indicated that little is known about the factors that enhance or inhibit psychological safety climate strength within a team (Koopman et al., 2016). This study aimed to address these gaps in empirical knowledge and, through a mixed-methods research design, provide a

comprehensive understanding of the dimensions that influence the success of teams. The

following questions guided this study:

1. How does PS climate strength affect the relationship between psychological

   safety, team learning, and performance?

   a. To what extent is there a direct relationship between psychological safety

      and performance?

   b. To what extent is there an indirect relationship between psychological

      safety and performance through the mediating variable of team learning?

   c. To what extent does climate strength moderate the relationship between

      psychological safety and team learning?

2. What factors influence PS climate strength in teams characterized by:

   a. A strong positive climate?

   b. A strong negative climate?

   c. A weak climate?

This chapter summarizes the findings of this study, provides interpretations and

implications of the data, and connects the findings to relevant literature. It also discusses

the study's limitations as well as directions for future research.

The Impact of Climate Strength on Psychological Safety, Team Learning Behavior,

and Team Performance

The quantitative phase of this study examined the relationship between

psychological safety, climate strength, team learning behavior and team performance.

Originally, this study intended to test the mediation of team learning through a series of

regression analyses. However, due to a small sample size, a series of Mann-Whitney tests

were used to analyze the data instead. Unfortunately, unlike regression analyses, the Mann-Whitney test cannot determine how the independent variables are numerically related to one another. This meant that the results of this study did not provide conclusions about the cause and effect relationship between the variables. However, the results did generate meaningful conclusions using the Mann-Whitney tests from which inferences could be drawn about the relationships among these variables. As expected, results from this study discovered that teams with higher psychological safety demonstrated greater team learning, and teams with greater team learning showed higher team performance. While the mediating relationship could not be tested directly, it can be inferred that team learning behavior serves a mediating role in the link between psychological safety and team performance given the statistical significance of these two tests. Such findings are in line with existing studies that indicate team learning behavior acts as a mediator between these psychological safety and team performance (Sanner & Bunderson, 2015). The line of thinking follows that when team members perceive their environment as safe, they are more likely to speak up, ask questions, and surface conflicting ideas, which are foundational actions of the team learning process (Edmondson, 1999, 2002; Kostopoulos & Bozionelos, 2011; Liang, Farh, & Farh, 2012). When team learning behavior occurs, teams acquires the necessary information and skills to coordinate and execute their tasks, and therefore, perform more effectively (e.g. Huang et al., 2008; Ortega et al., 2014).

    This study also found that in teams with strong climates, the teams with high PS demonstrated higher team learning scores than teams with low PS. In other words, the teams whose members all generally felt psychologically safe showed great team learning

behavior than teams whose members all generally felt unsafe. This finding is supported by other studies that have found that strong climates enhance the relationship between climate variables and their outcome variables such that when a positive climate is uniformly present within the team, positive outcomes are more likely to occur (e.g. Afsharian et al., 2017; Gonzalez-Roma et al., 2009).

Interestingly, the results also revealed that in teams with weak climates, high PS teams also showed higher team learning scores than teams with low PS. At first glance, the fact that a statistically significant difference was also discovered among high and low PS groups in weak climates may suggest that the effects of climate strength upon the relationship between psychological safety and team learning are negligible because both the strong and the weak climates produce the same effect. Looking closer however, there is a distinction between the strong climate teams and the weak climate teams in terms of their rank sum values. In teams with a strong climate, the high PS team had a rank sum of 57 while the low PS team had a rank sum of 9. The wide range in rank sum scores suggests that there is a greater probability that high PS teams will exhibit higher team learning scores. In teams with a weak climate, the high PS team had a rank sum of 42 and the low PS teams had a rank sum of 24. The smaller range of rank sum scores suggests that the high and low PS teams within weak climates are slightly more alike in their team learning scores, which means that predicting team learning scores in a weak climate is more challenging.

Findings from the few studies that have examined the impact of climate strength as a moderator between climate variables and outcome variables align with these results. For example, Afsharian et al. (2017) discovered that weak climates diminish the strength

of the relationship between psychosocial climate and work engagement. These findings agree with the rationale of Mischel's (1977) theory of situational strength explaining that when team members are exposed to strong situational cues, there is more certainty about appropriate behavioral responses. Therefore, members tend to behavior in more uniform ways, which makes performance more predictable. However, when team members are exposed to ambiguous environmental cues, there is less certainty in how to act, so individual differences in behavior tend to arise. Therefore, predicting whether or not team members will demonstrate learning behavior or perform well becomes more difficult.

The Factors that Influence Perceptions of Psychological Safety

The qualitative analysis of interviews from members of the three teams yielded five core themes that affected differences in perceptions of psychological safety. Existing literature supports the conclusions drawn within each of the themes. At the dyadic level, the data suggested that the frequency and quality of leader-member interactions created a relational foundation on which the team members began to understand and build their relationship with their manager. Interactions ranged from formal meetings to informal exchanges throughout the workday. Team members who interacted with their managers more frequently and perceived the interaction as helpful and positive generally felt more psychologically safe in their teams. This is consistent with a stream of literature that describes the impact of leader distance on followers, explaining that social and physical proximity allows the leader to, "deliver sensitive information and individually tailored confidence-building, which are probably more effective than messages addressed to the group as a whole," (Yagil, 1998, p. 172). Specifically, in the weak PS team, proximity to the manager provided an avenue to receive information and motivation from the manager

for some team members, yet others who did not receive this access were left feeling

relegated to the "out-group," and thus perceived their environment as less

psychologically safe. Previous studies support this finding and help explain the effect of

this dynamic on perceptions of climate. For example, Kozlowski and Doherty (1989)

discovered that workers who had high-quality relationships with their supervisor

demonstrated greater agreement regarding the organizational climate, while workers with

low-quality relationships with their supervisor showed less agreement in their

perceptions. This is an important finding to highlight because it suggests that even

interactions that occur at the dyadic level of interaction have an effect on a team-level

perception. Most importantly, in the team with high PS, the manager's intentional effort

to equalize the distance between him and the team members emphasizes the importance

of the leader's role in shaping the frequency and quality of these interactions. Indeed, the

data collected from the teams indicated that a greater frequency of high-quality meetings

with the manager led to members feeling more psychologically safe.

The interactions that occurred when the team met all together allowed members to

experience the full team dynamic. Specifically, the findings demonstrated that the

manager's role, structure of the meetings, and the nature of communication in leader-

team interactions shaped members' beliefs about psychological safety in their teams. In

the high PS team, the manager organized consistent meetings in which he explicitly

expressed the vison and the goals for the team, inviting input and questions. Moreover, he

remained present in the meetings and prompted the team members to share leadership

among themselves to run the meetings, which encouraged free-flowing interactions.

Importantly, the manager's presence held his place as the formal authority figure, which

prevented other members from consciously or unconsciously competing for his role, as may have been the case if he was repeatedly absent. It also minimized the potential of a social hierarchy forming, which would most likely have led to variations in perceptions of psychological safety (Brooks, 1994; Keltner, Van Kleef, Chen, & Kraus, 2008). Indeed, research shows that leaders who express inclusiveness and openness promote greater psychological safety in their teams, and this behavior has an equalizing effect for team members regardless of formal and informal status differences (Carmeli et al., 2010; Walumbwa & Schaubroeck, 2009 Nembhard & Edmondson, 2006).

In contrast, the data also revealed that the weak PS and low PS managers failed to provide clear structure or direction for the teams' goals and tasks in their meetings. Studies indicate that when task uncertainty is high, the elevated ambiguity can negatively impact psychological safety, which could certainly be seen in the team members in this study (Faraj & Yan, 2009). In addition, the loose structure of meetings led to interactions that contributed to social hierarchies in the teams based upon who had insider information about team projects and who had a closer relationship with the manager. The managers' desire to avoid "micromanaging" created a relatively structureless group. As a consequence, Freeman (1972) writes, "structurelessness does not prevent the formation of informal structures, only formal ones…As long as the structure of a group is informal, the rules of how decisions are made are known only to a few and power is limited to those who know the rules," (p. 152). This phenomenon—where only members who knew the informal rules and structures were perceived to have power—was observed in the weak and low PS teams. Members of the out-group in the low and weak PS teams expressed feeling powerless and confused when "only two or three people don't know about it but

the rest people know," which prevented them from participating in the large group. Without full member participation, team learning is jeopardized. This is an important finding because it illustrates the tendency of managers to conflate micromanaging behaviors with significant and necessary leadership behaviors that provide direction and build trust, and in doing so, fail to lead effectively.

When the stakes rose in the team's environment, the data showed that members and managers who could regulate their emotions, and therefore their behavior, had more productive and healthy interactions with their teammates, which led to greater psychological safety. 'High stakes' situations, such as admitting a mistake or addressing failure, often activate to one's social threat response because these instances could jeopardize social status or one's sense of belonging in the team (Lieberman & Eisenberger, 2008). When the threat response is activated, the limbic system (i.e. emotional center) of the brain jumps into overdrive while the prefrontal cortex activity (i.e. areas connected to planning, self-awareness, emotional regulation) decreases (Arnsten, 1998). When this occurs, members are more likely to lash out or avoid the interaction altogether. This reaction is especially powerful when the leader initiates interactions that activate threat responses because team members are particularly aware of leader behaviors (Tyler & Lind, 1992). Negative behavior generates a ripple effect of threat response activation among team members, which diminishes perceptions of psychological safety, especially for team members with lower social status in the team (Eisenberger et al., 2003). This ripple effect could be seen in the repeated negative interactions during high stakes situations in the low and weak PS teams, which ingrained a culture of blame towards one another. However, when issues arose in the high PS team,

members described more respectful responses, which respondents explained as minimizing the threat activation among team members. Such behavior encourages positive collaboration and productive problem-solving, according to Rock (2008).

At the organizational level of analysis, individuals interviewed for this study explained that the teams' position in the organization and the impact of recent organizational changes shaped their perceptions of psychological safety. When the layoffs occurred, even though all teams lost members, the high PS team was less emotionally affected than the weak and low PS team members. This was not surprising after the high PS members explained the benefits of their team's elite status in the organization due to the specialized function it provides. Importantly, the members believed that their team's elite status protected them from future layoffs. External threats have been shown to create a bonding effect on groups with defined boundaries (Chiocchio & Essiembre, 2009). The members' clear identification as an elite team brought them closer together, while simultaneously buffering them from future consequences, which contributed to their shared perception of high psychological safety in the team.

In addition, the layoffs across the organization affected all three teams, however the low and weak PS teams had to take on new members as a part of the restructuring while the high PS team did not. The integration of new members proved to be a challenge for the low and weak PS teams. According to team members, the managers of the low and weak PS teams placed little attention, if any at all, on assisting the new members in their transition on to the team. The fact that the new members were added as a result of the layoff further exacerbated frustration from existing team members. Had the managers

attended to the contextual and relational dynamics of the team, they could have prevented

tensions from escalating. Instead, when an existing team member harshly spoke out

against a new member joining the team while the new member was present, the manager

chose not to intervene. According to this new member, the sequence of events shattered

her psychological safety, and she is still working to rebuild it. This finding is significant

because it shows the impact of organizational context on team members' perceptions of

psychological safety, and managers must learn to consider these dynamics when fostering

psychological safety within their teams.

Finally, the data suggests that the leader's systems intelligence underpinned the

four previous themes. Systems intelligence refers to "the ability, capacity, or skill to

identify, assess, and manage the systems of one's environment and within one's self,"

(Martela & Saarinen, 2013, p. 87). Systems intelligence extends beyond cognitive ability

to understand rational systems; it engages one's ability to sense, feel, attune, and act in

order to intervene in feedback loops of the systems of the environment (Hämäläinen &

Saarinen, 2007). A greater level of systems intelligence was observed in the high PS

manager than in the low and weak PS managers as indicated by how the high PS manager

thought about the behavior of his team in terms of patterns rather than isolated behaviors

of individuals. In addition, his interventions arose in response to feedback he received

from his environment, and they demonstrated his consideration of short and long-term

consequences. These behaviors are key skills that constitute high systems intelligence

(Martela & Saarinen, 2013, p. 87). To my knowledge, this is the first study that proposes

a link between leader systems intelligence and psychological safety in teams, so it is not

possible to corroborate this finding with parallel studies. However, several streams of

research show that core components of systems intelligence—systems thinking and emotional intelligence—are correlated with enhanced outcomes for teams. For example, systems thinking has been found to enhance relational leadership capabilities in managers (Palaima & Skarauskiene, 2010). In addition, leader emotional intelligence has also been correlated with encouraging positive supportive relationships among team members (Prati et al., 2003). Taken together, it is feasible to conclude that current literature supports the proposed relationship between leader systems intelligence and psychological safety among teams.

The quantitative portion of this study illustrated how different levels of psychological safety climate strength can significantly affect team outcomes, which are known to ultimately impact organizational success. The survey analysis showed that, indeed, climate strength matters. Therefore, the qualitative portion of this study sought to understand what leads to variations in climate strength in the first place. When considered together, the findings in this study provide a broad and detailed picture of the cycle of events that impact team success. Although this study makes several important contributions to the literature, it is not without limitations. The following section will elaborate on this discussion.

Limitations

While a mixed-methods study presents strengths in its methodology, this study had several limitations. The first limitation relates to concerns with external validity of the quantitative data. This study was conducted at a large organization, but it only sampled a relatively small number of participants. In addition, the organization's project teams spanned a variety of work contexts and functions. Undoubtedly, the nature of the

teams' work and interactions varied widely, even within the organization. Due to the small sample size and variations in the nature of participants' work, the quantitative findings from this study cannot be generalized to the general population or populations in other industries or sectors.

In addition, the quantitative variables that this study measured were analyzed at the team level of analysis, which could have neglected multilevel interactions among variables. Indeed, some scholars have warned that, given the nested structure of the team unit, multiple levels of analysis must be considered when conducting organizational research to avoid incomplete or inaccurate conclusions (Edmondson & Lei, 2014). However, other researchers have argued that conducting team studies using one level of analysis still yields meaningful results as long as the results are supported and explained in the study's theoretical framework (Newman et al., 2017). This study attempted to mitigate these concerns by providing a robust theoretical framework within which to situate the variables of this study.

The low response rate among the surveyed population also posed limitations to the aggregation techniques utilized in creating team-level variables. Although the study had 94 respondents to the survey, some teams had as few as two participant responses per team even though the teams had an average of six members. Therefore, it is possible that the team-level psychological safety, team learning, and team performance scores did not accurately represent the entire team's perception of each construct. Furthermore, climate strength scores were calculated by taking the standard deviation of the psychological safety composite scores in each team. In teams with fewer respondents, fewer scores were available to use in the standard deviation calculations. Therefore, insufficient data

could have generated climate strength scores that inaccurately depicted the true distribution of psychological safety climate perceptions among members of the same team.

In addition, the survey was sent to managers so that their scores on team performance could be added to each team's performance score to generate a composite score, which is considered a best practice when measuring team performance. However, only five of the eighteen managers that responded to the survey (out of a total of 84 managers) had team members that also responded. In other words, only five teams had measures of team performance from both team members and managers. This would have been too small of a sample size for survey research. Therefore, the managers scores were not considered in the data analysis.

The qualitative phase of this study also posed several limitations. First, this study only interviewed members from three teams in the organization. Although this subset of the population provided insight into team dynamics that may be occurring in the rest of the organization, the findings cannot be generalized to larger populations, which is a common limitation to qualitative research.

Researcher subjectivity constituted as another limitation of this study. As in any qualitative study, I inevitably brought my own perceptions and interpretations to the data collection and analysis process, which could have potentially challenged my ability to remain objective (Peshkin, 1988). Wolcott (1990) suggests that researchers actively mitigate subjectivity and biases through several approaches that I employed in this study.

First, I wrote analytical memos to note any reactions, insights, or personal opinions that I had while interviewing and analyzing the data. I focused the analytical

memos on summarizing critical insights, highlighting initial interpretations of the interviews, noting further questions that arose, and emphasizing connections to existing literature. I spent five days on site conducting interviews. Before each day, I reviewed the analytical memos from the previous sessions. While I still adhered to the basic structure of the interview guide, this proved useful in adjusting my line of questioning to inquire about certain topics more effectively. For example, one of my memos noted that, "Participants seem hesitant to criticize their manager outright. What other questions would draw out their critiques but may be less direct?" After reflecting upon this insight before the next day of questions, I decided to remove the question, "What about your manager's leadership style is ineffective?" and replace it with "If you were the manager of this team, what would you do differently?" This drew out rich information from the participants about their perceptions of their managers' leadership style in a way that made them feel that they were not disparaging their manager.

I also intended to utilize member-checking as an additional strategy to address researcher subjectivity. However, the organization preferred that I did not initiate direct contact with the participants, either in scheduling interviews or following up with the participants unless they reached out to me via the email address that they received on their consent form. This was unfortunate because member-checking is an important step in giving participants a chance to clarify and confirm their thoughts while reading through their interview transcript. As a consolation, I shared with each participant at the end of the interview that they could take the initiative to email me and request to see their transcript to member-check it. Only one participant reached out to me to review his

interview transcript. I sent the transcript to him, and he returned it with no requests for changes.

Finally, my positionality as a researcher must be acknowledged as a significant factor that shaped the way in which I perceived and interpreted the data in this study. According to Banks's (2006) categorizations of positionality, I most likely held an "external outsider" position, meaning that I have never been a member of the group being studied and I continued to remain outside of the boundaries of the group throughout the duration of the study. Conducting research as an outsider had several advantages in promoting greater objectivity and emotional distance (Chavez, 2008). Because I had no previous attachments or experiences with this population, it could be argued that I brought in fewer assumptions and greater curiosity towards the participants in the interviews. The outsider status was especially helpful in assuring confidentiality with the participants. Had I been a member of the organization, a former employee, or even a long-term consultant hired by the organization, I doubt the participants would have been as open with me in the interviews given the recent challenging events that occurred within the organization. However, having an external outsider status also created some initial hurdles in understanding where the pain points were in the participants' particular context. Psychological safety relies heavily on the context of one's environment. Because I had little familiarity with the participants' environment, it is possible that I may have overlooked crucial topics that affected their daily experiences.

In addition, I also must acknowledge that my identity as a young, white, cis-gender female likely impacted the data collection and analysis process. When I received the list of interviewees, I noticed that only three out of twenty-five individuals were

women. Given the sensitive nature of the topic of psychological safety and the fact that

the majority of the participants were men, I anticipated that my position as woman would

aid me in making the participants feel comfortable enough to share more intimate

experiences, given that men tend to refrain from sharing the full range of their emotional

concerns with other men (David & Brannon, 1976). I also expected that the few female

participants might feel more comfortable opening up to me about their experiences as

women in a male-dominated field, given our shared identity as women. These two

assumptions appeared to be correct, as participants seemed to open up relatively quickly

even though our interviews only lasted a half an hour.

However, I had to constantly reflect upon the impact of my positionality as a

woman. For example, during an interview in which one female participant shared a

startling experience of gender discrimination by her manager, I could feel myself slipping

out of role as she was telling her story. I even stated out loud in the interview, "Okay, I

am going to continue to be impartial researcher because otherwise, I might lose my mind

with you." During that interview, I had to remain mindful of my line of questioning, my

body language, and my interpretation of the data to diminish the chances of my personal

reactions skewing the data analysis. By acknowledging and constantly reflecting upon my

positionality during each step of the data collection and analysis process, I attempted to

decrease researcher subjectivity issues and enhance the validity of the data.

Implications

Despite the limitations mentioned above, this study enhanced the existing body of

literature on psychological safety in several meaningful ways. First, although climate

strength research is gaining attention from organizational scholars in areas such as

innovation or support climate strength (González-Romá et al., 2009), virtually no studies existed that examine the impact of psychological safety climate strength on psychological safety and team learning and team performance outcomes. Therefore, this study provided foundational evidence to demonstrate that psychological safety climate strength impacts the relationship between psychological safety, team learning, and team performance. As a result, this study reinforces that climate strength warrants attention from researchers interested in studying psychological safety.

  In addition, some organizational scholars have criticized studies that fail to account for the level of within-team agreement regarding perceptions of psychological safety, stating that teams with lower agreement are not factored into data analysis procedures due to the cutoff requirements of the intra-class correlation coefficient (Roussin et al., 2016). By treating psychological safety strength as a moderating variable, this study captured the impact of within-team agreement on the relationship between team psychological safety and team outcomes. Therefore, this enhanced the predictive validity of psychological safety climate strength.

        Finally, few mixed methods studies on psychological safety, team learning and team performance exist, and this study harnessed the strengths of each methodology to obtain a more comprehensive understanding of these variable relationships. In addition, the qualitative phase allowed for deeper exploration of the factors that impact psychological safety climate strength, which are understudied. As a result, this study proposed a comprehensive framework with which researchers and practitioners alike can use as a model to understand and assess the factors that could lead to variations in perceptions of psychological safety among team members. The model intends to clarify

and emphasize the multi-level nature and interconnectedness of dimensions that influence psychological safety. This framework is the first of its kind to attempt to capture the complex, dynamic, multi-level processes and contextual factors at play. Undoubtedly, the findings from this research generated new avenues for research, which will be explored in the following section.

Future Research

During the execution of this research, additional questions surfaced regarding the relationships among the variables in this study that warrant further exploration. First, the small sample size of this study prevented the use of regression analysis to investigate the meditating and moderating effects of team learning behavior and climate strength, respectively. In the event that a larger sample size of teams could be attained, future research should test this study's model using regression analysis so that the numerical relationships between the variables can be attained. This would provide a more precise understanding the moderating effects of climate strength as well as increase the confidence in the conclusions made about the mediating role of team learning behavior. In addition, the qualitative data highlighted the multi-level influences on teams' psychological safety. Despite researchers' acknowledgment of this fact, few studies explore multi-level models. This could enhance understanding of the relationship among psychological safety and other variables at various levels of the organizational system. Finally, this study was the first to propose that the systems intelligence of the leader impacts his ability to foster psychological safety in a team. This claim needs further exploration. Specifically, quantitative methods could shed light on the statistical validity of this relationship. If the relationship between leader systems intelligence and team

psychological safety was statistically supported, it could make a case for leadership

development programs and executive coaches to focus on this key dimension when

strategizing about their approach to developing effective leaders.

Conclusion

This study reinforced the complex and dynamic nature of team functioning.

Specifically, these findings demonstrated that higher levels of team psychological safety

generate increased team learning behavior, which leads to greater team performance. In

addition, climate strength was found to be a significant boundary condition of the

relationship between psychological safety and team learning. When teams had strong

climates, it was more likely that they exhibit higher learning behavior. When teams had

weak climates, team learning behavior became less predictable, which impedes

organizations' ability to project team and organizational outcomes. Taken together, these

results indicate that psychological safety climate strength in teams matters. For this

reason, the second phase of this study took a deeper look at the factors that affected

variations in team members perceptions of psychological safety. Ultimately, the findings

led to the development of a model that illustrates the impact of five dimensions of

influence on psychological safety: leader-member interactions, leader-team interactions,

high stakes situations, organizational context, and the systems intelligence of the leader.

As the demands upon organizations become more challenging and multifaceted,

the necessity for effective teams will only increase. As a result, it is critical that

organizations invest in developing leaders that understand the complexities of leading

teams. The importance of effective team leadership is not only about achieving higher

levels of productivity or greater success for organizations. While these outcomes may

capture the initial interest of organizations to justify investing in team development, the most significant outcome of effective team leadership lies in its impact upon those who experience it. When teams create environments in which people believe that they can show up with authenticity regardless of mistakes or failures and know that they have the inherent respect of their colleagues, individuals gain the ability to access the best within themselves and experience a deeper sense of connection and belonging—one of the most fundamental human needs. Ultimately, psychological safety has profound impacts on teams' ability to learn and accomplish their goals. Thus, scholars and practitioners engage in a worthy pursuit as they continue to study and cultivate teams that thrive.

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APPENDIX A

Email to Participants

Good morning/afternoon colleagues,

The [Organization] IT department is partnering with <u>Taylor Harrell,</u> a doctoral candidate from the Department of Leadership Studies at the University of San Diego, to conduct research on our team dynamics and performance.

Your participation will help us understand the working environment and effectiveness of our teams better. It will also assist Taylor with the completion of her dissertation.

In order to gain the benefits of this research, **<u>we ask that you please participate in a brief survey that will take no longer than 10 minutes to complete.</u>** Click the link below to go to the survey website. You will receive additional information and directions there.

[Survey link]

All of your responses will be kept confidential. No personally identifiable information will be associated with your responses to any reports of these data. Your participation in this survey is voluntary. The USD Institutional Review Board has approved this survey. Should you have any comments or questions, please feel free to contact Taylor at taylorharrell@sandiego.edu.

Thank you very much for your time and cooperation.

Sincerely,

HR Executive

APPENDIX B

Survey Instrument

Task Interdependence (1=Strongly disagree, 5=Strongly agree)

Morgeson , F. P. Humphrey , S. E. (2006). The Work Design Questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of Applied Psychology*, 91, 1321-1339.

1. My job cannot be done unless others do their work.
2. Other jobs depend directly on my job.
3. My job depends on the work of many different people for its completion.
4. My job activities are greatly affected by the work of other people.
5. Unless my job gets done, other jobs cannot be completed.

Psychological Safety and Team Learning Scale (1=Strongly disagree, 5=Strongly agree)

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. Administrative Science Quarterly, 44, 350-383.
The 'R' notation indicates that the item is reverse scored.

6. When someone makes a mistake in this team, it is often held against him or her (R).
7. In this team, it is easy to discuss difficult issues and problems.
8. It is completely safe to take a risk on this team.
9. It is difficult to ask other members of this team for help (R).
10. In this team, it is safe to express opinion and make suggestions for improvement even when others disagree
11. Members of this team respect each others' contributions.
12. Problems and errors in this team are always communicated to the appropriate people (whether team members or others) so that action can be taken.
13. We often take time to figure out ways to improve our team's work processes.
14. In this team, people talk about mistakes and ways to prevent and learn from them.
15. This team tends to handle conflicts and differences of opinion privately or off-line, rather than addressing them directly as a group (R).
16. This team frequently obtains new information that leads us to make important changes in our plans or work processes.
17. Members of this team often raise concerns they have about team plans or decisions.
18. This team constantly encounters unexpected hurdles and gets stuck (R).
19. In our team, we try to discover assumptions or basic beliefs about issues under discussion.
20. People in this team frequently coordinate with other teams to meet organization objectives.
21. People in this team adjust to satisfy customer needs.

22. This team is not very good at keeping everyone informed as to what the team is planning and accomplishing. (R)
23. This team goes out and gets all the information it possibly can from a lot of different sources.
24. We don't communicate information about our team's work to others outside the team. (R)
25. We invite people from outside the team to present information or have discussions with us.
26. Members of this team help others understand their special areas of expertise.
27. Working with this team, I have gained a significant understanding of other areas of expertise.
28. The outcomes or products of our work include new processes or procedures.

Leader Openness Scale (1=Strongly disagree, 5=Strongly agree)
Ashford, S. J., Rothbard, N. P., Piderit, S. K., & Dutton, J. E. (1998). Out on a limb: The role of
    context and impression management in selling gender-equity issues. *Administrative Science Quarterly*, 23-57.
29. My direct manager is open to ideas and opinions even if he/she disagrees.
30. My direct manager welcomes team members to report mistakes without harshly criticizing the reporter.

Team Performance – Subjective Measure
Jehn, K. A., Northcraft, G. B., & Neale, M. A. (1999). Why differences make a difference: A field study of diversity, conflict and performance in workgroups. *Administrative science quarterly*, *44*(4), 741-763.
31. My teams' performance meets organizational standards.
32. My team produces a high quality of work.
33. My team accomplishes its goals consistently.

Control Variables
34. How many people, including your direct supervisor, are on your current work team?
35. Please select your direct supervisor. (Dropdown list of all team supervisors).
36. About how many months has your current team been intact?
37. About how many months have you been an employee of Qualcomm?
38. What is your age?
39. What is your gender?
40. What is your race/ethnicity? (Dropdown of EEO race/ethnicity)
    a. Hispanic or Latino
    b. White (not Hispanic or Latino)
    c. Black or African American (Not Hispanic or Latino)
    d. Native Hawaiian or Pacific Islander (Not Hispanic or Latino)
    e. Asian

APPENDIX C

Qualitative Interview Guide

1. Could you please tell me a little bit about how your team came together?
2. How would you describe your team's working process up to this point?
3. What are the relationships like among the team members? Team members and manager? How have they either changed or stayed the same? Please describe them in detail.
4. How do the team relationships impact the overall climate of the group working sessions?
5. How would you describe your role in this group? Please elaborate.
6. How would you describe others' roles in the group? Please elaborate.
7. Has your group encountered any disagreements, mistakes, or misunderstandings since we've spoken, whether they have been made implicit or explicit? If so, how were they handled?
8. (If answered yes to Question #7) How did this event impact the team environment? How did this event impact group behavior?
9. Did your group do anything to address this event? If so, how was it received?
10. To what extent do you feel safe to take risks in the group such as bringing up concerns, speaking up, and making mistakes?
11. How would you say your team has been performing? What enhances or hinders your team performance?

IRB #: IRB-2019-309
Title: Do we all agree?: A mixed-methods study of the impact of climate strength on psychological safety, team learning, and performance in work teams
Creation Date: 2-28-2019
End Date: 3-24-2020
Status: Approved
Principal Investigator: Taylor Harrell
Review Board: USD IRB
Sponsor:

Study History

Submission Type	Initial	Review Type	Expedited	Decision	Approved

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