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Developing Psychological Safety in Technical Teams

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Pepperdine University
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DEVELOPING PSYCHOLOGICAL SAFETY IN TECHNICAL TEAMS

A dissertation submitted in partial fulfilment
of the requirements for the degree of
DOCTOR OF BUSINESS ADMINISTRATION

by

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DEDICATION

This dissertation is dedicated to my mom, Miriam Giordano Clayton, and my dad, Russell John Clayton, who continue to guide me from heaven. I am grateful that God gave me to you. May you see your only child, the product of your genuine love, worthy of your countless sacrifices.

This dissertation is also dedicated to my husband, Junji Harry Nakashima, who has supported me in my lifetime objectives through four decades of marriage. Thank you for providing me with unconditional love and an exhaustive amount of understanding. To my only child, my daughter, Danielle Lauren Tamaki Nakashima Bates, and son-in-law, Liam Michael William Bates, thank you for your endless encouragement and inspiration.

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God has carried me through this three-year journey with His countless blessings and I am extremely humbled and grateful.

VITA

Susan Ellen Clayton Nakashima was born in New Jersey and spent her formative years there before her family moved to the "land of opportunity", California. As the only child of two Navy veterans, she excelled in academics and business and has over 25 years of IT senior/executive leadership experience in Fortune 500 companies. Susan has directed business development and implementation of business and technical strategies that addressed corporate and customer initiatives ensuring enterprise-wide compatibility. Her career includes being accountable for delivering complex global projects and integration activities for business relationship management, business process management and optimization, business resiliency and disaster recovery, risk and compliance management, project management, organizational readiness, technical operations, and infrastructure and network services.

Susan has multiple certifications in Information Technology Infrastructure Library (ITIL), Certified in the Governance of Enterprise IT (CGEIT)/Information Systems Audit and Control Association (ISACA), Black Belt in Lean Six Sigma, and trained with experience in Incident Command System (ICS) for emergency response. She is an active participant in numerous corporate committees and was a committee member on an academic executive board of directors, twice elected Chairperson for UCLA IS Associates/Innovate@UCLA. Susan published an Op-Ed article in April 2022 with Dr. Kevin Groves of Pepperdine University titled "Psychological Safety Training: Winning the minds and hearts of employees" in HR.com.

Susan has two degrees from the University of Redlands: a Bachelor's of Science degree in Business Administration (GPA 3.8) and a Master's degree in Business Administration (GPA 3.9) with Leadership Society Honors. She also has a Doctorate in Business Administration from Pepperdine University (GPA 3.9).

ABSTRACT

Being promoted from an individual contributor to a supervisor brings new challenges and opportunities. One challenge new supervisors face is creating and fostering a psychologically safe environment to encourage teams' interpersonal risk taking. This research introduces the antecedent of first level technical leaders perceived transformational leadership training on team members psychological safety. A study of 92 technical teams (400 participants across nine companies, three industries, and four US regions) measured the impact of four hypotheses related to psychological safety. A positive relationship between leaders training and team psychological safety was discovered. The highly correlated variables, training and emotional intelligence, led to a recommendation for more research into four transformational leadership training elements and four emotional intelligence elements. A strong positive relationship between team psychological safety and team learning behavior was revealed. A strong negative relationship was realized between team psychological safety and team knowledge hiding. Qualitative remarks are included from 42 survey participants and 14 interviews. A call to action for organizations to shape their first level technical leaders' training as training and behaviors will need to evolve to effectively address the changing needs of organizations, inspiring better leadership and consequently promoting improved psychologically safe working environments and resulting outcomes.

Keywords: transformational leadership training, leader emotional intelligence, team psychological safety, team learning behavior, team knowledge hiding

CHAPTER 1: INTRODUCTION

Overview

Imagine being on a team where you do not feel like you could speak up to share your ideas, challenge the status quo, or ask for help in your working environment. Worse yet, envision being humiliated or even punished for speaking up when you see a problem that you believe should be addressed and resolved. If this sounds familiar, then maybe it is not hard to imagine after all. Leaders create and foster a wide range of working environments for their employees. The concept of psychological safety is widely recognized as a contributing factor to positive and productive working environments. Employees feeling psychologically safe will voice opinions, thoughts, and ideas contributing to solving problems.

Schein and Bennis (1965) initiated research into the psychological safety phenomenon when they spotlighted the need for people to feel safe and capable of adjusting their behaviors in a changing workplace. Afterward, there was a nominal amount of research in this field until the 1990s. Since then, numerous books and articles have been written with motivated intent to grasp the antecedents and outcomes of psychological safety in the workplace and explore its effects on individuals, teams, and organizations.

Kahn (1990) concluded that there is a belief that all peoples' intentions are honest when there are trust and respect within the team. Kahn (1990) conducted two qualitative exploratory studies that provided valuable insight into three psychological conditions: meaningfulness, safety, and availability.

Edmondson (1999), who developed the concept of psychological safety, stated that it is a shared belief for interpersonal risk taking. Edmondson (2002) shared that when individual contributors are selected to be team leaders on the basis of their technical competency, they may

not have the interpersonal skills needed to foster open dialogues. In turn, they establish environments where employees are unwilling to express their ideas or concerns.

An enabler, the perceived impact of leadership training on team members' psychological safety, is currently a gap in the literature. We have not thoroughly researched the impact of leadership training concepts and the moderating effects of leaders' emotional intelligence (e.g., the competence to observe accurately, assess, and voice emotion, team psychological safety, and the following effects on employees' behaviors, especially in technical teams). Thus, my intention is to provide actionable team psychological safety research to shape first level technical leadership programs.

Problem Addressed

Without the appropriate leadership training, many individual contributors who are promoted into supervisory positions, first level leaders, remain focused on their technical roles. As individual contributors, their goal was to emphasize their technical capabilities, attracting the attention of their leaders and meeting or exceeding the performance standards that were established. As first level leaders, their goal is to assist their employees emphasize their technical capabilities and take responsibility for their employees errors and oversights. Previously, as individual contributors, they depended on their leader to schedule their work activities and pave the way for their success, and now they are required to solve problems directly with colleagues and provide developmental opportunities. The enormity of this change is not immediately evident to new leaders (Benjamin & O'Reilly, 2011). Their goal as leaders should be to establish a clear vision, communicate the vision, and foster an environment for their teams to feel safe to explore new ways of doing things.

Edmondson (1999, 2002) has conveyed my reality as I have seen and continue to see many first level technical leaders struggle with the human side of their leadership role. Currently, I am mentoring seven first level technical leaders, considered to be high potential employees, and I have mentored many more throughout my career. This experience led me to my topic of "Developing Psychological Safety in Technical Teams."

A 2021 Deloitte Global Human Capital Trends report states that competent leadership will become even more critical in organizational teams. Sixty percent of the executives in the survey shared that leadership was imperative to prepare for what is ahead by coaching and promoting employees' abilities to learn and change with the organization. Team leaders are best positioned to identify their team members' potential and how their abilities could be harnessed.

The average age of an individual promoted to a supervisory position is 27 years old, and the average age of an individual in a company leadership development program is 46 years old (Zenger & Folkman, 2020). That is an average of 19 years that a supervisor is leading without formal training. Starting the development process of supervisors early in their careers is imperative. McCall (2004) states that the majority of organizations begin the development process at high-ranking levels, but advocates that to be effective, leadership development must commence much sooner. Though many researchers have noted that experience, instead of formal training, may be the best method to develop leaders, instructive training that provides relevant developmental experiences can improve leadership abilities by encouraging employees to think analytically about a specific set of circumstances, coaching them to analyze inherent origins and outcomes of problems, and empowering them to foster new approaches of working with others (DeRue & Wellman, 2009).

Gentry et al. (2014) stated that 60% of first level leaders say they have never received any training for their new role and, without training, supervisors frequently adopt an authoritative, top-down leadership style. Directly supervising 80% of the workforce, first level leaders are essential to three core components of organizations: executing the strategies of executive management, maintaining employee engagement, and retaining talent (Tynan, 2020). Conversely, these first level leaders are not receiving the investment, attention, and development required to achieve those goals.

Research Question(s)

To inform this research, three questions were developed to address the perceived impact of leadership training on team members' psychological safety, leaders' emotional intelligence amplifying the relationship between the perceived impact of leadership training and team members' psychological safety, and team members' psychological safety influence on team behaviors:

- What is the perceived impact of formal (instructor-led or web-based) and informal (books, casual advisor) leadership training on team members' psychological safety in technical teams?
- Does team leaders' emotional intelligence moderate the relationship between the perceived impact of formal and informal leadership training and team members' psychological safety?
- Does team members' psychological safety influence team behaviors?

This research aims to bridge a gap in the literature by discovering to what extent training is perceived to be beneficial to first level leaders to create team psychological safety in technical teams. The objectives are twofold. First, to provide an academic contribution to the research on

team psychological safety, exploring perceived training as an antecedent to team psychological safety. Second, to contribute to technical practitioners by providing relevant, pragmatic, and applicable research. This research includes important evidence for companies to prepare technical leaders for their critical role and, in turn, the development of leaders to manage better, evidence-based management.

This study provides evidence of team psychological safety outcomes (i.e., team learning and team knowledge hiding) in technical teams, expanding the body of academic literature. The evidence provides important findings to illuminate the significance of team members to feel secure, thereby improving business outcomes and the broader society for the ultimate purpose of creating a better world.

With technology being essential for business growth and IT leaders spearheading significant initiatives, today's technology leaders need to establish a safe atmosphere for change to be embraced, innovation to be achieved, and challenging people, process, and technology issues to be effectively and efficiently solved.

To provide direction on how leaders can create a better working environment, research was conducted to obtain and analyze data addressing the key variables associated with the research questions (i.e., team leaders' transformational leadership concepts, team leaders' emotional intelligence, team members' psychological safety, team members' promotion behavior (team learning), and team members' prevention behavior (team knowledge hiding)).

First level technical leaders were surveyed to determine the extent of their transformational leadership training (i.e., training that addresses individualized consideration, inspirational motivation, idealized influence, and intellectual stimulation) (Bass & Avolio, 1990). Additionally, first level technical leaders were asked questions related to their emotional

intelligence through four dimensions: appraisal and expression of emotion in the self (self-emotional appraisal [SEA]), appraisal and recognition of emotion in others (others' emotional appraisal [OEA]), regulation of emotion in the self (regulation of emotion [ROE]), and use of emotion to facilitate performance (use of emotion [UOE]) (Salovey & Mayer, 1990).

Subordinates of first level technical leaders were requested to complete survey questions regarding their perception of their team leader's training and emotional intelligence, their team's psychological safety, learning behavior, and knowledge hiding behavior.

The results of the research can be shared with the relevant management and employees of the surveyed companies for their awareness and consideration for action, should they request it.

Significance of the Proposed Research

Psychological safety studies have spotlighted the necessity for employees to feel safe in their working conditions so that they may mature, learn, and effectively perform in a fast-moving world (Edmondson & Lei, 2014). Understanding that organizations rely on their employees' contributions to survive and optimally flourish, it is significant to note that team leaders have the greatest effect on a team's psychological safety according to DeSmet et al. (2021).

This research focuses on the perceived impact of team leaders' transformational leadership training and emotional intelligence on team psychological safety and the outcome of team learning and team knowledge hiding. This research will increase the body of knowledge in the team psychological safety area for scholars to review and contemplate extending. For practitioners, the results of this study will provide evidence for their consideration to create, modify, and implement training for their first level technical leaders.

While executives are establishing goals to meet their strategic vision, their teams of subject matter experts are expected to meet those goals and significantly contribute to their

companies success. Great leaders understand the significance of setting expectations and discussing future endeavors to create a feeling of safety for their staff members (Rock, 2010). Team leaders must establish an environment conducive to employees openly communicating their ideas in an enjoyable working environment. This situation is especially true in technical teams where exploring innovative ideas to propel their organizations to reach new pinnacles of success is essential. A psychologically safe environment may provide a safety net to act with creative intent, given the journey may be precarious (Kark & Carmeli, 2009).

In summary, this introduction provided background on the initial research into the phenomenon of psychological safety and the expansion of the research over the last several decades. Individual contributors promoted to supervisors, specifically first level technical leaders, face the challenge of creating and maintaining team psychological safety in their working environments without transformational leadership training.

CHAPTER 2: LITERATURE REVIEW

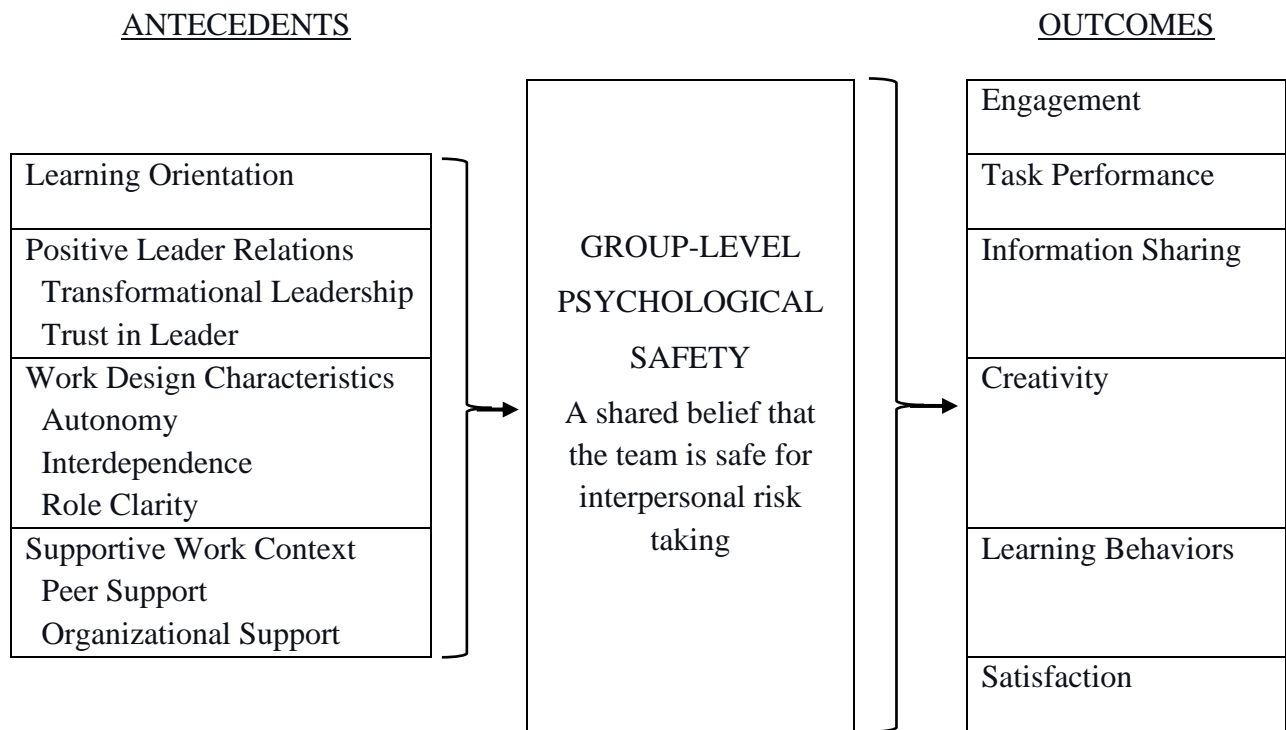
The method used for identifying theoretical and empirical papers for this review of group-level psychological safety included keyword searches in databases (e.g., EBSCO, JSTOR, ProQuest) and in leading management peer-reviewed research journals. A keyword search was used to recognize applicable books and articles and included such phrases as psychological safety, team psychological safety, team climate, employee voice, team learning, leader humility, team creativity, engagement, learning behaviors, employee participation, shared fear, and risk taking. Key terms that were excluded were occupational health, occupational safety, and workplace illnesses. There is a total of 86 references included in this literature review with 8% of the research focused on research fundamentals, 31% on leadership, 18% on emotional intelligence, 25% on psychological safety, and 18% on outcome behaviors. In support of the research questions, literature was reviewed in leadership training, transformational leadership, emotional intelligence, psychological safety, and outcome behaviors (e.g., learning behaviors and knowledge hiding behaviors).

Several meta-analyses were used to provide the central ideas in the disciplines of leadership development training: Lacerenza et al. (2017) covered the period of 1951-2014 and Collins and Holton (2004) covered 1982 - 2001; transformational leadership: Hoch et al. (2018) included research through 2015; emotional intelligence: Harms and Credé (2010) included studies through 2009 and Mills (2009) included 48 studies; psychological safety: Frazier et al. (2017) included 136 independent samples with over 22,000 individuals and close to 5,000 groups; and team learning: Koeslag-Kreunen et al. (2018) assimilated 43 empirical studies. A meta-analysis focused on knowledge hiding could not be located.

The psychological safety literature is viewed through three lenses: individual, group-level, and organizational. Edmondson and Lei (2014) state that psychological safety is a “phenomenon that lives at the group level” (p. 37) and Frazier et al. (2017) assert that psychological safety would advance with more group-level research. As an overview of the group-level psychological safety literature, Figure 1 presents four antecedents and six outcomes.

Figure 1

Meta-Analysis of Antecedents & Outcomes / Group-Level Psychological Safety



Note. This is based on the findings from Frazier et al. (2017).

Four antecedents to psychological safety are recognized by Kahn (1990): interpersonal relationships, group dynamics, leadership, and organizational norms, acknowledging the possible effects of individual differences. Edmondson and Mogelof (2006) shared some personality traits linked to learning, risk taking, and self-expression that have been hypothesized to impact psychological safety stating, “being open to new ideas and different ways of doing things may

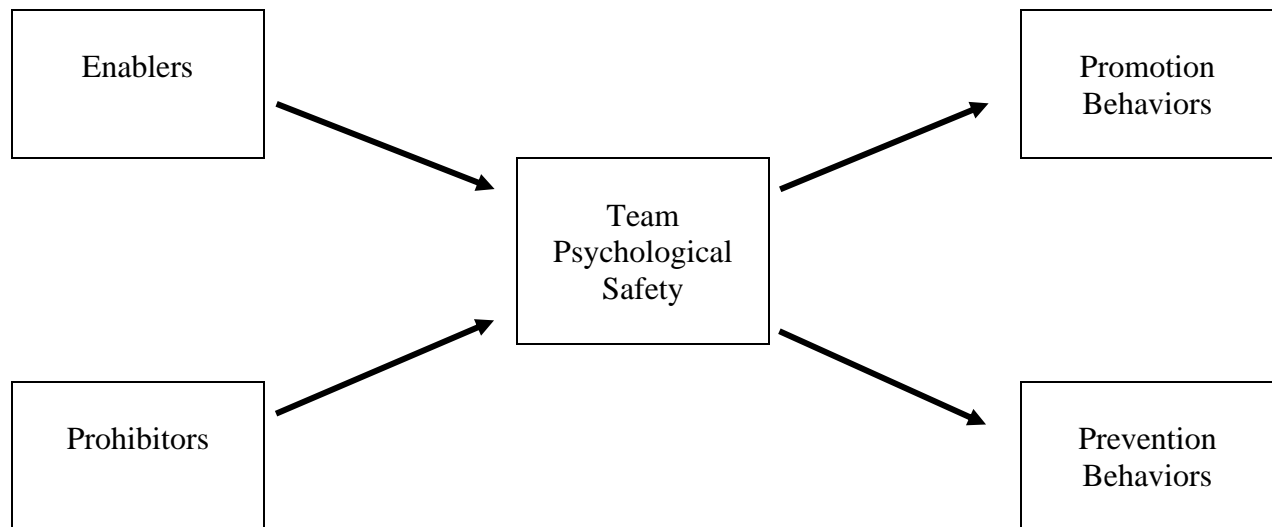
increase the likelihood that individuals would feel safe taking risks and exposing their vulnerabilities in a work environment” (p. 118).

Positive relationships with leaders are acknowledged by Kahn (1990) and Edmondson (1999) as having a fundamental effect on views of psychological safety. Rapports with leaders provide a communication channel for critical information to be shared with employees regarding agility, competency, consistency, support, and trust (Kahn, 1990). Edmondson et al. (2004) state that social relations between leaders and employees significantly impact the established expectations of appropriate behavior. Frazier et al. (2017) cite that many leadership theories have been researched as antecedents to psychological safety, including transformational leadership, (e.g., Detert & Burris, 2007).

By reviewing the cumulative research, an opportunity to categorize the antecedents and outcomes into an organized model was realized (Figure 2). Capturing the antecedents in two distinct categories provides a clearer view of positive (enablers) and negative (prohibitors) precursors to psychological safety and a consistent lens to the possible positive (promotion) and negative (prevention) behavioral results.

Figure 2

Model Organizing Team Psychological Safety Research Literature



Note. Promotion behaviors and prevention behaviors based on Higgins (1997).

There can be both enablers and prohibitors as antecedents that can affect team psychological safety. Enablers may include, but are not limited to, role clarity, peer support, interdependence, learning orientation, strategic vision, coaching, transparency, leader humility, and positive relationships with followers. Prohibitors may include, but are not limited to, conflict, shared fear, workplace incivility, and leader aggression. As an outcome of team psychological safety, some behaviors could be promoted and some behaviors could be prevented. Behaviors to be promoted may include learning, engagement, and task performance, among others. Behaviors to be prevented may consist of knowledge hiding and rudeness, among others.

In summary, the opportunity to expand the research in psychological safety at the group-level of analysis was leveraged in two areas: perceived leadership training as an antecedent and technology team as the context. The contributions of perceived leadership training, the moderating effects of emotional intelligence, and the cognitive behaviors of both team learning and team knowledge hiding were considered.

Leadership Training

It has been widely stated in the research that leadership matters in providing and sustaining psychologically safe environments. Evidence from research purports that both social and emotional competencies are associated with leader effectiveness and could be further developed and strengthened through training (Riggio & Reichard, 2008). There is an extensive leadership shortfall (Lacerenza et al., 2017; Leslie, 2009). Organizations are "...not developing enough leaders" and "...not equipping the leaders they are building with the critical capabilities and skills they need to succeed" (Schwartz et al., 2014, p. 26). Thus, the usefulness and effectiveness of existing leadership development programs are challenged.

Lacerenza et al. (2017) advocate that leadership training is considerably more effective than previously supported, acting as a catalyst to improvements in perceptions of efficacy, learning, and organizational and subordinate results. According to Collins and Holton (2004), data suggests that practitioners can achieve considerable improvements in both comprehension and competencies if initial adequate analysis is completed ensuring the appropriate development is presented to the applicable leaders. Leadership development is the least investigated area within the field of leadership research and theory. Hickman and Akdere (2018) did not uncover any leadership training research in the IT organizational context. I believe both researchers and practitioners would benefit from an increased understanding of leadership development in IT; therefore, this research investigated the perceived effects of transformational leadership training on team psychological safety and the resulting behaviors.

Liu et al. (2017) state that organizations should assist managers to develop better interpersonal skills and more positive attitudes toward work by investing in training programs. Additionally, it is suggested that managers exercise transformational leadership, as it has been

advocated to promote employees' positive affect (Bono et al., 2007) and voice (Detert & Burris, 2007). The quality of being open to new ideas and opinions is the explicit leadership behavior that has the greatest impact on employee voice (Detert & Burris, 2007).

Several leadership constructs were examined and transformational leadership was determined to be the most effective, slightly exceeding inclusive leadership (Frazier et al., 2017). Specific leadership styles (e.g., transformational leadership) have more impact than other leadership styles, resulting in increased development of employees' emotions and behaviors (Bass & Stogdill, 1990). Transformational leadership was introduced by Burns (1978) defining the idyllic condition between political leaders and their supporters. Burns (1978) postulated transformational leadership as a continuing process where "leaders and followers raise one another to higher levels of morality and motivation beyond self-interest to serve collective interests" (p. 20). Bass (1985) broadened Burns' (1978) political perception of transformational leadership by relating it to organizational contexts. Bass (1985) described the transformational leadership process as a leader's proficiency "to achieve follower performance beyond ordinary limits" (p. 13). Meta-analyses and leading research on transformational leadership have constantly proven high universal validity for transformational leadership (Hoch et al., 2018; Judge & Piccolo, 2004).

Transformational leaders must enable advanced diverse thinking, implement optimal innovative ideas, and foster a progressive, transparent, and trusting organizational culture to help organizations innovate successfully (Christensen et al., 2015). Leaders need to encourage and embrace a strategic thinkers environment, providing senior leadership with insight for decision making. Efficacious leadership can have a significant impact on employees and organizations, providing an emotionally safe environment (Kerr et al., 2006).

There are numerous leadership theories (e.g., authentic, charismatic, inclusive, servant, transactional, transformational). With the rapid change in organizations, transformational leadership is deemed to be more relevant than transactional leadership and is needed to survive the fluctuating expectations of internal and external stakeholders (Trivedy, 2018). Empirical research provides evidence that leaders practicing transformational leadership in a technical environment are more successful than those participating through transactional leadership as leaders acted as managerial facilitators, offered intellectual stimulation, were charismatic, and utilized conditional incentives (Thite, 2000).

Emotional Intelligence

Emotional intelligence, coined Emotional Quotient (EQ), was brought to the forefront as an alternative to the conventional gauge of Intelligence Quotient (IQ) by Salovey and Mayer (1990) who defined emotional intelligence as a set of interrelated skills concerning “the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth” (p. 10). They conceptualized emotional intelligence as comprised of four distinct behavioral dimensions: recognition of emotion in others (others’ emotional appraisal [OEA]), appraisal and regulation of emotion in the self (regulation of emotion [ROE]), appraisal and expression of emotion in the self (self-emotional appraisal [SEA]), and use of emotion to facilitate performance (use of emotion [UOE]). Leveraging Salovey and Mayer’s (1990) four element factors, which were applied to surveys for leader-subordinate dyads, Wong and Law (2002) developed a 16-item scale, the Wong and Law Emotional Intelligence Scale (WLEIS).

Goleman (1995) expanded Salovey and Mayer's (1990) four-branch system to incorporate five essential elements of emotional intelligence: emotional self-awareness, self-regulation, motivation, empathy, and social skills. Both researchers and practitioners have come to appreciate the significance of emotions in working environments. Still, because innate emotions can positively or negatively affect performance, leaders must become skilled on how to influence group members' emotional responses (Humphrey et al., 2008). As companies acknowledge the vital role of training, there is increased recognition that effective leaders need a blend of technical, conceptual, and human skills (Goleman, 1995).

In competitive workplaces, the culture and emotional intelligence of leaders is a significant element for psychological safety. Leaders with elevated levels of emotional intelligence can efficiently resolve problems with employees (Adiguzel & Kuloglu, 2019). Increased focus should be directed to the development of IT employees' emotional intelligence (Rezvani & Khosravi, 2019) as it seems to be an essential element of social environments, creating a feeling of trust and cooperation with project teams, specifically in working environments that invoke tremendous stress (e.g., significant IT projects). Emotional intelligence related to IT professionals needs attention as emotional strength and communication skills within technology professions is scarce in the literature (Hendon et al., 2017). Soft skills, as a foundation to emotional intelligence, have been valued at senior and executive management levels, but as IT has become a critical part of organizations, it is important for IT employees to demonstrate soft skills as they collaborate with their colleagues, clients, and management.

George (2000) suggests that emotional intelligence contributes to effective leadership as leaders need to anticipate how employees will react to different circumstances and effectively manage their responses. Additionally, an individual's level of emotional intelligence can

significantly affect their ability to lead teams successfully, and an absence of emotional intelligence can considerably impede a leader's ability to acknowledge others for their contributions (George, 2000).

Several studies discuss the relationship between emotional intelligence and transformational leadership. Emotional intelligence was found to be positively related to the various aspects of transformational leadership; however, assertions of emotional intelligence being the locus of transformational leadership were overstated, according to Harms and Credé (2010). In their meta-analysis, they state that emotional intelligence was positively related to the several dimensions of transformational leadership, and that emotional intelligence does demonstrate that it may be a factor to successful leadership at some level. Mills (2009) suggests that emotional intelligence is an element of transformational leadership that should be assessed and developed. Mills (2009) concluded that there is a reasonably strong relationship between emotional intelligence and effective leadership implying that it may be necessary to consider emotional intelligence as an element of leadership effectiveness. Developing abilities related to emotional intelligence and applying a leadership style reflective of emotional intelligence may support greater levels of effectiveness.

Team Psychological Safety

A result of psychological safety that has received substantial consideration is that of work engagement. Kahn (1990) states that psychological safety is a requirement for work engagement, defined as “the harnessing of organization members’ selves to their work roles; in engagement, people employ and express themselves physically, cognitively, and emotionally during role performances” (p. 694). Succeeding research has leveraged Kahn’s (1990) efforts to model

engagement as a motivational state that surfaces when there is a feeling of safety to engage in work without being fearful of negative outcomes (Edmondson & Lei, 2014).

Managers can enhance their relationships and engage their employees by promoting team-related activities. Theoretically, employees who have an elevated level of psychological capital (i.e., positive psychological state of development) receive things optimistically in their organizations even if things do not occur in alignment with their expectations. Optimism keeps employees loyal to their teams and organizations. Gupta and Shaheen (2017) support the premise that though work engagement has a negative relationship with turnover intention, psychological capital strengthens the relationship.

Several studies have validated that psychological safety has a direct effect on task performance. Psychological safety curtails the potential negative consequences of making mistakes or taking initiative (Edmondson, 1999), permitting teams to concentrate on the assignments that lead to increased performance and learning (Faraj & Yan, 2009). As an example, consider Google's pursuit to form the perfect team in 2015 (Duhigg, 2016). Google researchers donned the enormous task of assessing the factors common to high-performing teams by reviewing academic studies that were performed over 50 years. Grounded on that research, they examined Google's group composition aspects (e.g., socializing outside of the office, skills, hobbies, educational backgrounds, personality characteristics (extroverts/introverts), longevity of group members, groups who exceeded their goals, and groups gender balance) impact on success. Through varied manipulation checks, researchers could not find a model or provide evidence that team composition mattered. The researchers concluded it was not who was on the team that any bearing on the results of their research, but what determined a team's success was if psychological safety was present within the team.

Employees sharing information in their teams is an important component of organizational success. Managers behavior is critical to employees psychological safety creating a work environment for employees to share their thoughts and ideas (Subhakaran & Dyaram, 2018). Empirical evidence has shown that co-workers upward voice has a restricted role in initiating a perception of psychological safety. Voice climate, as defined by Frazier and Bowler (2015), is “shared group member perceptions of the extent to which they are encouraged to engage in voice behaviors” (p. 841). Employees who feel a considerable amount of psychological safety are more likely to share their opinions. Upward communication can be a central factor in helping organizations learn and thrive as employees are encouraged to question the status quo and share their creative ideas for improvement (Edmondson & Lei, 2014).

Leaders may intend to do their best to provide an environment for employees to share ideas and concerns. Still, leaders can do the opposite if they do not deal with two significant hindrances: the fear of consequences for voicing their opinions and a feeling of uselessness. When staff members do not speak up, errors are made, and good ideas are not brought forward (Detert & Burris, 2016). Fundamentally, psychological safety is an interpersonal concept developed through interactions in working environments (Edmondson, 2002). Given this construct, psychological safety can be disrupted and damaged. A breach of psychological safety would require reparation to continue to provide a secure environment for staff members. While there is research that addresses trust repair (Kim et al., 2013), research was not discovered that concluded trust repair and psychological safety repair are synonymous.

Edmondson (2018) states that psychological safety is vital in creating value in organizations functioning in complicated and changing environments. As organizations become increasingly dependent on their technology departments in an ever-changing world, the teams

psychological safety will become increasingly important. Presently, wars are more often fought on different landscapes, technology landscapes, with deliberate and malicious cybersecurity attacks breaching information systems to gain access to sensitive information. Teams must collaborate cohesively in an environment free of risk and fear to develop proactive strategic plans and tactical remediations that immediately address unforeseen issues. Shao et al. (2017) stated the psychological safety of employees positively affects organizational knowledge sharing, contributing to the overall success of IT projects and organizations. Organizations may not achieve the outcomes expected if IT employees psychological safety is non-existent.

Team Learning

Edmondson (1999) hypothesized learning at the team level of analysis as “an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions” (p. 353). The research in this area focused on discerning how leaders can inspire their teams to learn and boosting their teams engagement in the learning process.

Research has shown that a psychologically safe workplace should provide an environment rich in creative ideas and solutions strongly associated with learning and performance in environments that encompass complexity, ingenuity, and sensemaking (Sanner & Bunderson, 2015). By performing a meta-analysis examining relationships between psychological safety, team learning, and team performance, Sanner and Bunderson (2015) discovered to understand the predictors of experiential teams learning, psychological safety was the most used variable. Furthermore, the preponderance of the research showed psychological safety as a direct predictor of team learning and, through team learning, team performance.

Psychological safety is positively related to team learning behaviors (Edmondson, 1999). Employees working in teams with average-to-high degrees of psychological safety will likely learn from their mistakes. In addition, teams will seize the opportunities to learn in an environment where they feel they will not be penalized for failure (Wilhelm et al., 2019). Empirical research underscores the magnitude of psychological safety in technical environments where failing fast and learning from failures is paramount (Thorgren & Caiman, 2019). This is due to the pressures associated with the need to automate and innovate. Managers who provide communications as a monologue and do not encourage a dialogue fail their organizations by not hearing from the subject matter experts how work processes could be completed more efficiently and effectively. In these environments, employees follow specific management directions concerning their contributions and do not think creatively in a shared team environment.

Psychological safety is related to learning and is reasoned to be foundational for facilitating behaviors critical to learning. In a complicated and rapidly changing world, learning is essential (Edmondson & Lei, 2014). Koeslag-Kreunen et al. (2018) share that team learning behavior has proven to be one of the most effective team processes, as team level learning behavior allows teams to enhance their current comprehension or develop new knowledge. Team leadership behavior is deemed to be an essential element for creating conditions that are vital for employees to engage in team learning behavior.

Team Knowledge Hiding

One of the behaviors that should be prevented in a psychologically safe environment is team knowledge hiding. Knowledge hiding is defined as a counterproductive behavior when there is an intentional attempt to withhold or conceal knowledge that has been requested (Connelly et al., 2012), and team knowledge hiding is defined as an elevation from an individual

level to a team level phenomenon. There are three distinct strategies identified by Connelly et al. (2012) that employees may utilize to hide their knowledge: evasive hiding, playing dumb, and rationalized hiding. These three strategies represent a wide array of employee hiding behaviors and are proven to be separate from each other. There has been notable research expansion in this area, focusing on this phenomenon's complicated nature as it can have considerable impacts on companies (Connelly et al., 2019). To remediate this, there is evidence that context is essential as task interdependence in teams can alleviate the negative association between knowledge hiding and team creativity (Fong et al., 2018).

Knowledge hiding is commonly situational and not always meant to be detrimental to an individual or the organization (Connelly & Zweig, 2015). Situational factors can play a crucial role in knowledge hiding. Employees are more likely to hide knowledge when the knowledge they possess is complicated and when employees perceive that their organization does not have a “climate of sharing” (Connelly et al., 2012, p. 484). Interpersonal dynamics affect knowledge hiding as employees are motivated to hide knowledge from co-workers they distrust (Černe et al., 2014; Connelly et al., 2012). Černe et al. (2017) investigated multilevel interactions among team level, job-related, and individual characteristics in stimulating employees' innovative work behavior (IWB). The analysis uncovered notable two- and three-way interactions, where a mastery climate (a climate with characteristics of teamwork and skills development), task interdependence, and decision autonomy moderated the relationship between knowledge hiding and IWB. When there is knowledge hiding, a team mastery climate will enable high levels of IWB only if complemented by high task interdependence or high decision autonomy. Without one of these job characteristics, knowledge hiding precludes higher levels of IWB despite a

sound team mastery climate and inhibits adapting, modifying, or customizing existing innovations within organizations. Figure 3 illustrates the five elements of the literature review.

Figure 3

Literature Reviews

LEADERSHIP TRAINING

Traditionally focused on developing "...the collective capacity of organizational members to engage effectively in leadership roles and processes" (Day, 2000, p. 582).

TEAM LEARNING

Edmondson (1999) conceptualized learning at the team level of analysis as "an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions" (p. 353).



EMOTIONAL INTELLIGENCE

A set of interrelated skills concerning "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge and the ability to regulate emotions to promote emotional and intellectual growth" (Salovey & Mayer, 1990, p. 10).

TEAM PSYCHOLOGICAL SAFETY

Edmondson (1999), who developed the concept, states that it is a shared belief for interpersonal risk-taking. Edmondson and Lei (2014) stated that psychological safety is a "phenomenon that lives at the group level" (p. 37).

TEAM KNOWLEDGE HIDING

Defined as "an intentional attempt by an individual to withhold or conceal knowledge that has been requested by another person" (Connelly et al., 2012, p. 65) and team knowledge hiding describes what happens when knowledge hiding elevates from an individual level to a team level phenomenon.

Various industries were included in team psychological safety research, mainly healthcare, financial, and education. There were several similarities across industries allowing for the generalization of team psychological safety's antecedents and outcomes. The studies were conducted in English-speaking countries. There were fewer articles in the literature focused on technical teams and organizations. However, technical teams may differ from other teams as there is a direct dependency to solve complex problems that may have significant and immediate organizational impacts.

In summary, this chapter provided information regarding database keyword searches in the areas of leadership training, transformational leadership, emotional intelligence, psychological safety, and outcome behaviors. An overview of the group-level psychological safety literature was presented along with a categorization of the antecedents and outcomes.

CHAPTER 3: RESEARCH DESIGN AND METHODS

Overview

This chapter includes the four hypotheses and framework for this research. The positivist approach and deductive design is justified. Approval was received from the institutional review board (IRB) for this research meeting the requirements for exemption under the federal regulations 45 CFR 46.101 that govern the protections of human subjects (Appendix A).

Surveys were created containing three sections and were sent to the study sample. The three sections included questions posed to first level technical leaders, to employees reporting to the respective first level technical leaders, and demographic questions were posed to all survey participants. Survey participants were required to provide their approval in the consent form before completing the survey (Appendix B). A cover letter was presented to the survey participants providing them with an overview of the intent of the online survey, the approximate time to complete the survey, and confidentiality and protection of the data (Appendix C).

Leaders were requested to complete 30 questions; their employees were requested to complete 56 questions and one open-ended question along with being invited to complete an interview (Appendix D). Not all 56 responses from employees were included in the study, only the responses to team variables were included (26 questions). Survey participants who were interested in participating in an interview were required to provide their approval in the consent form before the interview was conducted (see Appendix E).

Research Design and Approach

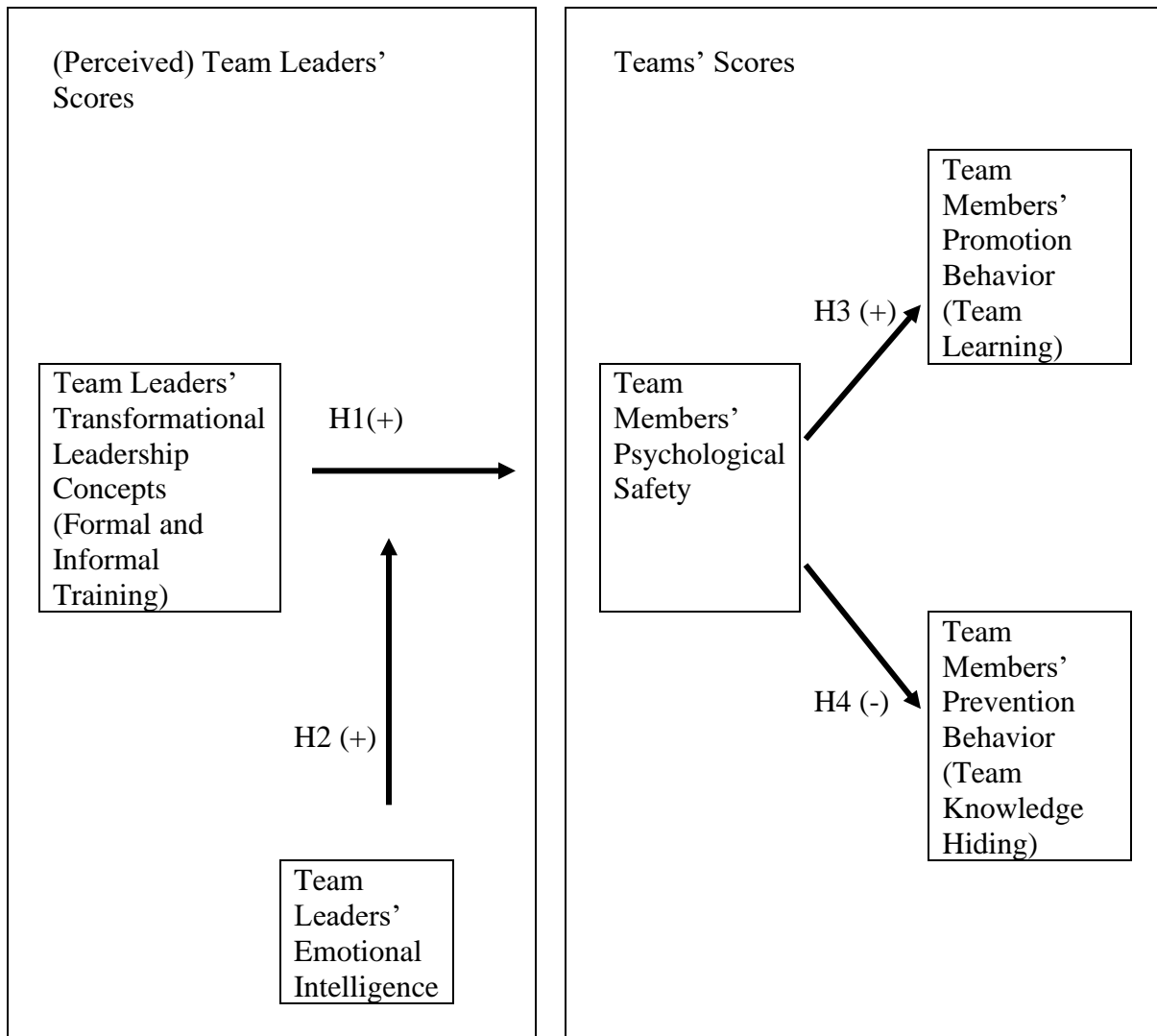
While conceptual and empirical research continues to increase on the topic of psychological safety, critical questions remain. First, what is believed to be a gap in the enablers of team psychological safety will be addressed and that is the degree to which leadership training

by the leader is perceived. Second, the research will focus on technical teams. Four hypotheses are tested as depicted in Figure 4:

- H1: First level leaders' perceived exposure to transformational leadership concepts through formal and informal training is positively related to team members' psychological safety.
- H2: The relationship between perceived exposure to transformational leadership concepts and team members' psychological safety is moderated by the level of the team leaders' emotional intelligence. Specifically, a positive relationship is weakened when team leaders' emotional intelligence is low.
- H3: Team members' psychological safety is positively related to team learning behavior.
- H4: Team members' psychological safety is negatively related to team knowledge hiding.

Figure 4

Hypothesized Framework



The study design will use a positivist approach involving a quantitative method. Comte (1880) noted that the basis for knowledge and thought should rely on a scientific method and not develop conclusions subjectively. A deductive design is appropriate based on the methodological fit. Psychological safety literature has advanced throughout the last few decades to a mature domain providing well developed constructs, precise models, and broad agreement on specific variables. Prior research has identified the key variables and scales to operationalize them, and

there is a clear rationale for the relationships in the causal model developed. The design tests the relationships, providing evidence for the predictive model which can guide the development or modification and implementation of leadership training for first level technical leaders.

A pilot study was performed to test the mechanics of the survey with a sample of seven first level technical leaders and 44 of their employees at the place of my employment. Feedback was requested on the web-based access and automated survey process and made format changes for cell phone access to provide a smooth and seamless experience for the survey participants. The teams who completed the technical pilot were not included in the final data collection. In addition, a noted expert in providing consulting and training to information systems professionals completed the survey to ensure the questions are understandable and the order of the questions is appropriate. No adjustments were made based on this expert.

Subsequently, self-administered three section surveys were sent, coding the respondents by team, to all first level technical leaders and their team members in three industries: entertainment, non-profit (city government and university), and utilities (electric, gas, and oil). In the first section of the survey, a total of 30 questions (14 questions regarding exposure through both formal and informal leadership training and 16 regarding emotional intelligence) were posed to first level technical leaders. In the second section of the survey, a total of 56 questions (14 questions regarding their perception of their team leader's training, 16 regarding their perception of their team leader's emotional intelligence, seven regarding team psychological safety, seven regarding team learning, and 12 regarding team knowledge hiding) were posed to the first level technical leaders respective employees.

One open-ended question was asked to all participants to provide any additional information they believe would be meaningful for the research topic. Participants were provided

with an opportunity to provide their contact information should they choose to be interviewed. Supplementing the quantitative results with qualitative information, additional insight was acquired into team members psychological safety supporting employees survey responses. Specific questions were developed for semi-structured interviews focusing on the perceived leaders' training and emotional intelligence (Appendix F).

All survey participants were asked to complete seven demographic questions regarding gender, ethnicity, highest level of education, age, team size, team tenure, and tenure in their current company.

Study Sample

The study sample was IT working teams. First level technical leaders and their employees within three industries were sampled: entertainment, non-profit, and utilities. Professional relationships were leveraged to contact chief information officers (CIOs) and other technology executives. The research was introduced, and CIOs were requested to approve their teams participation with an eye towards the benefit it might provide to their organizations. Communication was provided to reinforce the purpose of the research to the CIOs, including a request to provide their first level technical team members email (Appendix G). An email was sent to the CIOs to be forwarded to their respective staff members (Appendix H).

A criteria-driven sampling strategy was used to select the companies included in this research. The criteria for companies to be selected include being in the US and companies with over 1,500 employees / 100 technology employees. Criterion concerning the variations in the extent of training for first level technical leaders was discussed with each CIO prior to the surveys being distributed.

Upon receipt of the email addresses, surveys were distributed via Qualtrics software to each leader and their team members. A team was defined as employees who are permanently assigned, interdependent with each other, and directly reporting to a first level technical leader. These teams design, develop, modify, adapt, and implement short- and long-term IT solutions through new and existing applications, systems architecture, network systems, and application infrastructure. Typically, the educational background of these team members includes science, technology, engineering, and mathematics (STEM).

I targeted a study sample of 25 first level technical leaders, each ideally with three employees in each of the three industries. Leaders with a minimum of three employees directly reporting to the leaders were surveyed. The target number of participants (75 teams) allowed the hypothesized relationships to be tested drawing meaningful conclusions from the data. The actual study sample resulted in 92 teams from nine companies: 26 from the entertainment industry (28%), 28 from the non-profit industry (31%), and 38 teams from the utility industry (41%). The participating teams represented four US geographical regions: 16 from the midwest (17%), 17 from the northwest (19%), 23 from the southeast (25%), and 36 from the southwest (39%).

A total of 655 survey participants were invited to participate and 400 responded (61.07% response rate). There were 166 females (41.5%), 230 males (57.5%), and four (1%) who did not provide their gender. Of the 384 of 400 participants who provided their age, the range was 21 years to 70 years with a mean age of 41.52 ($SD = 10.26$). There were 398 participants who provided their ethnicity with 192 being White (48%), 67 being Hispanic or Latino (16.8%), 67 being Asian (16.8%), two being Native Hawaiian or Pacific Islander (0.5%), zero being American Indian or Alaska Native, and 70 selecting other (18%). All participants provided their

highest level of education with 29 being high school (7.25%), 41 being Associate's degrees (10.25%), 242 being Bachelor's degrees (60.5%), 83 being Master's degrees (20.75%), and five being Doctorate's degrees (1.25%). There were 398 participants who provided their tenure in their current company with a range of one to 26 years with a mean of 6.61 years ($SD = 4.78$).

Of the 400 respondents, 92 were first level technical leaders and 308 were employees of the first level technical leaders. With the focus on 92 leaders, there were 32 females (34.79%), 58 males (63.04%), and two (2.17%) who did not provide their gender. Of the 89 of 92 leaders providing their age, the range was 29 years to 66 years with a mean age of 46 ($SD = 8.59$). The number of team members who responded to the survey ranged from three to six, though the largest true team size was as high as 11. The number of years in the current team ranged from one to 20, the average years in the team of 6.62 ($SD = 4.96$).

Data Collection Methods and Instruments

For data collection, surveys were coded to identify respondents by industry, company, and team. The unit of analysis is teams. A team consisted of one leader and a minimum of three direct report employees to be included in the research. In an email, prior to the participants completing the survey, participants were assured that their responses would remain confidential.

First level technical leaders were asked to consider their exposure through both formal (instructor-led or web-based) and informal (books, casual advisor) leadership training and complete transformational leadership survey questions. The questions were developed from the well-defined concepts presented in the literature by Bass and Avolio (1990) which includes four dimensions: individualized consideration, idealized influence, inspirational motivation, and intellectual stimulation.

Individualized consideration (IC) is the level to which the leader listens and attends to each employee's concerns and needs and as acts as a mentor or coach. The leader provides challenges for growth, has empathy, and communicates openly. This also includes the leader respecting and recognizing each employee's contributions to the team. Idealized influence (II) is the leader being a role model for ethical behavior, instilling pride, and earning the respect and trust of her/his employees. Inspirational motivation (IM) is recapped as the extent to which the leader communicates their vision that is inspiring to employees. The leader articulates clear and challenging goals with optimism providing a sense of purpose to her/his employees. Intellectual stimulation (IS) is outlined as the degree to which the leader challenges their employees assumptions, takes risks, and requests employees creative ideas. The leader develops employees and views employees' mistakes as opportunities to learn.

First level technical leaders were asked to consider their exposure through both formal (instructor-led or web-based) and informal (books, casual advisor) leadership training. Sample questions for transformational leadership training included "To what extent were you trained to acknowledge every follower's needs?" and "To what extent were you trained to provide support and empathy?" Transformational leadership training questions were slightly modified and posed to the leaders team members regarding their perception of their leader's training. Cronbach's alpha for the transformational leadership training questions was $\alpha = 0.95$.

First level technical leaders were requested to answer emotional intelligence questions from Wong and Law (2002) through four dimensions that were conceptualized by Salovey and Mayer (1990): 1) appraisal and recognition of emotion in others, 2) regulation of emotion in the self, 3) appraisal and expression of emotion in the self, and 4) use of emotion to facilitate performance. Sample questions included, "I have a good sense of why I have certain feelings

most of the time” and “I have good understanding of my own emotions.” Questions were slightly modified and posed to the team members regarding their perception of their leader’s emotional intelligence. Cronbach’s alpha for the emotional intelligence questions was $\alpha = 0.93$.

First level technical leaders team members were asked questions regarding their psychological safety and learning behaviors. Team psychological safety questions from Edmondson (1999) included “If you make a mistake on this team, it is often held against you” (reverse scored), and “Members of this team are able to bring up problems and tough issues.” Cronbach’s alpha for the team psychological safety questions was $\alpha = 0.82$. Sample questions for team members learning behaviors (Edmondson, 1999) included “We regularly take time to figure out ways to improve our team's work processes” and “This team tends to handle differences of opinion privately or off-line, rather than addressing them directly as a group” reverse scored. Cronbach’s alpha for the team learning behaviors questions was $\alpha = 0.85$. Four questions in the survey addressing psychological safety and learning behaviors were negatively worded to mitigate response set bias.

Pre-validated knowledge hiding behavior questions (Connelly et al., 2012) at the individual level of analysis were adapted to team level of analysis. Knowledge hiding is comprised of three related factors: evasive hiding, rationalized hiding, and playing dumb. Sample questions include such items as “Generally, our team/we agree to help others but never really intend to” and “Generally, our team/we agree to help others but instead give information different than wanted.” Cronbach’s alpha for the team knowledge hiding questions was $\alpha = 0.86$.

Of the seven demographic questions, I controlled for two continuous team variables: team size and team tenure. I also controlled for one categorical variable: industry. I collected information but did not control for gender, age, ethnicity, highest level of education, and tenure

in current company as these are individual-level responses which could be used a future paper analyzing data from a different level of analysis.

One week after the quantitative surveys were sent to the respective team leaders and their employees, emails reminders were sent with the intention of increasing the response rate adhering to Dillman et al. (2014) survey protocol to address the potential problem of low response rate in web-based surveys. Additional reminders were sent to respondents who did not respond within a two-week period and again one month after the initial survey was sent to them. Additionally, Qualtrics software responses were monitored for survey participants who began but did not complete the survey as the software requires surveys to be completed within one week once a participant opens the survey. Email reminders were sent to the individuals who began but did not complete the surveys advising them of the number of days remaining. There was a specific focus on teams who, at that time, did not meet the three-team member minimum and those who had opened the survey but had not completed it.

The qualitative research collected complemented the quantitative foundation by providing data through one open-ended question at the end of the survey and by using a semi-structured interviews protocol. Fourteen survey participants, five first level technical leaders and nine employees, provided comments to the open-ended question, “Please provide any additional information you believe would be meaningful for the research topic, Developing Psychological Safety in Technical Teams.”

Fourteen survey participants agreed to an interview following the completion of the quantitative survey, four leaders and 10 employees. All 14 survey participants were interviewed. One team represented the entertainment industry (one leader and two employees), one team represented the non-profit industry (one leader and four employees), and two teams represented

the utility industry (two leaders and four employees). The interview protocol contained questions to prompt participants portrayals of their specific work environments and the interviewees provided information reaffirming the quantitative data.

Measures or Operationalization

The approach consisted of a cross-sectional survey design capturing data at a specific point in time. Data were obtained from survey questions using a 7- point Likert scale that helped make deductions about the relationships among variables and how the sample results may be generalized. The Likert scale does this by ranking each response in a quantitative scale so the data variables may be operationalized (Creswell & Creswell, 2018).

In summary, the research design and approach were defined with the hypothesized framework. The study sample for the survey was provided along with the use of Qualtrics software for data collection. The number of survey questions was discussed along with the follow up required to accumulate the responses received. Sample questions were provided.

CHAPTER 4: DATA ANALYSIS AND FINDINGS

Overview

This chapter focused on several areas. Data analysis methods provides a summary of methods utilized in this study. Preliminary analysis includes descriptive statistics, distribution patterns, and intraclass correlation coefficients. The differing data aggregation of leaders and employees variables will be discussed. Results for each hypothesis include a linear regression table and suggested findings. Complementary qualitative data are also included.

Data Analysis Methods

A quantitative method was used to study and measure the components in the model with an investigative approach using a qualitative protocol to capture nuances from study participants. To test the hypotheses in the team psychological safety construct, technical teams, defined as employees permanently assigned and directly reporting to a first level technical leader, were studied. The study participants were in three industries: entertainment, non-profit, and utility.

The lower and upper bounds of within-group responses were three and six, respectively. Dawson's (2003) selection rate to eliminate teams with low team-level response rates from further analyses was applied. There were 18 leaders and 33 of their respective employees who completed the survey but, as a data cleaning activity, their data were not included in the research as the minimum number (three) of respective employees completing the survey was not met. I did not perform a manipulation check due to the explanatory nature of my study.

Correlation Analysis

A correlation matrix (Table 1) is provided with descriptive statistics (e.g., means, standard deviations, and alphas of all variables) as a first step to test relationships. Although this is not definitive or conclusive, it provides an initial indication that the relationships in my model

are supported. Two variables are focused on leader concepts: transformational leadership training and emotional intelligence. The data collected from these two leader variables were included in the study as each individual leader's scores. There are three variables that are focused on team concepts: psychological safety, learning, and knowledge hiding. Each employee's scores were aggregated for team/group-level analysis for these three team variables in the model.

Table 1

Cronbach's Alpha and Intercorrelations Between Survey Variables

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
1. Leader Training	5.500	0.887	0.947								
2. Leader Emotional Intelligence	5.652	0.712	0.633***	0.929							
3. Team Psychological Safety	5.774	0.704	0.308**	0.310**	0.816						
4. Team Learning Behaviors	5.177	0.781	0.328***	0.310**	0.745***	0.851					
5. Team Knowledge Hiding	1.519	0.455	-0.199	-0.313**	-0.521***	-0.523***	0.856				
6. Team Size	3.358	0.656	0.050	0.058	0.065	0.005	-0.015	†			
7. Team Tenure	6.619	4.956	-0.210*	-0.206*	-0.157	-0.034	0.020	-0.086	†		
8. Org Type 1	0.272	0.447	0.028	-0.084	-0.008	0.117	0.047	0.039	0.102	†	
9. Org Type 2	0.424	0.497	0.166	0.284**	0.107	0.030	-0.089	0.236*	-0.425***	-0.524***	†

Cronbach's alpha coefficients are presented on the diagonal. N=92

*** Correlation is significant at the 0.001 level.

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

† Only one survey question.

The first seven variables listed are continuous variables while team size, team tenure, and industry are used as control variables. To control for industry, two dummy variables were created: entertainment (org type 1) and utility (org type 2). The results are relative to the non-profit industry (a third org type).

Transformational leadership is a well-defined construct, but a documented scale was not discovered for transformational leadership training and development. Twelve survey questions were developed using the four dimensions of transformational leadership as defined by Bass and Avolio (1990): individualized consideration (IC), three questions; idealized influence (II), two

questions; inspirational motivation (IM), four questions; and intellectual stimulation (IS), five questions.

Cronbach's alpha for each of the constructs can be found in Table 3. Cronbach's alpha ranges between 0 and 1, with higher values indicating that the survey or questionnaire is more reliable for that that construct. All Cronbach's alpha scores were good between (0.82) and excellent (0.95).

The correlations for each hypothesis were reviewed and each hypothesis revealed a significant correlation between the variables. There appears to be a significant correlation (0.31) between leader training and team psychological safety. A significant correlation (0.63) was found between leader training and leader emotional intelligence. Since these two are both IVs in Hypothesis 2, multicollinearity needed to be addressed. The results indicated a significant correlation (0.75) between team psychological safety and team learning and a significant negative correlation (-0.52) between team psychological safety and team knowledge hiding.

To perform team/group level analysis, intraclass correlation coefficients (ICCs) were calculated to justify aggregating data from individual responses to generate team-level assessments size (Bliese, 2000). As the ICC(1) is the reliability of a single assessment and ICC(2) is reliability of the group means, LeBreton and Senter (2008) suggested that an ICC(1) = 0.05 represents a small to medium effect, an ICC(2) result of < 0.40 are poor, 0.40 to 0.75 are fair to good, and > 0.75 are excellent (Fleiss, 2004). While the employees within a team are not required to entirely agree, there should be more variability between teams than there is within the teams. Therefore, ICCs were calculated for team variables only (leaders variables were developed at the individual level). Table 2 provides the ICCs for group-level scales.

Table 2

Intraclass Correlation Coefficients for Group-Level Scales

Team Survey Variables	ICC(1)	ICC(2)
Team Psychological Safety	0.556	0.807
Team Learning	0.590	0.828
Team Knowledge Hiding	0.484	0.758

The interrater reliability coefficients, ICC(1), for team psychological safety, team learning, and team knowledge hiding were 0.56, 0.59, and 0.48, respectively. The ICC(2) coefficients for team psychological safety, team learning, and team knowledge hiding were 0.81, 0.83, and 0.76, respectively. Overall, the teammate responses indicated a high degree of consistency which justified aggregating the direct report employees' data to the team level. These three variables were aggregated to the team level construct and operationalized as the mean of the responses from the individual team members.

Results and Findings

Linear regressions were performed for each hypothesis. The VIF for each variable was provided to validate the absence (low value) or presence (high value) of multicollinearity within this model. By performing this analysis, the probability of a Type II error was minimized. This analysis will assist in improving interpretation of non-significant results (Cohen, 2013).

H1: First level leaders perceived exposure to transformational leadership concepts through formal and informal training is positively related to team members' psychological safety. Results can be seen in Table 3.

Table 3

Hypothesis 1

Variable	R^2	Adjusted R^2	F	Standardized Coefficients Beta	t	VIF
	0.105	0.053	2.028			
Leader Training				0.285	2.705**	1.068
Team Size				0.040	0.377	1.104
Team Tenure				-0.089	-0.771	1.278
Org Type 1				-0.003	-0.024	1.492
Org Type 2				0.011	0.079	1.899

*** Significant at the 0.001 level.

** Significant at the 0.01 level.

* Significant at the 0.05 level.

First level leaders perceived exposure to transformational leadership concepts through formal and informal training is positively related to team members psychological safety with a significant correlation of 0.31. This implied a direct and strong relationship. The results of this regression were as follows: $R^2 = 0.105$ Adjusted $R^2 = 0.053$, $F(91,400) = 2.028$, $p = .008$. None of the control variables were significant in this hypothesis. There is not a significant relationship between specific industries in this hypothesis test. This hypothesis can be supported meaning leader training positively influences team psychological safety.

H2: The relationship between perceived exposure to transformational leadership concepts and team members psychological safety is moderated by the level of the team leaders emotional intelligence. Specifically, a positive relationship is weakened when team leaders emotional intelligence is low.

The correlation between leader training and leader emotional intelligence was high (0.63). This correlation required further exploration to research and reduce the resulting

multicollinearity so that the research model as proposed could remain as designed. By investigating the correlation between the two IVs with the goal of reducing the high correlation, three other options were considered: 1) leader training with three questions removed, 2) leader training dichotomized, and 3) leader emotional intelligence dichotomized. The three options are discussed with tables provided for two options where the multicollinearity was resolved.

H2, Option 1: An exploratory factor analysis (EFA) was performed with leader training questions (14) and leader emotional intelligence questions (16) utilizing principal axis factor (PAF) and varimax rotation. Based on the results, there were three leader training questions that cross-loaded, indicating they were correlated with leader emotional intelligence questions. The three questions that showed high correlation were “To what extent were you trained to be considerate of individual talents, backgrounds, and situations,” “To what extent were you trained to act as a role model by adhering to high levels of ethical and moral conduct,” and “To what extent were you trained to provide stimulation by your ideas.” These three questions were removed and the correlation was rerun. All four leader training components were accounted for in the remaining 11 questions: individualized consideration (IC) two questions, individualized influence (II) one question, inspirational motivation (IM) four questions, and intellectual stimulation (IS) four questions. Removing these questions was an attempt to eliminate the multicollinearity between the two IVs. This action reduced the correlation, but it remained high at 0.61. The multicollinearity remained, and no further consideration was given to this option.

H2, Option 2: Because leader emotional intelligence is a well-defined set of questions and scale, dichotomizing leader training was the primary consideration. Changing leader training from a continuous Likert scale to a dummy variable, into high versus low training, was conducted. This was split in two different ways. First, the median (3.50) of the 7-point Likert

scale was used as a cut-off point but using the mean (5.50) provided better data. Therefore, I recoded a leader's score above 5.50 as perceived high training and anything below 5.50 as low training. Table 4 highlights the results of this option.

Table 4
Hypothesis 2 – Option 2

Variable	R^2	Adjusted R^2	F	Standardized Coefficients Beta	t	VIF
	0.113	0.039	1.523			
Dichotomized Leader Training				0.677	0.671	96.430
Leader Emotional Intelligence				0.349	2.362*	2.066
Dichotomized Leader Training x Leader Emotional Intelligence				-0.702	-0.668	104.509
Team Size				0.052	0.478	1.121
Team Tenure				-0.115	-0.984	1.287
Org Type 1				0.015	0.115	1.513
Org Type 2				-0.036	-0.249	2.007

*** Significant at the 0.001 level.
 ** Significant at the 0.01 level.
 * Significant at the 0.05 level.

This option corrected the multicollinearity that was found when using the original data. This model presents $R^2 = 0.11$, Adjusted $R^2 = 0.04$, $F(91, 400) = 1.523$, $p = .506$ at the interaction level. This option did not provide sufficient results. This option failed to support the hypothesis that leaders trainings influence on team psychological safety is moderated by leaders emotional intelligence.

H2, Option 3: This option dichotomized leader emotional intelligence which supported the hypothesis; however, modifying a pre-validated scale was not necessarily fitting. The Likert scale was dummy coded to 0s and 1s that produced low versus high emotional intelligence ratings. The analytical method was similar to option 2 in that dichotomization was used at the

mean (5.65). Therefore, I recoded leader’s score above 5.65 as high emotional intelligence and anything below 5.65 as low emotional intelligence. Table 5 outlines these results.

Table 5
Hypothesis 2 – Option 3

Variable	R^2	Adjusted R^2	F	Standardized Coefficients Beta	t	VIF
	0.161	0.092	2.310*			
Leader Training				0.563	3.579***	2.475
Dichotomized Leader Emotional Intelligence				1.543	2.246**	47.290
Leader Training x Dichotomized Leader Emotional Intelligence				-1.710	-2.340**	53.458
Team Size				0.063	0.601	1.118
Team Tenure				-0.134	-1.167	1.314
Org Type 1				0.021	0.171	1.505
Org Type 2				-0.019	-0.132	2.060

*** Significant at the 0.001 level.

** Significant at the 0.01 level.

* Significant at the 0.05 level.

This option corrected the multicollinearity that was found when using the original data. This model presents $R^2 = 0.16$, Adjusted $R^2 = 0.09$, $F(91, 400) = 2.31$, $p = .022$ at the interaction level. Due to this significant interaction term, a positive relationship was weakened when team leaders emotional intelligence was low. This option supported the hypothesis that leaders trainings influence on team psychological safety is moderated by leaders emotional intelligence; however, this hypothesis is not supported as dichotomizing the pre-validated Likert scale removed the variability of the leaders emotional intelligence making this concept abstract. Scholars and researchers find the specifics of emotional intelligence as a continuous variable to be more informative than a categorical variable. Also, using a dichotomized method may generate misleading results.

H3: Team members psychological safety is positively related to team learning behavior.

Table 6 provides the results of this analysis.

Table 6

Hypothesis 3

Variable	R^2	Adjusted R^2	F	Standardized Coefficients Beta	t	VIF
	0.582	0.557	23.926***			
Team Psychological Safety				0.757	10.690***	1.030
Team Size				-0.063	-0.860	1.106
Team Tenure				0.102	1.293	1.271
Org Type 1				0.163	1.930	1.474
Org Type 2				0.093	0.971	1.870

*** Significant at the 0.001 level.
 ** Significant at the 0.01 level.
 * Significant at the 0.05 level.

A strong positive relationship was found between team psychological safety and team learning: $R^2 = 0.58$, Adjusted $R^2 = 0.56$, $F(91,308) = 23.93$, $p < 0.001$. This hypothesis can be supported, meaning team psychological safety positively influences team learning.

Hypothesis 4: Team members psychological safety is negatively related to team knowledge hiding. Table 7 highlights the results of this hypothesis.

Table 7

Hypothesis 4

Variable	R^2	Adjusted R^2	F	Standardized Coefficients Beta	t	VIF
	0.281	0.239	6.714***			
Team Psychological Safety				-0.530	-5.707***	1.030
Team Size				0.027	0.283	1.106
Team Tenure				-0.092	-0.892	1.271
Org Type 1				0.013	0.120	1.474
Org Type 2				0.071	-0.567	1.870

*** Significant at the 0.001 level.
 ** Significant at the 0.01 level.
 * Significant at the 0.05 level.

A strong negative relationship was found between team psychological safety and team knowledge hiding: $R^2 = 0.28$, Adjusted $R^2 = 0.24$, $F(91, 308) = 6.71$, $p < 0.001$. This result was in the predicted direction. This hypothesis can be supported, meaning team psychological safety negatively influenced team knowledge hiding.

Qualitative Data

The quantitative research that has been presented is complemented with supplemental qualitative data provided through individual participant interviews. Qualitative data can be used to understand participants experience and perspective (Billups, 2020). Forty-two survey respondents (10.5%) completed an open-ended question that was asked toward the conclusion of the survey: “Please provide any additional information you believe would be meaningful for the research topic Developing Psychological Safety in Technical Teams.” The responses reinforced the quantitative feedback received and centered on the importance of communications. For example, one comment that epitomizes the sentiments includes, “I think it's important to create a place and a space for communication. Whether it's holding ten-minute daily meeting or weekly/monthly meetings with our staff, I think it's critical for the success of our organization for team members to have the opportunity to communicate” (Respondent #2G12).

All survey participants had an opportunity to participate in an interview to further share their comments. Fourteen survey participants (3.5%) expressed an interest in an interview. Those interested in an interview were advised that their responses would be linked to their survey responses. All personally identifiable information used to make that connection was deleted following the interview so the data provided became completely anonymous. Interviewees were asked to reflect on and discuss their experiences as a first level technical leader or as an employee reporting directly to a first level technical leader to assist with the research. Those who

participated in an interview were assured that there were no right or wrong answers, only their perspectives and experiences in their respective work environments were sought.

The qualitative data documented during one-hour interviews provided insight to the quantitative data received as interviewees responses were consistent with the quantitative scores. Specifically, three of the four teams (nine interviews) represented the entertainment (one team) and utility industries (two teams). The three leaders stated they received, embraced, and consistently practice the training they received. The leaders focused on all areas of transformational leadership (i.e., individualized consideration, inspirational motivation, idealized influence, and intellectual stimulation). The areas most mentioned were the importance of providing support and empathy, creating a sense of purpose, being transparent in communications, acting as a role model, earning respect, and encouraging calculated risk taking by their employees. These leaders' employees were appreciative of their respective leader's behaviors, noting their leaders on-going candor concerning challenges, genuine concern for their personal well-being and professional career, knowledge and consideration of their backgrounds and leveraging their skills, motivation and encouraging team spirit, high level of ethics, and the employees comfort in speaking up and respectfully challenging each other and their leaders to make the best decision possible. One leader provided this comment discussing the challenges of being a new leader:

It was difficult moving from being an individual contributor to a leader without any initial training. I was micromanaging my team members as I did my project deliverables. It took me a while to understand that while we were meeting the deadlines, my team was not happy and burned out with my focused attention on their work, checking in on each one at the end of each day. They didn't tell me how they were feeling, but I could sense it after months had gone by. I then started backing off and gave them some autonomy. I wish I had done it sooner as I had a lot of damage control to do to gain their trust and respect (Interviewee #1P1).

Human behaviors cannot change overnight, but it is important that behaviors be addressed through transformational leadership training. This training can be a springboard for day-to-day experiences and work activities.

The fourth team, one leader and four employees, interviewed represented the non-profit industry. The team leader (Interviewee #5C1) shared that they attended many training programs but did not find value in leadership training. They stated that they learned their leadership skills from their former managers and they were very successful in this organization. They continue to mimic their “transactional management style” by rewarding good behavior and punishing bad behavior. The team leader mentioned that the department had been managed this way for decades and said they were promoted to a management role by following direction without questioning and taking a “self-preservation” role. The four employees who report to this leader were interviewed and all responded by echoing the leaders comments regarding the culture and added a descriptive comment of the environment being “fear-based.” The employees reported they have limited conversations with their leader as they have “shut down” due to their points of view being disregarded. In these situations, diversity of thought is diminished, magnificent ideas go unheard, and their silence may impact the successful delivery of expensive enterprise-wide technology deployments. Four comments were provided. The first employee provided this comment regarding the lack of collaboration:

One common theme within our team is people are afraid to take ownership and responsibility for certain issues/tasks. I often see team members hesitant to speak up to help certain team members who are trying to gather information to remediate issues or opportunities for process improvement. I would like to see more unity within our team where we help each other flourish in our work, career development, interpersonal skills, and personal goals even if they are not directly involved. This requires undivided attention during meetings and an interest in the work others are doing. The experience and insights that individual team members have are extremely valuable, but there seems to be a mentality of working in silos and less collaboration (Interviewee #5C12).

The second employee provided this comment regarding leadership progression:

The only way for individual contributors to progress their careers is to move into a leadership role. My observation is that gifted technical individual contributors do not always make good leaders and generally establish toxic work environments. Leadership aptitude tests and developmental opportunities are key to identifying leaders that promote psychological safety (Interviewee #5C13).

The third employee provided this comment regarding the lack of transparency, “The technical teams are good and are working for a single goal, but the managers are creating groups within the team that leads to different teams. The managers are incapable of being honest and open.

They have a hidden agenda” (Interviewee #5C14). The fourth employee provided this comment regarding retaliation:

I hold back my ideas and pointing out errors that I see as a risk to projects. I know if I say something and I’m wrong, I’ll suffer the consequences in my performance ratings, and potential raises and promotions. It’s easier to say I didn’t know there was an error then point one out. My supervisor is more forgiving if I missed something than I called out an error (Interviewee #5C16).

In summary, three of the four hypotheses were quantitatively supported. Qualitative comments from leaders and their respective teams reinforced the quantitative results.

CHAPTER 5: DISCUSSION

Overview

This research began with a goal of providing visibility to leaders perception of their transformational leadership training by examining its effects on team psychological safety, with a moderating factor of leaders emotional intelligence and the resulting team behaviors (i.e., learning and knowledge hiding). A review of extant literature was performed in the areas of leadership training, transformational leadership, emotional intelligence, psychological safety, and outcome behaviors (e.g., learning behaviors and knowledge hiding behaviors). This study included what appears to be a gap in the enablers of team psychological safety being the degree to which transformational leadership training by the leader is perceived. Also, the research had a focus on technical teams, which had not previously been studied.

An empirical study was performed to test and understand various relationships of the model. The first objective of this study was to assess the relationship between leaders perceived exposure through both formal (instructor-led or web-based) and informal (books, casual advisor) transformational leadership training to team psychological safety. The second objective of this study was to investigate the moderation effect of emotional intelligence on the relationship between perceived transformational leadership training and team psychological safety. The third objective of this study was to examine the relationship between team psychological safety and team learning. The fourth and final objective of this study was to explore the relationship between team psychological safety and team knowledge hiding.

In this study, a total of 400 people in technical teams were surveyed including 92 leaders and 308 of their employees. The leaders responses for leaders transformational training and leaders emotional intelligence were considered and employees responses for team psychological

safety, team learning, and team knowledge hiding were included. Also, 14 individuals (four leaders and 10 of their respective employees) were interviewed.

This study furthers extant research in all aspects of the model. The findings suggest positive implications for team psychological safety with leaders perceived training in transformational leadership and team psychological safety positively relating to team learning behavior. Additionally, the findings indicate that team members psychological safety was negatively related to team knowledge hiding. With the enabling variables of transformational leaders training and emotional intelligence being highly correlated to team psychological safety, a deeper review was warranted in the subcategories.

This research points to implications for advancing psychological safety research by studying the antecedent of leader's perception of training, in the context of technical teams and implications for practice including a better understanding of how first level technical leaders create and maintain environments for their employees.

Implications for Advancing Theory

The analysis revealed insights that create a unique understanding of team psychological safety enablers and outcomes from employees of first level technical leaders. There were four implications derived for theories concerning transformational leadership training, emotional intelligence, and psychological safety. These implications came from not only testing the four hypotheses, but from further investigation into the subcategories of constructs used and individual questions in the constructs. While these investigations went beyond the original study, they emerged from curiosity as to the results and, in one case, the issue of multicollinearity between leadership training perception and emotional intelligence.

First, various antecedents to psychological safety have been studied but not that of perceived leaders training in transformational leadership elements. This study may add to both the antecedents of psychological safety literature as well as literature on transformational leadership, providing additional insight to the importance of technical teams' training on psychologically safe environments.

Though there have been significant advances in understanding leadership training and development, this topic continues to be somewhat immature (Day et al., 2013), especially in the first level technical team context. An opportunity was seen to expand extant literature considering the leadership training provided to first level technical leaders and the effects on team members psychological safety. Transformational leadership training and behaviors will need to continue to evolve to effectively address the changing needs of organizations. The prospect of inspiring better leadership and consequently promoting improved psychologically safe working environments is motivating.

There was a difference between the highest and lowest rated responses to questions in leader training. The leader training question with the highest mean (6.15) was "Act as a role model by adhering to high levels of ethical and moral conduct" in the idealized influence subcategory. The question with the lowest mean (4.90) was "Provide stimulation by your ideas" in the intellectual stimulation subcategory. For the highest mean question, this suggests that leaders believe they were trained to be role models for their employees. The lower most mean question indicated that leaders received the least training to provide stimulation by their ideas. While providing stimulation was the lowest rated question, "To what extent were you trained to take risks" was very close to being the lowest rated question. Interestingly, the data in team psychological safety noted the lowest rated question was, "It is safe to take a risk on this team?"

This suggests that risk taking is not prominent in transformational leadership training programs and more research is required to infer the causal relationship. The element of risk taking in both leadership training and psychological safety is something to explore in future research.

There were four subcategories of transformational leadership training. The transformational leadership training subcategory of idealized influence had the highest mean (6.01), indicating that the leaders surveyed perceived that they received the most training in this subcategory. However, the most correlated subcategory to team psychological safety was intellectual stimulation. Leaders surveyed reported intellectual stimulation to be the subcategory where they perceive they received the least training (5.14). The other two subcategories, individualized consideration and inspirational motivation had means of 5.63 and 5.60, respectively. This research increases the body of knowledge in perceived leadership training and its impacts on team psychological safety. Table 8 shows these results.

Table 8

Transformational Leadership Training

<u>Individualized Consideration (IC)</u>	Mean	Standard Deviation
• Be considerate of individual talents, backgrounds, and situations?	5.90	0.927
• Provide support and empathy to your followers/employees?	5.72	0.976
• Acknowledge every follower's needs?	5.28	1.261
<u>Inspirational Motivation (IM)</u>	Mean	Standard Deviation
• Create a sense of purpose and encourage team spirit?	5.84	1.030
• Provide a sense of vision and mission?	5.74	1.078
• Provide motivation?	5.46	1.190
• Create appealing visions by showing optimism about followers' abilities?	5.34	1.320
<u>Idealized Influence (II)</u>	Mean	Standard Deviation
• Act as a role model by adhering to high levels of ethical and moral conduct?	6.15	0.925
• Gain followers trust and respect?	5.87	1.051
<u>Intellectual Stimulation (IS)</u>	Mean	Standard Deviation
• Help followers think outside the box?	5.32	1.157
• Provide opportunities for creativity?	5.29	1.263
• Challenge assumptions?	5.27	1.241
• Take risks?	4.92	1.277
• Provide stimulation by your ideas?	4.90	1.326

As a next step, a paired samples t-test was performed between the highest and lowest rated responses to determine if the responses were significantly different from each other. There was a significant difference between the highest rated question (Act as a role model by adhering to high levels of ethical and moral conduct) versus the lowest rated question (Provide stimulation by your ideas), $t(91) = 9.56, p < .001$. On average, leaders scored 1.25 points more on the highest rated question than the lowest rated. It is suggested that more research could be performed in this area that could contribute to research on training in transformational leadership skills.

Second, a high correlation was found between perceived leaders transformational training and leaders emotional intelligence (0.63) which posed a concern for multicollinearity in H2 with both being IVs. Due to this concern, further research was performed at the subcategory level of both leader training and leader emotional intelligence. There are connections and similarities between leader training and leader emotional intelligence questions that were found.

Multiple attempts were sought to solve for the high correlation between leader training and leader emotional intelligence. One attempt was successful at removing the multicollinearity; however, this was achieved by dichotomizing leader emotional intelligence. The data provided evidence that a positive relationship between perceived leaders training and leaders emotional intelligence was weakened when team leaders emotional intelligence is low. Dichotomizing the well-defined, validated scale of leader emotional intelligence quantitatively provided some support for the hypothesis but failed to support as this approach diminished the scale. It is suggested that leader training and leader emotional intelligence be further investigated.

There are four subcategories of emotional intelligence. The leaders emotional intelligence subcategory of use of emotion (UOE) had the highest mean (5.83), indicating that the leaders surveyed rated themselves the highest in this subcategory. UOE was the most correlated

subcategory to team psychological safety. This indicates that leaders are applying their use of emotion more than other dimensions. This appears to be the most used and effective dimension of emotional intelligence by the leaders on team psychological safety. The other three subcategories, others emotional appraisal (OEA), regulation of emotion (ROE), and self-emotional appraisal (SEA) had means of 5.33, 5.62, and 5.81, respectively. Even though the direct relationship between emotional intelligence on team psychological safety was not hypothesized, curiosity led to this investigation. This research expands the awareness and understanding in emotional intelligence and its impacts on team psychological safety.

When looking at individual questions within the construct of emotional intelligence, there is a significant difference between the highest and lowest rated responses. The leader emotional intelligence question with the highest mean (6.07) was “I’m a self-motivated person” in the use of emotion (UOE) subcategory. The question with the lowest mean (5.09) was “I always know others emotions from their behavior” in the others emotional appraisal (OEA) subcategory. The highest rated leader emotional intelligence question suggested that leaders are motivated to act because of their own enthusiasm or interest, without others influence. The question with the lowest mean indicated leaders are somewhat unsure of detecting others emotions based on their behaviors. Table 9 highlights these results.

Table 9

Emotional Intelligence

<u>Others' Emotional Appraisal (OEA)</u>	<u>Mean</u>	<u>Standard Deviation</u>
• I am sensitive to the feelings and emotions of others.	5.53	1.208
• I am a good observer of others' emotions.	5.38	1.025
• I have a good understanding of the emotions of people around me.	5.33	1.060
• I always know others' emotions from their behavior.	5.09	0.885

<u>Regulation of Emotion (ROE)</u>	<u>Mean</u>	<u>Standard Deviation</u>
• I am able to control my temper and handle difficulties rationally.	5.75	1.086
• I am quite capable of controlling my own emotions.	5.65	1.074
• I have good control of my own emotions.	5.63	1.013
• I can always calm down quickly when I am very angry.	5.47	1.104

<u>Self-Emotional Appraisal (SEA)</u>	<u>Mean</u>	<u>Standard Deviation</u>
• I always know whether or not I am happy.	5.90	0.890
• I have good understanding of my own emotions.	5.87	0.801
• I have a good sense of why I have certain feelings most of the time.	5.79	0.944
• I really understand what I feel.	5.68	0.925

<u>Use of Emotion (UOE)</u>	<u>Mean</u>	<u>Standard Deviation</u>
• I am a self-motivated person.	6.07	0.849
• I would always encourage myself to try my best.	5.99	0.989
• I always set goals for myself and then try my best to achieve them.	5.86	1.065
• I always tell myself I am a competent person.	5.45	1.312

A paired samples t-test was performed between the highest and lowest rated responses. There was a significant difference between the highest rated question “I am a self-motivated person” (UOE) versus the lowest rated question “I always know others’ emotions from their behavior” (OEA). On average, leaders scored 0.98 points more on the highest rated question than the lowest rated.

Just as Harms and Credé (2010) and Mills (2009) concluded, this study discovered that there is a relationship between leader training and emotional intelligence. At the subcategory level, perceived leaders’ transformational training idealized influence (II) and leaders’ emotional intelligence use of emotion (UOE) resulted in a significant correlation of 0.55. With idealized influence (II) centering on leaders being role models and gaining the trust and respect of their employees, it is plausible that this was tied to use of emotion (UOE) as this subcategory is

focused on self-cultivation being a leader that employees want to follow. This is like Barling et al. (2000) asserting that idealized influence (II) in leaders “who know and can manage their own emotions and who display self-control and delay of gratification, could serve as role model for their followers, thereby enhancing followers’ trust in and respect for their leaders” (p. 157).

Third, psychological safety has been primarily explored in healthcare, financial, and educational contexts. The research contributes to the theory of psychological safety as an important dimension in technical teams at the group-level in alignment with Edmondson and Lei (2014) as they contend that psychological safety “lives at the group level” (p. 37). This assertion was reinforced by Frazier et al. (2017), stating that literature would benefit from more psychological safety research performed at the group-level. The sense of being psychologically safe supports innovation by inspiring creative interactions, which can generate new knowledge and have a positive effect on organizations revenues with the creation of new products and services (Collins & Smith, 2006). With this, companies will need to cultivate psychologically safe environments for their technical teams. Leaders that unambiguously communicate their expectations to achieving company goals are more likely to lead to their employees to perceived psychological safety as employees better comprehend their assignments (Frazier et al., 2017).

The importance of technical organizations and teams cannot be understated as they provide a necessary service for companies to operate. Technical organizations have changed their posture from a supporting to a strategic role. Companies are and will continue to be reliant on their technical teams insight to new technologies and processes. Technical teams flourish when they are empowered to be innovative and have opportunities to experience the exhilaration of discovery (Roberts, 2013). The changing landscape of technology requires teams to be flexible, agile, and take risks in complex environments.

Employees of first level technical leaders were asked seven questions concerning their teams psychological safety. Employee psychological safety scores of each question were reviewed. The team psychological safety question with the lowest mean (5.43) was “It is safe to take a risk on this team.” It was unfortunate to see that taking a risk was the lowest rated of all the questions as this is the foundational premise to psychological safety.

Fourth, while the outcomes of psychological safety have been studied previously from both promotion behaviors (e.g., learning) and prevention behaviors (e.g., knowledge hiding), this research reinforces findings in other workplace settings. Of particular interest, the team learning question with the lowest mean (4.53) was the reverse coded “This team tends to handle differences of opinion privately or off-line, rather than addressing them directly as a group.” This suggested that teams that are psychologically safe address differences of opinion openly as a group versus having private conversations with individual members.

Psychological safety has been recognized in organizational research as an essential component in understanding the phenomena (e.g., teamwork and team learning) (Edmondson & Lei, 2014). As Edmondson (2002) asserts, a group-level assessment on learning behaviors highlights interpersonal perceptions and actions. Its view is directed on interactions among a small number of individuals and how these promote or prevent the process of developing new knowledge and taking new action. Empirical evidence suggested that psychological safety could facilitate learning behavior in work teams as it boosts employees confidence that the team will not admonish any team member for speaking up (Edmondson, 1999).

The team knowledge hiding question with the lowest mean (1.20) was “Say that we will not answer others’ questions” in the rationalized hiding subcategory. This infers that the surveyed employees are almost always answering questions posed to them.

These results provide support to the existence of knowledge hiding in organizations as recognized by Connelly et al. (2012). Specifically, colleagues hide knowledge from each other by using three separate strategies: evasive hiding, playing dumb, and rationalized hiding. Organizational effectiveness is impeded with knowledge hiding (Connelly et al., 2012) and it continues to be widespread in current work environments (Peng, 2013). First level leaders who want to reduce the number of occasions of knowledge hiding have options including fostering employees opportunities for social interactions and exhibiting their support for a knowledge sharing climate (Connelly & Kelloway, 2003). Prompt mediations may help to preclude negative outcomes related to knowledge hiding behaviors from becoming embedded and even more challenging to control (Garud & Kumaraswamy, 2005).

Implications for Business Practice

This study has several important practical implications. The research findings can be used to help extend the understanding of the important topic of team psychological safety. The benefits to science and/or society include a better understanding of how first level technical leaders develop and shape working environments for their employees. The results of this research indicate that teams who are psychologically safe are inclined to display learning behaviors and minimize knowledge hiding behaviors which is compelling for technical teams due to their mounting responsibilities. Study outcomes are useful for organizations that choose to develop and invest in their leaders capabilities as the development of effective leaders are acknowledged as an important priority in organizations (Pratt, 2019).

The empirical evidence provided in this study may influence organizations to consider modifying their existing training programs or creating and implementing transformational leadership training for their first level technical leaders. Preparing individual contributors that

have the desire and capability to be first level leaders is an essential responsibility for organizations as first level leaders generally supervise 80% of the workforce. Focusing on individual contributors as they begin their management career provides maximum time for leaders to embrace and absorb transformational leadership concepts, emotional intelligence concepts, and put their training into practice.

For existing first level technical leaders, the research provides insight into the importance of transformational leadership training and emotional intelligence in creating a psychologically safe working environment. For employees who aspire to move into a supervisory role, it is recommended that they request transformational leadership training. If companies are not willing to invest in their employees, employees should invest in themselves and seek to acquire transformational leadership traits given this study's suggested impact and effect on team psychological safety. Specifically, given the high correlation and significance, it is recommended that the training concentrates on the transformational leadership subcategory of idealized influence and the emotional intelligence subcategory of use of emotion. The focus on these two subcategories will provide insight as to the importance and value of technical leaders stepping forward from their role of being individual contributors and guiding them to embrace their new position being leaders who are respected role models that their employees want to follow. Leaders should inspire their employees with their vision of meeting organizational goals and take responsibility for their communications and the impact it has on their employees.

This research is relevant and timely as technical teams continue to receive increased responsibilities for developing innovative products and cost-effective services. The responsibility placed on first level technical leaders continues to increase and intensify for the delivery of improved processes leveraging various technologies. Creating and fostering psychologically safe

environments will assist employees to openly communicate and meet corporate goals positively contributing to their companies success. Research reveals that companies suffer when employees don't share their ideas (Edmondson, 2018). Leadership training and behaviors will need to continue to evolve to effectively address to the evolving needs of organizations, and the prospect of inspiring better leadership and consequently promoting improved psychologically safe working environments is inspiring.

Limitations

As is the case in all studies, this study has limitations. It is recommended that future research should replicate these findings on different populations to confirm the generalizability of the current findings. Data was gathered from nine companies from three industries. While there are several similarities across industries allowing for the generalization of team psychological safety, it may be limited. Furthermore, this study is US-based. This research focuses on first level technical leaders and their respective employees. Again, there are similarities concerning first level leaders, but it may have boundaries. Technology teams are not historically known for prioritizing and completing humanities or soft skills training, therefore there may be a limitation to generalize the results.

Common method bias can arise when the variables (independent and dependent) are both obtained by the same response process (Kock et al., 2021). To address this in the self-reported responses, survey participants were asked to participate in interviews elaborating on their survey answers. The size of the technical teams examined in this study may present a potential boundary condition. The team size ranged from three to six team members reporting to a leader. Psychological safety may not have the same magnitude or significance on larger teams.

Study findings are the result of self-reported survey responses from first level technical leaders regarding the extent of their leadership development training and their self-assessment of emotional intelligence. Employees of first level technical leaders were asked questions regarding their level of team psychological safety, team learning, and team knowledge hiding. As with research that addresses interpersonal behaviors, it is possible that study participants responded in socially desirable ways. Thus, participants were assured their responses would be confidential in an attempt to mitigate this potential issue. Participants' honesty in answering the survey and interview questions was paramount.

Recommendations for Future Research

An important expansion of extant literature has been provided to address specific antecedents and outcomes of team psychological safety as an implication for future research. To further substantiate these results, it is recommended that an increased scope of population, both the number of participants and the geographic regions, be pursued. In this study there were 655 surveys sent via email with a total of 400 responding participants, 92 first level technical leaders and 308 employees reporting to first level technical leaders. This population sample allowed inferences to be proposed regarding a larger population. An increased number of participants could be sought. Collecting a larger population sample can help with bias, and most other sampling issues, to minimize errors and strengthen validity of the findings. Also, different industries and companies should be included in this area of research to demonstrate additional support for these results increasing the depth and breadth of this study.

The team tenure was an average of 6.61 years in this study. Newly formed teams of approximately one year could provide a different perspective of their leaders' behaviors with an opportunity to understand the working environment associated with team psychological safety.

Further, as this research included only US companies, different countries could be included and results compared. Consideration could be given to separating the cause and effects of the responses based on participants living in different regions or countries. Also, there is an opportunity for additional research to uncover if demographic (i.e., gender) or geographic (i.e., non-US based organizations) render different responses.

A cross-sectional design was used for this study capturing data at one point in time. Given the inherently dynamic nature of learning, a snapshot may provide an incomplete picture. Future research should consider longitudinal designs that provide a progressive view of how team psychological safety develops over time including observer rated elements. The history of the team and how long the team members have worked together, may provide insight to their behaviors (e.g., learning and knowledge hiding).

Three of the four research hypotheses were supported; however, H2 failed to be supported though three different methods that were sought. Further exploration is encouraged to investigate the details of the resulting multicollinearity between perceived leaders transformational training and leaders emotional intelligence. It is recommended that this investigation include the association of the four transformational leadership elements and four emotional intelligence elements. Due to the strong positive correlation between these two variables, the possibility of a direct relationship may exist. Since the data failed to support the hypothesis that the relationship between perceived leaders transformational training and team psychological safety is moderated by leaders emotional intelligence, then it may be possible that leaders transformational training directly increases leaders emotional intelligence (Goleman, 1995). The direct relationship between transformational leadership training and emotional intelligence should be further investigated.

This research addresses a specific level of leaders, first level leaders and their individual contributor employees. It is advocated that this research be performed with more senior level technical leaders and their direct reports to determine if their teams have similar levels of psychological safety as they may have different degrees of political, organizational culture, or recognition and rewards.

With team knowledge hiding reflecting employees shared perceptions, it is recommended that future research explore the specific cultures of teams to determine why the behavior occurs, how the behavior is expressed, and the effect on employees. Knowledge hiding can have negative effects on those that are hiding knowledge with regard to their interpersonal relationships (Černe et al., 2017; Černe et al., 2014) that could be pursued. Research to understand the additional antecedents and consequences of team knowledge hiding is suggested.

Conclusion

This research aspired to inform and complement ongoing studies as the search for answers continues in the relationships between transformational leadership, emotional intelligence, team psychological safety and teams behaviors, particularly in technical teams. This study provides empirical evidence that leaders perceived exposure through both formal and informal transformational leadership training predicts team psychological safety and team psychological safety predicts learning behaviors and knowledge hiding behaviors.

The research findings provide a clear call to action for organizations with technical teams. Given the fast pace of change and disruptive technologies being developed, more creativity and risk taking is required by technical teams that could lead to achieving swift marketplace penetration. Team psychological safety is needed for employees to have an environment where agility, innovation, and experimentation is encouraged. To do so, first level

technical leaders have a tremendous opportunity to set the tone and lead the way by opening the doors for active thinking and fostering an environment for employees to thrive and reach their full potential by performing, failing, and growing on the job.

As reported by Pratt (2019), leadership is a top priority for organizations; however, less than half of those surveyed state they are ready to meet their leadership requirements. It is important to invest in transformational leadership training for first level technical leaders to provide a psychologically safe environment for their employees. Organizations should provide training to leaders upon entry to a supervisory position emphatically working to reduce the 19 years on average that a supervisor is leading without training (Zenger & Folkman, 2020).

Technical work is demanding, challenging, and thought provoking. It must be coordinated through team communication. Employees sharing their input and being curious to hear what others share is critical to team psychological safety. When team members are safe, they will apply their ingenuity which provides outgrowth to team learning and reduces team knowledge hiding. Leaders who had positive responses from their team members reportedly provided a clear mission that aligned their employees to a greater purpose and informed their employees with candor the challenges they are up against. These leaders humbly and transparently shared that they do not know all the answers and are looking for their teams to work with them collaboratively taking calculated risks to solve problems.

It is envisioned that this study encourages researchers to pursue future investigations into the antecedents and outcomes of team psychological safety. When leaders create and foster a psychologically safe environment, they are winning the hearts and minds of their employees.

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APPENDIX A: IRB APPROVAL LETTER

Pepperdine University
24255 Pacific Coast Highway
Malibu, CA 90263
TEL: 310-506-4000

NOTICE OF APPROVAL FOR HUMAN RESEARCH

Date: October 08, 2021

Protocol Investigator Name: Susan Nakashima

Protocol #: 21-07-1620

Project Title: Developing Psychological Safety in Technical Teams

School: Graziadio School of Business and Management

Dear Susan Nakashima:

Thank you for submitting your application for exempt review to Pepperdine University's Institutional Review Board (IRB). We appreciate the work you have done on your proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations 45 CFR 46.101 that govern the protections of human subjects.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit an amendment to the IRB. Since your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite the best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete written explanation of the event and your written response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the IRB and documenting the adverse event can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* at community.pepperdine.edu/irb.

Please refer to the protocol number denoted above in all communication or correspondence related to your application and this approval. Should you have additional questions or require clarification of the contents of this letter, please contact the IRB Office. On behalf of the IRB, I wish you success in this scholarly pursuit.

Sincerely,

Judy Ho, Ph.D., IRB Chair

cc: Mrs. Katy Carr, Assistant Provost for Research

APPENDIX B: CONSENT FORM FOR SURVEY

IRB Number # 21-07-1620

Study Name: Developing Psychological Safety in Technical Teams

My name is Susan Nakashima. I am conducting a study in team psychological safety. I intend to provide actionable team psychological safety research to shape first level technical leadership programs. If you are 19 years of age or older and are a first level technical leader or report to a first level technical leader, you may participate in this research.

Participation in this study will require approximately 5 - 10 minutes to complete several questions and will take place via online survey.

Your survey responses will be captured and safeguarded. Your survey information will be stored on my password-protected laptop computer and backed up with two-factor authentication in private cloud storage, e.g., Microsoft's Azure private cloud, accessible through a web-based interface.

A spreadsheet with employee names and survey codes identifying the leader-employee relationship will be maintained for a brief period as is necessary for the research. The only permanent record (retained for three years) will be survey codes, not any personally identifiable information (PII). There will be no disclosure of PII back to companies nor disclosure of who has participated or not.

The results of this survey will be used to help extend the understanding of the important topic of team psychological safety.

You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the study.

For study related questions, please contact me (Principal Investigator) at susan.nakashima@pepperdine.edu or 1 (626) 826-0566.

For questions concerning your rights or complaints about the research, contact the Institutional Review Board (IRB):

- Phone: 1 (310) 568-2305
- Email: gpsirb@pepperdine.edu

You can decide not to be in this research study, or you can stop being in this research study ("withdraw") at any time before December 31, 2021, for any reason. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with me (Principal Investigator), Pepperdine University, or your employer.

You are voluntarily making a decision whether or not to participate in this research study. By clicking on the “I agree” button below, your consent to participate is implied. You should print a copy of this page for your records.

- I agree
- I do not agree

APPENDIX C: COVER LETTER INVITING RESEARCH PARTICIPANTS

You are invited to participate in an important research project, "Developing Psychological Safety in Technical Teams." Team psychological safety is the shared belief that the team is safe for interpersonal risk taking. Upon completion of this survey, you will be entered in a random drawing for a new and current generation iPad.

The purpose of my research is to assist technical organizations by identifying the leadership training components that prepare first level technical leaders to create team psychological safety. As a doctoral candidate, I am conducting this research under my supervisor's and Institutional Review Board (IRB) guidance at Pepperdine University.

You are being asked to be included in this study as you are either an employee reporting directly to a first level technical leader/supervisor or a first level technical leader/supervisor. The questions in this brief survey focus on transformational leadership concepts (formal and informal training), emotional intelligence, team psychological safety, and team behaviors.

You must be 19 years of age or older to participate in this study and your participation in this survey is voluntary. You can decide not to be in this research study, or you can stop being in this research study ("withdraw") at any time before December 31, 2021. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with me as the Principal Investigator, Pepperdine University, or your place of employment.

This survey has been approved by the IRB of Pepperdine University. Your responses will be stored confidentially in a password-protected laptop computer and backed up with two-factor authentication in private cloud storage, e.g., Microsoft's Azure private cloud, accessible through a web-based interface. The survey responses you provide can be linked to your personally identifiable information (PII) for a brief intervening period only by me/Principal Investigator between your survey response and when the PII is deleted. The only long-term record, three years, will be the unique survey codes.

Please use the coded link below to gain access to the consent form followed by the survey. Should you wish to answer the questions on paper, please contact me at the email address below.

I am committed to assisting organizations to be more developmental, and your responses will help me in my research and results. Upon request, an executive summary of my findings can be made available to you. Thank you very much for your participation!

Susan Nakashima
Principal Investigator
Doctoral Candidate
Pepperdine University
Susan.Nakashima@pepperdine.edu

APPENDIX D: SURVEY QUESTIONS

Please advise your status:

- I am a first level technical leader
- I report to a first level technical leader → Skip to Q31

First Level Technical Leaders

As you answer the next 14 questions, consider your exposure through both formal (instructor-led or web-based) and informal (books, casual advisor) leadership training.

Likert scale of 1 – 7 (Strongly disagree to strongly agree).

To what extent were you trained to...

- Q1. Acknowledge every follower's needs?
- Q2. Provide support and empathy to your followers/employees?
- Q3. Be considerate of individual talents, backgrounds, and situations?
- Q4. Create appealing visions by showing optimism about followers' abilities?
- Q5. Create a sense of purpose and encourage team spirit?
- Q6. Act as a role model by adhering to high levels of ethical and moral conduct?
- Q7. Provide a sense of vision and mission?
- Q8. Gain followers trust and respect?
- Q9. Challenge assumptions?
- Q10. Take risks?
- Q11. Help followers think outside the box?
- Q12. Provide stimulation by her/his ideas?
- Q13. Provide opportunities for creativity?
- Q14. Provide motivation?

Please answer these questions related to emotional intelligence.

Likert scale of 1 – 7 (Strongly disagree to strongly agree):

- Q15. I have a good sense of why I have certain feelings most of the time.
- Q16. I have good understanding of my own emotions.
- Q17. I really understand what I feel.
- Q18. I always know whether or not I am happy.
- Q19. I always know others' emotions from their behavior.
- Q20. I am a good observer of others' emotions.
- Q21. I am sensitive to the feelings and emotions of others.
- Q22. I have a good understanding of the emotions of people around me.
- Q23. I always set goals for myself and then try my best to achieve them.
- Q24. I always tell myself I am a competent person.
- Q25. I am a self-motivated person.
- Q26. I would always encourage myself to try my best.
- Q27. I am able to control my temper and handle difficulties rationally.
- Q28. I am quite capable of controlling my own emotions.

- Q29. I can always calm down quickly when I am very angry.
Q30. I have good control of my own emotions.

Employees Reporting to First Level Technical Leaders

Please answer the questions based on your perception of team leader's training. Consider past interactions with your team's leader.

Likert scale of 1 – 7 (Strongly disagree to strongly agree).

Does your team leader:

- Q31. Acknowledge every follower's needs?
Q32. Provide support and empathy to followers/employees?
Q33. Provide consideration of individual talents, backgrounds, and situations?
Q34. Create appealing visions by showing optimism about followers' abilities?
Q35. Create a sense of purpose and encourage team spirit?
Q36. Act as a role model by adhering to high levels of ethical and moral conduct?
Q37. Provide a sense of vision and mission?
Q38. Gain followers trust and respect?
Q39. Challenge assumptions?
Q40. Take risks?
Q41. Help followers think outside the box?
Q42. Provide stimulation by her/his ideas?
Q43. Provide opportunities for creativity?
Q44. Provide motivation?

Please answer these questions related to your perception of your team leader's emotional intelligence. Consider past interactions with your team's leader.

Likert scale of 1 – 7 (Strongly disagree to strongly agree):

Does/Is your team leader:

- Q45. Have a good sense of why she/he has certain feelings most of the time?
Q46. Have a good understanding of her/his own emotions?
Q47. Really understand what she/he feels?
Q48. Always know whether or not she/he is happy?
Q49. Always know others' emotions from their behavior?
Q50. A good observer of others' emotions?
Q51. Sensitive to the feelings and emotions of others?
Q52. Have a good understanding of the emotions of people around her/him?
Q53. Always set goals for herself/himself and then try her/his best to achieve them?
Q54. Always tell herself/himself she/he is a competent person?
Q55. A self-motivated person?
Q56. Always encourages herself/himself to try her/his best?
Q57. Able to control her/his temper and handle difficulties rationally?

- Q58. Quite capable of controlling her/his own emotions?
Q59. Always calm down quickly when she/he is very angry?
Q60. Have good control of her/his own emotions?

Please answer these questions related to team psychological safety.
Likert scale of 1 – 7 (Very inaccurate to very accurate):

- Q61. If you make a mistake on this team, it is often held against you.
Q62. Members of this team are able to bring up problems and tough issues.
Q63. People on this team sometimes reject others for being different.
Q64. It is safe to take a risk on this team.
Q65. It is difficult to ask other members of this team for help.
Q66. No one on this team would deliberately act in a way that undermines my efforts.
Q67. Working with members of this team, my unique skills and talents are valued and utilized.

Please answer these questions related to team learning behavior.
Likert scale of 1 – 7 (Very inaccurate to very accurate):

- Q68. We regularly take time to figure out ways to improve our team's work processes.
Q69. This team tends to handle differences of opinion privately or off-line, rather than addressing them directly as a group.
Q70. Team members go out and get all the information they possibly can from others such as customers, or other parts of the organization.
Q71. This team frequently seeks new information that leads us to make important changes.
Q72. In this team, someone always makes sure that we stop to reflect on the team's work process.
Q73. People in this team often speak up to test assumptions about issues under discussion.
Q74. We invite people from outside the team to present information or have discussions with us.

Please answer these questions related to team knowledge hiding behavior.
Likert scale of 1 – 7 (1/Not at all, 4/Somewhat, and 7/To a very great extent).

Generally, our team/we:

- Q75. Agree to help others but never really intend to.
Q76. Agree to help others but instead give information different than wanted.
Q77. Tell others that we will help them later but stall as much as possible.
Q78. Offer others some other information instead of what is really wanted.
Q79. Pretend that we do not know the information.
Q80. Say that we do not know even though we do.
Q81. Pretend we do not know what others are talking about.
Q82. Say that we are not very knowledgeable about the topic.
Q83. Explain that we would like to tell others but are not supposed to.
Q84. Explain that the information is confidential and only available to people on a particular project.

Q85. Tell others that my boss will not let anyone share this knowledge.

Q86. Say that we will not answer others' questions.

Q87. Please provide any additional information you believe would be meaningful for the research topic, "Developing Psychological Safety in Technical Teams." (Essay/Open-ended question).

Demographic

Q88. What is your gender?

- Male
- Female
- Prefer not to specify

Q89. What is your ethnicity?

- White
- Hispanic or Latino
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Other

Q90. What is your highest level of education?

- High school diploma
- Associate's degree
- Bachelor's degree
- Master's degree
- Doctorate degree

Q91. What is your age?

Q92. Number of team members including yourself (excluding your team leader)?

Q93. Number of years in your current team?

Q94. Number of years of work experience in your current company?

Q95. If you would like to participate in an interview by phone, please click "yes" below. By doing so, you will be directed to a separate survey. If you do not wish to participate in an interview, please click "no" to end the survey.

- Yes
- No

End of Survey Thank You

I am extremely grateful for your contributions of your valuable time and honest information.

Thank you very much!

Susan Nakashima
Doctoral Student
Pepperdine University



APPENDIX E: CONSENT FORM FOR INTERVIEW

IRB Number # 21-07-1620

Study Name: Developing Psychological Safety in Technical Teams

Authorized Study Personnel

Principal Investigator: Susan Nakashima Cell: 1 (626) 826-0566
susan.nakashima@pepperdine.edu

Secondary Investigator: Ann Feyerherm Office: 1 (949) 223-2534
ann.feyerherm@pepperdine.edu

Invitation

You are invited to take part in this portion of the research study. The information in this form is meant to help you decide whether or not to participate. If you have any questions, please ask.

Why are you being asked to be in this research study?

You are being asked to be in this study because you are either a first level technical leader or report directly to a first level technical leader, and you are 19 years of age or older.

What is the reason for doing this research study?

I am conducting a study on team psychological safety. I intend to provide actionable team psychological safety research to shape first level technical leadership programs. This research is designed to answer the following key questions:

- What is the perceived impact of formal (instructor-led or web-based) and informal (books, casual advisor) leadership training on team members' psychological safety in technical teams?
- Does team leaders' emotional intelligence influence the relationship between the perceived impact of formal and informal leadership training and team members' psychological safety?
- Does team members' psychological safety influence teams' behaviors?

What will be done during the research study?

This interview is expected to take about one hour of your time and will involve you answering a series of follow up questions associated with the survey regarding your experience as either a first level technical leader or as a direct report to a first level technical leader. The interview will take place via telephone.

The information collected during the interview will be manually captured/typed in MS Word and stored for three years on my (Principal Investigator's) password-protected laptop computer and

backed up with two-factor authentication in private cloud storage, e.g., Microsoft's Azure private cloud, accessible through a web-based interface. Only I will have access to this file. Please be assured that my interview notes will not be used for any other purpose than this research project.

How will your interview be used?

Your interview will be analyzed together with that of other participants, and at some stage in the future, the academic team (Susan Nakashima and Ann Feyerherm) will use your interview (along with that of other participants) as data to inform my doctoral dissertation and potentially an academic journal article and/or business book.

What are the possible risks of being in this research study?

This research presents risk of loss of confidentiality. In addition, there is a potential risk of feeling coerced into participating in this research and the psychological risk relating to not knowing the answers to certain questions. Lastly, each of the participants will be given a choice, at the 25 or 30-minute mark, to take a break (water, food, bathroom) as to avoid the potential risk of fatigue.

What are the possible benefits to you?

Reflecting on and discussing your experiences as a first level technical leader or as an employee reporting directly to a first level technical leader may help you to further refine your own learning or knowledge. However, you may not get any benefit from being in this research study.

What are the possible benefits to other people?

The benefits to science and/or society may include a better understanding of how first level technical leaders develop and shape working environments for their employees. This will be useful for organizations that want to develop and invest in their leaders' capabilities. The research findings will be used to help extend the understanding of the important topic of team psychological safety.

What will being in this research study cost you?

There is no cost to you to be in this research study.

Will you be compensated for being in this research study?

No compensation will be provided.

What should you do if you have a problem during this research study?

Your welfare is the major concern of every member of the research team. If you have a problem as a direct result of being in this study, you should immediately contact one of the people listed at the beginning of this consent form.

How will information about you be protected?

Reasonable steps will be taken to protect your privacy and the confidentiality of your study data. The interview responses you provide will be linked to the survey responses you have already provided. All personally identifiable information (PII) used to make that connection will be deleted immediately following the interview so that all the data you have provided will become completely anonymous. The data will be seen by the research team during the study and for three years after the study is complete. The only persons who will have access to your research records are the study personnel, the Institutional Review Board (IRB), and any other person, agency, or sponsor as required by law. The information from this study may be published in scientific journals or presented at scientific meetings but the data will be reported as a group or summarized data and your identity will be kept strictly confidential.

What are your rights as a research subject?

You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the study. For study related questions, please contact the Investigator(s) listed at the beginning of this form. For question concerning your rights or complaints about the research, contact the Institutional Review Board (IRB):

• Phone: 1 (310) 568-2305 • Email: gpsirb@pepperdine.edu

What will happen if you decide not to be in this research study or decide to stop participating once you start?

Participation in this research is entirely voluntary and you may withdraw your participation at any time before December 31, 2021, without explanation. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with the Investigators or with Pepperdine University. You will not lose any benefits to which you are entitled.

Documentation of informed consent

You are voluntarily making a decision whether or not to be in this portion of the research study. By clicking on the “I agree” button below, your consent to participate is implied. This means that (1) you have read and understood this consent form, (2) any questions you had have been answered, and (3) you have decided to be in this portion of the research study.

- I agree
- I do not agree

APPENDIX F: INTERVIEW PROTOCOL

This interview is being conducted by:

Susan Nakashima
Principal Investigator
Doctoral Candidate
Pepperdine University

A semi-structured interview protocol will be used including pre-interview information and procedures. The Principal Investigator will introduce herself as a Principal Manager at Southern California Edison and a student at Pepperdine University Graziadio Business School, Executive DBA Program. The interview participants will be reminded of the topic “Developing Psychological Safety in Technical Teams”.

The Principal Investigator will advise the participants that one hour has been allocated for the interview and will thank the interviewees in advance for their candid feedback.

Participants will be assured that there are no right or wrong answers, only their perspectives and experiences in their work environment as it relates to the topic of discussion are sought.

Participants will be able to decide not to answer any question and will be provided with the option to remove themselves from the study at any point.

The following questions will be asked of first level leaders:

1. Do you have any questions that I can answer for you before we begin the interview?
2. Please tell me a little bit about yourself, your gender, age, number of members on your team, number of years leading the current team, and in what US state do you reside?
3. How effective do you believe your formal (instructor-led or web-based) leadership training has been?
4. How effective do you believe your informal (books, casual advisor) leadership training has been?
5. Did your leadership training include emotional intelligence? If so, do you believe it was effective? Why or why not?
6. Do you have a mentor? If so, is leadership one of the focus areas? If not, why not?
7. Is there anything else you'd like to share with me before we conclude our discussion?

The following questions will be asked of first level leaders' employees:

1. Do you have any questions that I can answer for you before we begin the interview?
2. Please tell me a little bit about yourself, your gender, age, number of members on your team, number of years leading the current team, and in what US state do you reside?
3. Can you describe your time on this team working with your current leader?
4. Do you feel there is an open line of communication with your leader?
5. Do you feel comfortable approaching your leader with problems and voicing your opinion? Why or why not?
6. When you took a risk and made a mistake, as we all do, what was the situation, and what was your leader's reaction? Did her/his reaction surprise you? Why or why not? Based on this, how much risk are you comfortable assuming?
7. Overall, how would you summarize your experience working for your current leader?
8. Are there any suggestions you have for improving your working environment?
9. Is there anything else you'd like to share with me before we conclude our discussion?

The Principal Investigator will be conducting all interviews via telephone. Interview notes collected will be typed in MS Word and stored for three years on the Principal Investigator's password-protected laptop computer and backed up with two-factor authentication in private cloud storage, e.g., Microsoft's Azure private cloud, accessible through a web-based interface.

The interviews will be concluded with the Principal Investigator thanking the participants for their time and honest feedback. If the interview participants are interested in reviewing the manually recorded notes, the notes will be sent as requested.

APPENDIX G: LETTER TO CHIEF INFORMATION OFFICIERS (CIO)

I would appreciate your organization's contributions to an important research project, "Developing Psychological Safety in Technical Teams." This research is being conducted under my supervisor's and Institutional Review Board (IRB) guidance.

As a doctoral candidate at Pepperdine University, I am committed to assisting organizations to be more developmental, and your teams' responses will help me in my research and results. Upon request, an executive summary of my findings can be made available to you.

The purpose of my research is to assist technical teams by identifying the leadership training components that prepare first level technical leaders to create team psychological safety. Team psychological safety is the shared belief that the team is safe for interpersonal risk taking.

The research includes a survey with questions on transformational leadership concepts (formal and informal training), emotional intelligence, team psychological safety, and team behaviors. Upon completion of the survey, participants will be asked if they are interested in participating in a telephone interview.

Participants must be 19 years of age or older. They can decide not to be in this research study, or stop being in this research study ("withdraw") at any time before, during, or after the research begins for any reason. Deciding not to be in this research study or deciding to withdraw will not affect their relationship with me as the Principal Investigator or Pepperdine University. On December 31, 2021, all participants who completed the survey and did not withdraw their data will be entered in a random drawing for a new and current generation iPad.

Survey responses will be captured and safeguarded. Survey respondents' information will be stored on my password-protected laptop computer and backed up with two-factor authentication in private cloud storage, e.g., Microsoft's Azure private cloud, accessible through a web-based interface.

A spreadsheet with employee names and survey codes identifying the leader-employee relationship will be maintained for a brief period as is necessary for the research. The only permanent record (retained for three years) will be survey codes, not any personally identifiable information (PII). There will be no disclosure of PII back to your company nor disclosure of who has participated or not.

Thank you for your consideration to support this research with an eye towards the benefits it might bring to you as well. I will work with you to communicate your support to your respective employees. I would appreciate your administrative staff providing me with email addresses (noting leader-employee teams) by November 5, 2021.

Sincerely,
Susan Nakashima
Principal Investigator
Doctoral Candidate, Pepperdine University

APPENDIX H: CIO LETTER TO EMPLOYEES

To: First level leader technical leaders and their direct staff members:

I invite you to take part in a survey focused on “Developing Psychological Safety in Technical Teams.” This research is being conducted by a doctoral student and Principal Investigator, Susan Nakashima, at Pepperdine University.

The purpose of this research is to assist technical teams by identifying the leadership training components that prepare first level technical leaders to create team psychological safety. Team psychological safety is the shared belief that the team is safe for interpersonal risk taking.

Upon completion of the survey, you will be asked if you are interested in participating in a telephone interview. If you choose to participate, you will be directed to a separate survey to provide your email address and/or telephone number.

You will soon be receiving an email from Susan.Nakashima@pepperdine.com requesting your participation in the survey. Participation in this research is voluntary. You can decide not to be in this research study, or stop being in this research study (“withdraw”) at any time before December 31, 2021 for any reason. Deciding not to be in this research study or deciding to withdraw will not affect your relationship with the Principal Investigator, Pepperdine University, or your employment.

Survey responses will be captured and safeguarded. Survey respondents’ information will be stored on the Principal Investigator's password-protected laptop computer and backed up with two-factor authentication in private cloud storage, e.g., Microsoft’s Azure private cloud, accessible through a web-based interface.

The Principal Investigator will be able to identify participant answers only in the intervening period between the survey response and when your personally identifiable information (PII) is deleted. A spreadsheet with employee names and survey codes identifying the leader-employee relationship will be maintained for a brief period as is necessary for the research. The only permanent record (retained for three years) will be survey codes, not any PII. There will be no disclosure of PII back to our company nor disclosure of who has participated or not.

Upon completion of the survey, participants will be entered in a random drawing for a new and current generation iPad provided by the Principal Investigator. I appreciate your consideration to support this research.

Sincerely,

Name
Chief Information Officer
Company