Learning Agility in Context:

Engineers' Perceptions of Psychologically Safe Climate on Performance

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ABSTRACT

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Organizations are changing faster than ever underscoring the importance of being learning agile—that is, learning new concepts and skills quickly while integrating learnings from past experiences to new situations in order to be successful (Mitchinson & Morris, 2012). Learning agility has been a topic of interest for almost two decades, and while research to date has demonstrated a positive relationship between learning agility and various performance outcomes (Dries, Vantilborgh, & Pepermans, 2012; Lombard & Eichinger, 2000; Smith, 2015), it remains to be seen whether certain contextual variables enhance, diminish, or altogether change learning agility's positive impact on performance (DeRue, Ashford, & Myers, 2012). This research examined organizational climate rooted in psychological safety as a contextual factor, or moderator, and how it influences when learning agility leads to high performance. While learning agility and psychologically safe climate were not significant predictors of performance, a marginally significant interaction revealed that when an organization's climate is perceived as low in psychological safety, those who score lower on learning agility perform worse than highly learning agile individuals. However, counterintuitive findings suggest than when the organization's climate is perceived as high in psychological safety, those who score lower on learning agility outperform those who score higher on learning agility. Exploratory and post-hoc analyses are used to better understand the data and the organizational context in which the results occurred. Directions for future research are discussed along with implications for organizations.

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Now, with the completion of this PhD, I am on to more learning...

L. C.-F.

Chapter I

INTRODUCTION AND STUDY PURPOSE

The importance of continuous learning in the workplace has been of interest for quite some time (McCall, Lombardo, & Morrison, 1988; Morrison; White, & Van Velsor, 1992; Spreitzer, McCall, & Mahoney, 1997). More than ever, an individual's capacity for ongoing learning and development is an expectation in the workforce today because organizations, and the contexts in which they operate, are rapidly changing (Marsick & Watkins, 2003). Thus, success is dependent upon how individuals and the organizations in which they operate adapt to change in the business environment.

Learning agility, "the ability to come up to speed quickly in one's understanding of a situation and move across ideas flexibly in service of learning" (DeRue, Ashford, & Myers, 2012, pp. 262-263), is becoming increasingly relevant for organizations who wish to remain abreast of changes in their environments which could threaten their existence should they fail to adapt accordingly. Being learning agile means that an individual is able to manage two priorities: integrating past experiences to inform how to navigate new and unfamiliar situations in addition to learning new concepts and skills quickly (Mitchinson & Morris, 2012). Thus, it is not simply about "getting up to speed" quickly; remaining open to new perspectives and experiences in tandem with not getting "stuck in one's ways" underscores what it means to be learning agile (DeRue et al., 2012; Mitchinson & Morris, 2012).

Considerable evidence has supported that learning agility is related to important outcomes such as potential (Dries, Vantilborgh, & Pepermans, 2012; Lombardo & Eichinger, 2000), performance after promotion (Eichinger & Lombardo, 2004), and broadly defined career success

(Dai, De Meuse, & Tang, 2013). However, much of this research was built upon varying conceptualizations of learning agility, which have resulted in an obscured portrait of the importance of learning agility and its implications for individuals and organizations (DeRue et al., 2012). In their attempt to redirect future research, DeRue and colleagues (2012) integrated various conceptualizations and findings from previous research to inform a theoretical framework illustrating the underlying processes associated with learning agility. According to this framework, there are three important individual-level antecedents (i.e., goal orientation, metacognitive ability, and openness to experience) that are purported to predispose one to being learning agile. According to DeRue and colleagues, the extent to which an individual possesses these traits influences his or her learning agility is realized through a combination of behavioral and cognitive processes. These processes are purported to influence an individual's ability to learn in specific situations and extrapolate his or her learnings to new and unfamiliar situations. DeRue and colleagues suggested that this process results in increased performance over time.

In this model, DeRue and colleagues (2012) emphasized the importance of understanding the impact of contextual factors and presented a few possible examples such as organizational culture, organizational climate, and experiential learning assignments. Contextual factors, or moderators, are important when it comes to theory building because they can inform researchers and practitioners about when certain outcomes can be expected. Behavior, or performance, cannot be comprehensively understood as a simple relationship between one independent variable and one dependent variable. Instead, many variables work together to influence the dependent variable(s) forming an interaction effect. While it is impossible to account for all variables that could influence the dependent variable(s), researchers can better predict behavior when they can account for some of these variables.

To date, there has been sufficient evidence to support that a relationship exists between learning agility and performance; see, for example, Smith (2015). However, what is still unknown is which contextual variables, or moderators, shape the relationship. This is an important next step for several reasons. First and foremost, in social psychology, it is clear that regardless of an individual's personality or individual differences, the context in which an individual exists can shape behavior (Lewin, 1936). Second, while researchers currently understand that learning agility leads to higher performance, we do not completely understand why or when we can expect this positive relationship to occur. This is critical to explore because it can have implications for how we, as researchers and practitioners, understand learning agility and its applicability in the workplace. While the long-term benefits of learning agility in the workplace have not been widely studied, ample theory has suggested organizations that select and develop learning agile employees will be best positioned to adapt to change in the fast-paced and dynamic workplace (Gravett & Caldwell, 2016). Thus, for these benefits to be realized, organizations would do well to create workplace climates that are conducive to learning.

Past research has suggested that organizational climate can set the tone at the group- or department-level of an organization and influence overall performance (Burke & Litwin, 1992). Organization climate is defined as a psychological state based on shared perceptions of the organization's systems, policies, and procedures (Litwin, Humphrey, & Wilson, 1978; Schneider, Ehrhart, & Macey, 2013). The extent to which organizational climate emphasizes learning through its systems, policies, and procedures is likely to differentially influence the performance of those who are learning agile (or not). To accomplish this effect, the organization's climate must feel "psychologically safe" to employees. Psychological safety is a group-level concept that has received much attention over the past few years since studies have shown its positive relationship with various outcomes, such as task performance (Edmondson, 1999; Schaubroek, 2011), creativity and

innovation (Madjar & Ortiz-Walters, 2009), engagement (Kahn, 1990), and organizational citizenship behaviors (Walumbwa & Schaubroek, 2009). The extent to which a workgroup or department feels psychologically safe would mean that members believe they can take risks and make mistakes in support of learning, without fear of repercussions for their professional credibility (Edmonson, 1999).

It cannot be overstated that learning agility is an important skill for organizations to encourage and develop in their employees as they strive for high performance in the dynamic context in which organizations currently operate. Our limited understanding of contextual factors that influence the relationship between learning agility and performance is a critical shortcoming because it has an impact on our ability to fully realize the benefits of learning agility in the workplace. Therefore, this study will help researchers and practitioners alike understand how an aspect of organizational climate—in this case, psychological safety—may influence and shape the relationship between learning agility and performance, which in turn may guide how to maximize the organizational outcomes associated with a learning agile workforce.

Chapter II

LITERATURE REVIEW AND HYPOTHESES

Early Research and Conceptualization

Before Lombardo and Eichinger (2000) introduced the term *learning agility*, research on the benefits of learning-on-the-job and learning from past experiences was already well known. For example, Spreitzer and her colleagues (1997) conducted a field study of six international organizations to explore potential predictors of executive potential. They developed an assessment to measure executive potential entitled the Prospector Survey, which measured one's ability to learn based on six competencies (i.e., uses feedback, is culturally adventurous, seeks opportunities to learn, is open to criticism, seeks feedback, is flexible). Their findings indicated that only two of the six learning competencies were significantly related to current performance and they were unable to establish evidence of predictive validity (Spreitzer et al., 1997). However, Spreitzer et al. posited that their findings were likely a product of their dependent variable, performance appraisals, which did not incorporate any aspects of learning. In other words, it is difficult to observe learning behaviors by way of learning competencies if the performance appraisal does not include measures related to learning. While this may seem problematic, it is important to note that the formalized concept of learning agility has yet to be introduced at the time of their study. Regardless, this study is relevant to the learning agility domain because it clearly highlighted the value of learning from experiences and applying said learnings to future situations.

A few years later, Lombardo and Eichinger (2000) were perhaps the first to conceptualize and attempt to measure learning agility directly. They defined the construct as "the willingness and

ability to learn new competencies in order to perform under first-time, tough, or different conditions" (p. 323). Based on existing interview and survey data with executives, they were able to identify attributes that aligned with this definition of learning agility. They supplemented this approach with a review of the literature to ensure that the attributes represented the full scope of learning agility. Subsequently, a factor analysis revealed four distinct factors or agilities that comprise the construct learning agility: people agility, mental agility, change agility, and results agility.

Learning Agility and Outcomes

After developing their learning agility measure, Lombardo and Eichinger (2002) examined concurrent validity of their measure using evaluations from close colleagues and an independent evaluation from human resources. Their results indicated that managers who were rated highly in each of the agilities were more likely to be labeled "high potential" (Lombardo & Eichinger, 2000).

In a subsequent study exploring the predictive nature of their learning agility measure, Eichinger and Lombardo (2004) were unable to find a relationship between learning agility and promotion; however, for individuals who received a promotion, learning agility was a significant predictor of performance, but this outcome was after the fact and, therefore, at best only a correlation. While there are some clear limitations to this study, including the measure used to assess learning agility and possible common method bias (DeRue et al., 2012), these findings were the first to identify and provide support for important outcomes associated with a new type of learning in the workplace.

Later, Dries et al. (2012) investigated the extent to which assessing an individual's learning agility could identify high potentials. As with previous studies, Dries and colleagues used the measure designed by Lombardo and Eichinger (2000). The study was carefully designed to avoid common method bias by using supervisor ratings of learning agility and job performance, in

combination with potential data provided by human resources. Consistent with Lombardo and Eichinger's findings, Dries and colleagues (2012) found that learning agility significantly predicted potential. Interestingly, their results indicated that learning agility was a better predictor of potential than job performance. In fact, individuals who were rated highly by others on learning agility were 18 times more likely than their lower learning agile peers to be labeled as high potential (Dries et al., 2012). While their study had limitations including a cross-sectional design and a small sample, their findings demonstrated that an individual's learning agility should be considered as a factor when making decisions related to employee development (Dries et al., 2012).

Then, Dai et al. (2013) built on extant learning agility research by exploring career success outcomes. Specifically, they were interested in whether leader competence explained the relationship between learning agility and career success. While they did not find an effect of mediation, it should be noted that they found significant positive relationships between learning agility and leader competence, pay, and proximity to the CEO—all of which have been shown to be indicative of career success (Dai et al., 2013). Then, in a follow-up study, Dai et al. explored whether learning agility predicted rates of promotion and pay increases. They found that learning agility significantly predicted both promotion rates and pay increases above and beyond gender and education. Dai and colleagues' research was among the first to explore a variety of career success outcomes, which highlights the different ways in which learning agility can have an impact.

The notion that learning agility may predict performance were again examined most recently when Smith (2015) examined learning agility and performance with a sample of 700 leaders and executives in the financial services industry. Using performance measures collected through a consulting organization that specializes in development, he subsequently found evidence that learning agility predicts performance in the financial services industry.

A Model of Learning Agility

Recognizing that interest in learning agility was growing and without much theoretical framing, DeRue and colleagues (2012) reviewed relevant research to better understand how researchers defined and measured learning agility. They proposed that learning agility has erroneously been defined with respect to its potential antecedents and/or outcomes, potentially obfuscating what it means to be learning agile (see De Meuse, Guangrong, & Hallenbeck, 2010; Lombardo & Eichinger 2000). With an unclear conceptual definition of learning agility, the reliability and validity of the tool developed by Lombardo and Eichinger (2000) were inevitably problematic, which was concerning given that this measure was used in most, if not all, subsequent learning agility research.

While there have been some methodological flaws in measuring learning agility, this was not an indication that learning agility is an invalid construct. After all, conceptually, learning agility does appear to be fundamentally different from other constructs such as learning ability (DeRue et al., 2012; Lombardo & Eichinger, 2000). Building on the existing learning agility research, DeRue and colleagues (2012) turned their attention to developing a framework that explained how learning agility operated to affect performance.

Integrating several definitions used in past research (see DeMeuse et al., 2010; Lombardo & Eichinger, 2000), DeRue and colleagues (2012) presented a revised definition of learning agility that intended to address methodological concerns around inclusion of antecedents and/or outcomes: "the ability to come up to speed quickly in one's understanding of a situation and move across ideas flexibly in service of learning both within and across experiences" (p. 263). Building on this definition, they also proposed a model for understanding the underlying mechanisms of learning agility (see Figure 1).

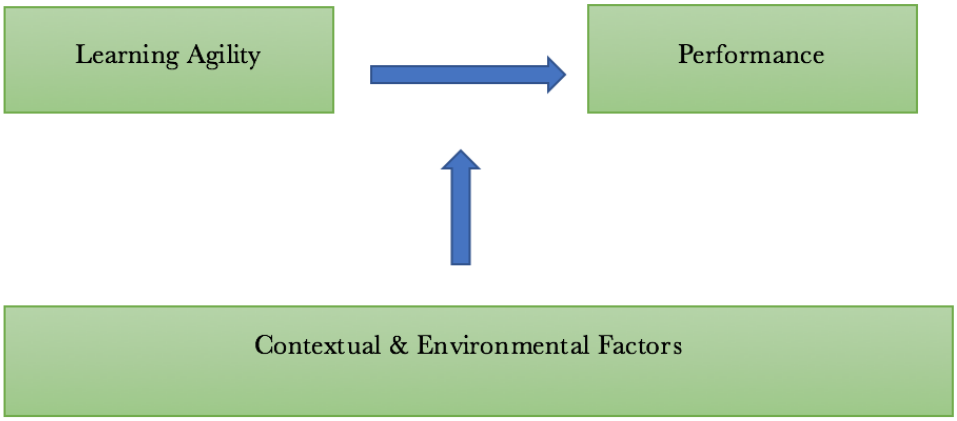

Figure 1. Annotated model of learning agility posited by DeRue, Ashford, & Myers (2012)

In their model, individual differences such as openness to experiences, goal orientation, and metacognitive ability affect an individual's capacity for learning from experiences and thus should be considered antecedents to learning agility. These antecedents then activate cognitive and behavioral processes that drive speed and flexibility—the two key processes that drive learning agility (DeRue et al., 2012). According to DeRue and colleagues (2012), cognitive processes occur in three forms: first, when the mind is exercising different possibilities/outcomes (i.e. cognitive simulations); second, when exploring alternative outcomes to past events (i.e., counterfactual thinking); and third, when making meaning from "seemingly unrelated events" (p. 268) (i.e., "pattern recognition"). On the other hand, behavioral processes are the observable actions that support learning agility such as "seeking feedback," "experimentation," and "reflection." The cognitive and behavioral processes that represent learning agility are influenced by contextual factors related to an individual's experience and/or organizational contextual factors such as culture or climate for learning. According to the model, the extent to which contextual factors influence learning agility leads to "learning in and across situations," which ultimately explains the

relationship between learning agility and "positive performance change over time." There has been some debate over the inclusion of "learning in and across situations" such that its distinction from "positive performance over time" is unclear (Mitchinson, Gerard, Roloff, & Burke, 2012).

DeRue and colleagues' (2012) model was effective in providing researchers with a common starting place for future research in the form of a guiding framework. To continue progress in the field, DeRue et al. went on to argue that a more reliable and valid assessment to measure learning agility is needed. In addition, they also emphasized that future research should look beyond a linear relationship between learning agility and performance to understand better under which conditions, or contexts, this relationship holds.

Organizational Climate as a Moderator

An organization's climate can be influential in terms of performance (Burke & Litwin, 1992). Furthermore, the extent to which an organization's climate is perceived as psychologically safe could be an important factor that determines whether learning agility is fully realized in an organization. Thus, the focus of this study was to examine the impact of perceptions of psychological safety in an organization's climate as a contextual factor, or moderator, that may influence the relationship between learning agility and performance. This type of theoretical examination was advocated by Lewin (1936) who believed that social sciences research must not simply consider main effects—or a single variable's impact on behavior. Instead, researchers should identify multiple variables that could influence behavior and examine their interactive effect in order to achieve a more accurate explanation of behavior. This rationale is illustrated through a formula $B = f(P, E)$ which conveys the idea that behavior (and, in turn, performance) is determined both by the individual and by factors in his or her perceived environment (Lewin, 1936).

As explained earlier, the empirical studies to date have provided evidence to support a relationship between learning agility and various outcomes. In other words, those who are highly

learning agile are likely to outperform their low learning agility peers, especially in circumstances when performance is based on indicators such as innovative ideas, creativity, or thought leadership (Catenacci, Kim, Drinka, & Burke, 2017; Spreitzer et al. 1997). Given past research, it is expected that the results of this study will replicate the finding that learning agility is related to performance.

Hypotheses and Research Questions

Hypothesis 1a. Individuals who score higher on learning agility will achieve higher performance than those who score lower on learning agility.

Hypothesis 1b. Individuals who score lower on learning agility will be more at risk for low performance compared to those who are lower on learning agility.

However, what is still unknown is the "E" in Lewin's formula, or the moderators that influence the degree and/or strength of this relationship (DeMeuse et al., 2010; DeRue et al., 2012). Hence, identification of relevant moderators and empirical support for how they influence the learning agility and performance relationship is warranted.

Past research has suggested that organizational climate is a determinant of both individual and organizational performance (Burke & Litwin, 1992). Organizational climate encompasses group-level perceptions of an organization's components such as systems, policies, procedures, and rewards. The extent to which elements of the organization's climate are strategically designed to support and establish priorities for the learning process could possibly strengthen the relationship between learning agility and performance. Cultivating this type of climate requires work-units/ departments to be "psychologically safe," which means that there is "a shared belief held by members of a team that the team is safe for risk-taking" (Edmonson, 1999, p. 350). When teams are psychologically safe, members trust and respect each other enough to try things out, whether successful or not, that could improve upon the group's collective understanding of a problem and ultimately work toward an effective solution (Edmonson, 1999).

As noted earlier, it is expected that when individuals are highly learning agile, they are likely to achieve higher performance. Additionally, it is expected that when highly learning agile individuals perceive their organizational climate to be conducive to learning (i.e., psychologically safe for tasking risks in support of the learning process), they will outperform those who do not share this climate perception. Part of the reason this is expected is because highly learning agile individuals are more likely to perceive their organization's learning climate to be aligned with their behavioral disposition to be learning agile.

Hypothesis 2a. When psychologically safe climate is lower, individuals who score higher on learning agility will performance better than individuals with lower learning agility. By contrast, when psychologically safe climate is higher, performance is similar regardless of learning agility score.

Hypothesis 2b. Individuals who score lower on learning agility are more likely to be at risk for low performance when their climate is perceived as psychologically safe. When psychologically safe climate is lower, individuals who score lower on learning agility are more likely to be at risk for lower performance, compared to those who score higher on learning agility. By contrast, when psychologically safe climate is higher, risk for low performance will be similar regardless of learning agility score.

What are not clear are the performance expectations for low learning agile individuals. For example, it is possible that perceptions of a psychologically safe organizational climate might boost performance, compared to those who do not perceive their organizational climate to be psychologically safe. However, it is possible that this contextual moderator may make no difference at all. Therefore, the nature of the interaction, or moderating role of a psychologically safe climate was explored as a research question in this study.

Research Question 1. For individuals who score lower on learning agility, to what extent will a psychologically safe climate influence their performance?

Research Question 2. How will performance be affected when individuals score higher on learning agility and perceive their climate as lower in psychological safety?

Present Study

Given that much of the research to date has been based on assessments that have questionable validity (DeRue et al., 2012), measurement of learning agility has been a key priority for this domain. In 2012, a research team at Teachers College, Columbia University developed a 38-item instrument now known as Burke Learning Agility Inventory (BLAI) (Drinka, Catenacci, & Burke, 2017). The instrument is based on both learning and agility behaviors. More specifically, "learning" is measured through seven behavior-based dimensions (feedback seeking, information seeking, interpersonal risk-taking, collaborating, performance risk-taking, reflecting, and experimenting). Finally and consistent with DeRue et al. (2012), "agility" is measured based on two dimensions: speed and flexibility. Together, these items comprise a measure of an individual's learning agility. See Table 1 for all dimensions, definitions, and sample items. Once the BLAI was developed, its reliability was tested using a sample of approximately 400 middle-level managers. Results indicated that the nine BLAI factors had moderate to strong Cronbach's alpha scores and a follow-up confirmatory factor analysis indicated a good structure and model fit (Drinka et al., 2017). Later, a series of studies exploring the BLAI's construct validity found that while learning agility (as measured by the BLAI) overlapped with expected constructs such as learning goal orientation and openness to experience, it was distinct as well, thus demonstrating convergent validity (Drinka et al., 2017). Moreover, the studies also suggested that learning agility is not related to risk aversion and reactance, thus providing evidence of discriminant validity (Burke et al., in

Table 1

Learning Agility Dimensions and Definitions

Learning Dimensions	Definition	Sample Item
Collaborating	The extent to which an individual tries to broker the learning process for others in his or her environment.	Ask a variety of stakeholders for their point of view.
Experimenting	The degree to which a person tries out new ideas or ways to get work done, usually through seeking out new information in the environment.	Jump into action and learn by trial and error.
Feedback seeking	The extent to which an individual solicits feedback about his or her performance.	Ask my peers to provide me with feedback on my performance.
Information seeking	The extent to which an individual continuously updates preexisting knowledge with new information.	Seek new information on topics related to my job or field.
Interpersonal risk-taking	The extent to which a person admits failings, mistakes, and other issues on-the-job and tries to get help to right these issues.	Ask others for help when needed.
Performance risk-taking	The degree to which a person places himself or herself in ambiguous situations and is unclear about the process or the outcome of the situation.	Take on new roles or assignments that are challenging.
Reflecting	The degree to which a person reflects on an experience—how something happened, why it happened, how the outcome could have been different, and how to make changes in the future.	Stop to reflect on work processes and projects
Agility Dimensions	**Definition**	**Sample Items**
Speed	The extent to which an individual is a "quick study" and is swift but not hasty while operating at his or her full potential.	Switch between different tasks or jobs as needed
Flexibility	The extent to which an individual displays adaptation, fluidity, resilience, the ability to bend under pressure, and the ability to switch between different modes of operating in his or her work.	Quickly develop solutions to problems

progress, 2018). Given the development of this new instrument, this current study aimed to examine the aforementioned hypotheses and research questions using the BLAI.

The Context

The data in this study come from a mid-size engineering design firm founded over 100 years ago. The firm, Dawson & Hughes,[1] is located in a metropolitan city in the Northeast United States and is regarded in the industry as a premier engineering firm.

A few years ago, the Managing Partner of Dawson & Hughes, anticipating his retirement, scanned his organization attempting to find a successor who would continue driving high performance in a constantly changing and complex industry. After considering many options, he ultimately decided to create a three-person executive leadership team that would head the organization; each of the three individuals were partners who had been with the firm over 20 years and informally assuming executive-level leadership responsibility. Additionally, their specialized trade expertise combined with a breadth of understanding of other engineering trades made them ideal candidates to lead Dawson & Hughes' strategy development and implementation.

The Managing Partner's decision formalized their roles as firm leaders who would lead the direction of the firm for years to come. However, at the same time, turnover at Dawson & Hughes was at its peak. Now, this new leadership team had to think critically about how to identify the cause of the increasing turnover and develop solutions to retain and attract top talent. The first step was to examine their role, as leaders of the firm, in the turnover problem. In partnership with a boutique consulting firm specializing in leadership development and executive coaching, they began to explore their behavior and impact through a series of interventions such as 360/multi-rater feedback assessments, the Hogan Personality Suite, and targeted executive coaching.

[1]This is a pseudonym to protect the identity of the firm.

Through these interventions, they better understood their behavior and how it impacted their peers' and direct reports' morale and ultimately performance.

With more self-awareness about their leader behaviors and impact, they began to think more about the organization's climate and culture, and soon began to discover that their overall culture and department climates were no longer enabling performance—change was needed if they were to survive over their next 100 years. Since the firm's inception, leadership had been authoritarian in nature, with work managed in a command and control fashion. Individuals were not actively mentored or provided with feedback about the job which stagnated their growth. As a tenured employee put it, "You knew you were doing a good job because you *had* a job." Related to this, the firm adopted a bureaucratic system regarding promotion to take the "guesswork" out of the picture so people could focus on the bottom line—revenue. Naturally, over time people grew dissatisfied with the lack of recognition for their contributions and began to leave the firm.

Of course, there were positive aspects of the various department climates and overall firm culture that were responsible for Dawson & Hughes' success—loyalty, deep expertise, and world-renowned projects. Therefore, the executive leadership team aimed to make tweaks to optimize the climate and culture, thus addressing the issues while keeping the elements that were working for them.

Soon, they began identifying critical leaders and change supporters and invested in their development through executive assessment and coaching. The impact of this led to more acceptance of challenging old practices and welcoming new ones that would enable them toward their vision. With this progress, Dawson & Hughes decided to calibrate all managers at the firm with this notion of self-awareness and growth mindset in service of performance at an annual offsite. The general reception was positive and people left the offsite looking for opportunities to become more flexible and open to change in support of Dawson & Hughes.

From a practical standpoint, this study builds upon the firm's interest to understand and cultivate a growth mindset among their workforce. More specifically, the study measures learning agility behaviors as assessed by the BLAI and the extent to which context—particularly a psychologically safe climate—influences the relationship between learning agility and performance. More specifically, this study explored how the interaction of an individual's learning agility and his or her perception of the organization's climate may differentially influence performance. Findings are expected to inform scholars in terms of continued theory building related to learning agility. Furthermore, the findings are expected to guide practitioners' understanding and application of learning agility for a variety of different functions in the workplace such as selection and development. See Figure 2 for the research model of the present study.

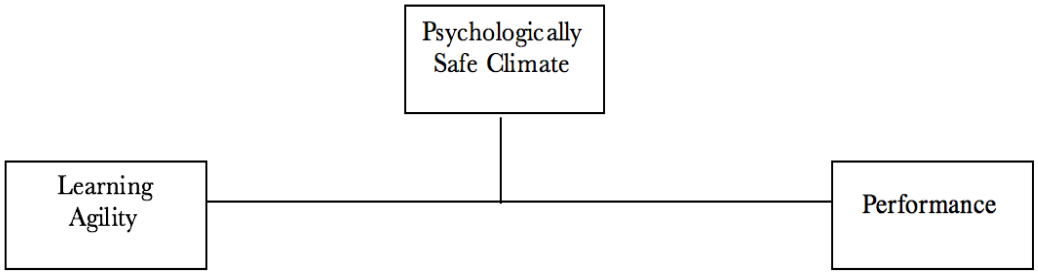

Figure 2. Present study research model

Chapter III

METHODOLOGY

The extent to which individuals are learning agile is of particular importance as organizations are constantly changing. Successful organization change enables organizations to adapt to their environments. Learning agility is relevant because those who are learning agile are more likely to be able to respond more efficiently when faced with change and adapt accordingly (Mitchinson & Morris, 2012).

Participants

While the participating firm consisted of $N = 290$ employees, the scope of research was limited to individuals who worked in an Engineering function ($N = 208$). The purpose of narrowing the score was to focus on individuals in professional services who likely need to be learning agile in the face of proliferation of knowledge and data. Thus, the number of engineers who participated in this study was $n = 128$, yielding a 62% response rate.

Approximately 53% ($n = 68$) participants were individual contributors and 47% ($n = 60$) were in a formal management position. There is a total of 83 managers across the firm, which means that the response rate for managers was 80%. Over two-thirds of the data came from the Heating, Ventilation, and Air Conditioning (HVAC) (34%, $n = 44$) and Electrical (34%, $n = 44$) groups; Plumbing and Fire Protection (PFP) comprised 15% of the sample ($n = 19$), followed by Information Technologies (9%, $n = 12$) and Commissioning and Advisory Services (7%, $n = 9$).

Participants had worked at the firm for approximately 6.26 years ($SD = 8.38$). On average, participants were 30.85 years of age ($SD = 10.24$). Over three quarters of the sample was male (78%, $n = 100$), 20% were female ($n = 25$), and 2% ($n = 3$) chose not to respond.

Design and Procedure

The present research was a field study, a design which was chosen given that the context of learning agility has primarily been understood through the lens of work in real-life organizations. In this type of design, the research goal is to examine variables in a context that are realistic to participants—in this case, their employing organization. The findings are expected to be more generalizable than those in a highly controlled laboratory experiment however some precision in measuring variables is likely to be weakened (McGrath, 1981).

As explained earlier, the study was conducted in partnership with Dawson & Hughes, an engineering firm in the Northeast United States. An executive partner who oversees organization development initiatives at the firm sent an email to all employees explaining the partnership and encouraging their voluntary participation (see Appendix B). The next day, the author/investigator followed up with the participation link, a reiteration that the study was voluntary, and the data would not be shared with Dawson & Hughes.[2]

The study was conducted via an online survey hosted on the Qualtrics platform and lasted about 10 minutes. Participants read and signed an informed consent, at which point it was explicit that their participation was voluntary (see Appendix A). Moreover, they were also informed that they would not experience any adverse treatment should they choose to forego participation. An important aspect of this research was to examine performance among high and low learning agility individuals, therefore, participants needed to provide their name so that their performance data could be matched to their scores. Each participant was compensated with a $10 Amazon E-Gift Card as compensation and a subsequent Learning Agility Report.

[2]Since the author/investigator was known to participants in her consulting role with the boutique firm, she used her university email address for all correspondence.

Dawson & Hughes was not permitted to view individual learning agility scores. The reason for this decision was to protect the participants who participated in the present study and scored low on learning agility. Instead, Dawson & Hughes received an aggregate report of learning agility scores within their firm.

Following informed consent, participants first completed an 18-item questionnaire about their department's climate, followed by the 38-item BLAI. All items within these two sections were randomized to avoid potential error. Lastly, participants answered several demographic questions.

Following the demographics questions, but before the conclusion of the survey, participants were asked to provide their name and email address so that the researcher could send them a $10 Amazon E-Gift Card and a short summary of their learning agility scores and interpretations. Participants were compensated within 48 hours of completion and reports were sent by late March (approximately 6 weeks following their participation).

Approximately 2 weeks after participant data were collected, the aforementioned executive partner rated all individuals in the Engineering department regardless of whether or not they participated in the present study. The rationale for this practice was twofold. First, it was critical to maintain the confidentiality of the participants so that they would feel comfortable participating and providing honest answers. If participants knew their performance was being evaluated, it could either prevent them from participating in the first place or may lead to providing socially desirable responses. Second, since the firm remained blind to who participated, the possibility for rater bias was reduced.

Measures

Learning Agility

Learning agility is a measured, independent variable in this study. To assess individuals' learning agility, the Burke Learning Agility Inventory (BLAI) was administered. The inventory is

comprised of 38 items that measure learning agility through nine dimensions—two dimensions pertain to agility (speed and flexibility) and seven dimensions pertain to learning behaviors (collaboration, experimentation, feedback seeking, information seeking, interpersonal risk-taking, performance risk-taking, and reflection). Each of the learning dimensions has a set of four items, whereas each of the agility dimensions has a set of five items.

For each item, participants were asked to rate the extent to which they engaged in the following behavior in the past 6 months using a 7-point scale (1 = not at all, 4 = occasionally, 7 = very frequently). A sample item is "discuss my mistakes with others"; see Appendix C for all items in this measure. An overall learning agility score was generated based on an average of all 38 items. Additionally, subscale items were also averaged into scales assuming an acceptable Cronbach's alpha coefficient. Given past research with this measure, the Cronbach's alpha coefficients were expected to range from .70-.92 (Drinka et al., 2017; Mitchinson & Morris, 2012).

Psychologically Safe Climate

Organization climate was the moderator in this study and it was a measured variable. While organization climate and psychological safety are typically regarded as separate constructs, in this research, the constructs were operationally combined in an attempt to explore the extent to which participants perceived their organization's climate as psychologically safe. Psychologically safe climate was measured using a portion of items (n = 18) from Garvin, Edmondson, and Gino's (2008) Learning Organization Survey. The initial scale was comprised of 56 items divided into three subsections: (a) supportive learning environment, (b) concrete learning processes and practices, and (c) leadership that reinforces learning. Given that the intention was to examine the extent to which an organization's climate was perceived as psychologically safe, because this is believed to be a critical situational variable for creating a learning climate, it made sense to use the items that focused solely on a supportive learning environment. This subsection was based on the

following characteristics: psychological safety, appreciation of differences, openness to new ideas, and time for reflection. A sample item is "In my work unit,[3] it is easy to speak up about what is on your mind." See Appendix D for all items in this measure.

Performance

To assess performance, an executive partner at the participating organization rated each participant in the Engineering department. Performance was measured using three items of a 4-item measure of performance and potential developed by Buckingham and Goodall (2015). The 4-item measure includes the following items: "Given what I know of this person's performance, and if it were my money, I would award this person the highest possible compensation increase and bonus"; Given what I know of this person's performance, I would always want him or her on my team"; "This person is at risk for low performance"; and "This person is ready for promotion this year." Given the organization's structure and process for promotion,[4] the last item "This person is ready for promotion this year" was amended to "This person is clearly a leader and capable of more influence in the organization." These items were measured on a 5-point Likert scale (1 = strongly disagree; 3 = neither disagree nor agree; 5 = strongly agree), with the exception of the item, "This person is at risk for low performance," which was measured using a yes/no response format.

Finally, an additional item was included to capture performance in the context of responding to challenging situations (Spreitzer et al., 1997). The item "This person constantly

[3]Small language adjustments were made to ensure that the items made sense in the context of the organization. For example, this particular item was changed to "In my *department*, it is easy to speak up about what is on your mind."

[4]At the participating firm, there are three broad levels of job titles: Engineer, Associate, and Partner. It takes approximately 5-7 years for individuals (junior level staff) to be promoted from Engineer to Associate (mid-level). Of the Associates, only about 1% will be promoted, and if applicable, that would happen approximately 12-14 years into their career. Individuals who are Partners will not be promoted again. Thus, the question "This person will be ready for a promotion next year" was not likely to provide much variance due to the promotion context.

finds new ways of dealing with challenging problems" was measured on a 5-point Likert scale (1 = strongly disagree, 3 = neither disagree nor agree, 5 = strongly agree).

Performance ratings were later matched to the data collected from those who participated in the study.

Demographics

Limited demographic information was collected to protect the identity of individuals who were in small departments. Participants were asked to identify their gender, age, the department in which they worked, and whether they had an individual contributor role or a manager role. Additionally, the firm provided dates of hire so that tenure could be computed and matched to participant data.

Chapter IV

RESULTS

Prior to data analysis, a power analysis conducted by G*Power revealed that a sample of $N = 119$ was needed to detect a small effect ($d = .10$) with 95% certainty.

Preliminary Analysis

Normality, Descriptives, and Outliers

To assess normality, data for learning agility and psychologically safe climate were examined visually using histograms and Q-Q plots (Figures 3-6) which indicated an approximately normal distribution. As a follow-up, a Shapiro-Wilks test was conducted and subsequently rejected for both learning agility ($p > .05$) and psychologically safe climate ($p > .05$), supporting the notion that the data came from a normally distributed population.

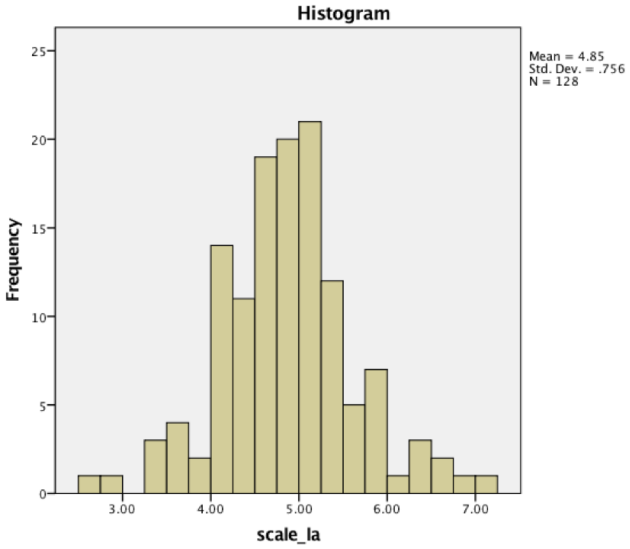

Figure 3. Histogram of learning agility data

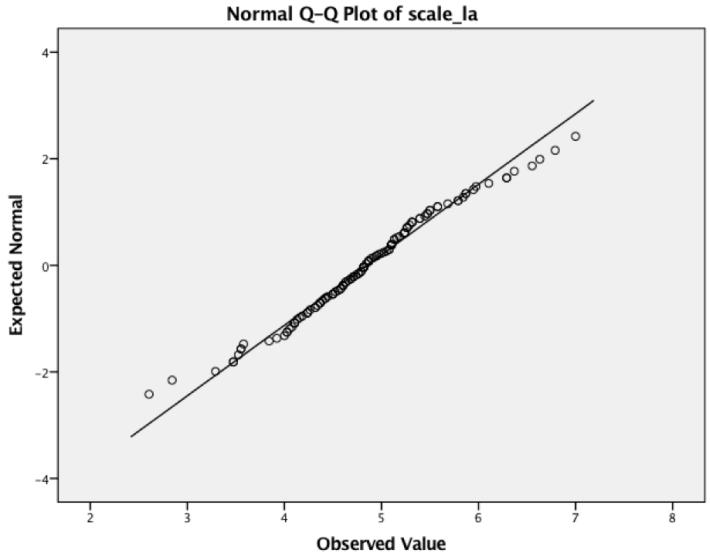

Figure 4. Q-Q plot of learning agility data

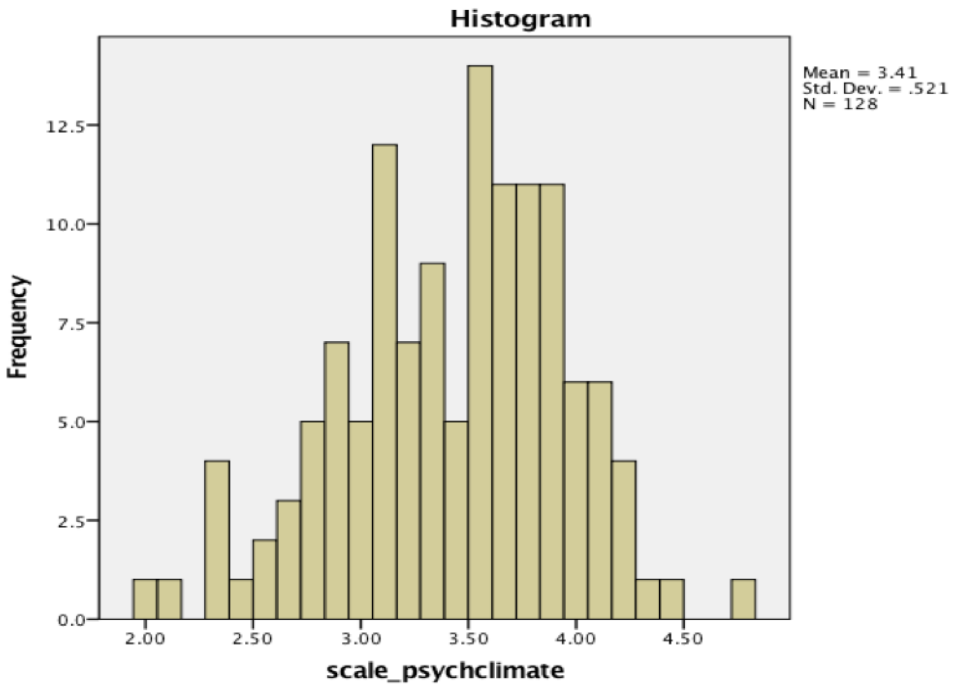

Figure 5. Histogram of psychologically safe climate data

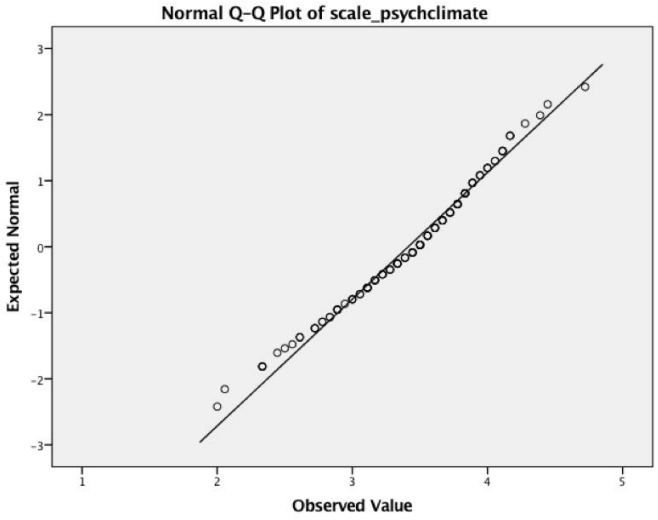

Figure 6. Q-Q plot of psychologically safe climate data

The performance composite data were also visually examined using the aforementioned method (see Figures 7-9 later in this chapter). However, the Shapiro-Wilks test was significant $p < .01$, indicating that the data did not come from a normal distribution. Prior to conducting the main analyses, an outlier analysis examining the appropriate Mahalanobis Distance, Cook's Distance, and Leverage values was conducted. Ten participants ($n = 10$) exceeded the threshold for 1 criterion, two participants ($n = 2$) exceeded the threshold for 2 criteria, and one participant ($n = 1$) exceeded the threshold for 3 criteria. Based on a closer examination of the visual plots and an examination of the performance data, the decision was made to include these participants in the dataset.

Reliabilities

Cronbach's alpha was calculated for each of the proposed constructs of interest: learning agility, psychologically safe climate, and performance. Alphas were above .70 for each of the three

constructs and thus averaged into scales to facilitate analysis. For performance, four of the five items were measured on a 5-point Likert scale; thus, these items were included in the aforementioned scale. However, the fifth item "this person is at risk for low performance" was measured individually in the second part of each hypothesis. See Table 2 for alphas, means, and standard deviations.

Table 2

Means, Standard Deviations, and Alphas for Scales

	Items	Alpha	M	SD
Learning Agility	38	.94	4.85	.76
Psychologically Safe Climate	18	.87	3.50	.52
Performance Composite	4	.92	3.81	.64

Note: Learning agility is measured on a 7-point Likert scale where 1 = not at all; 4 = occasionally; 7 = very frequently. Both psychologically safe climate and the performance composite are measured on a 5-point Likert scale where 1 = strongly agree; 3 = neither disagree nor agree; 5 = strongly agree.

Covariates

Next, a series of methods were employed to determine which covariates to use in the main analysis. For continuous variables, zero-order correlations were conducted (Table 3). Covariates that were both significant and theoretically relevant were considered for further examination as covariates in the main analysis.

Tenure. The correlations presented in Table 3 indicated that tenure was significantly related to the performance composite ($r = .29$, $p < .01$). Then, a follow-up regression was conducted to determine whether tenure predicted performance, and thus should be included as a covariate. The overall model was significant $\Delta R^2 = .08$, $F(1, 126) = 11.39$, $p < .01$. The regression

Table 3

Means, Standard Deviations, and Zero-order Correlations

		M	*SD*	1	2	3	4	5	6	7	8
1.	Age	30.85	10.24								
2.	Gender	.80	.40	-.20*							
3.	Role	.46	.51	.55**	.12						
4.	Tenure	6.26	8.38	.72**	.12	.52**					
5.	Learning agility	4.85	.76	.28**	-.11	.25**	.14				
6.	Psychologically safe climate	3.41	.52	.30**	.20*	.12	.11	.42**			
7.	Performance composite	3.80	.64	.11	.05	.30**	.29**	.11	.03		
8.	Risk for low performance	.05	.21	-.02	-.26**	-.06	-.04	.04	-.04	-.34**	

Note: **denotes $p < .01$. Zero-order correlations were based on a sample of n = 128, except for Gender, which was based on a sample of n = 125, since three respondents did not respond. Learning agility was measured on a 7-point Likert scale where 1 = not at all; 4 = occasionally; 7 = very frequently. Both psychologically safe climate and the performance composite were measured on a 5-point Likert scale where 1 = strongly agree; 3 = neither disagree nor agree; 5 = strongly agree. Gender was coded: 0 = female, 1 = male; Role is coded 0 = individual contributor, 1 = manager.

results indicated that tenure predicted performance $t(127) = 3.38$, $p < .01$, see Table 4. Taken as a whole, it made sense to include tenure as a covariate in the main analyses.

Table 4

Linear Regression Examining Covariate Relationship Between Tenure and Composite Performance

Predictor	B	SE B	β	t	p
Constant	3.66	.07		53.74	.00
Tenure	.02	.01	.29	3.38	<.01

Note: $\Delta R^2 = .08$, $F(1,126)=11.39$, $p<.01$

Job role. In addition to tenure, job role was also examined as a possible covariate, as it was positively correlated with performance ($r = .30$, $p < .01$). Additionally, from a theoretical perspective, it made sense to add job role as a covariate because, in most cases, those who are in management roles tend to have higher performance than individual contributors. A one-way ANOVA revealed that job role significantly predicted performance among managers and individual contributors, $F(1,126) = 12.36$, $p < .01$. More specifically, managers ($M = 4.00$, $SD = .70$) were rated significantly higher on the performance composite than individual contributors ($M = 3.62$, $SD = .53$). Given the significant differences between groups, it made sense to add job role as an additional covariate in subsequent analyses.

Hypothesis Testing

Hypothesis 1a. To test the hypothesis that individuals who score higher on learning agility will achieve higher performance compared to those who score lower on learning agility, a multiple regression was conducted. For the analysis, performance was regressed on learning agility

controlling for tenure and job role. The overall model was significant $\Delta R^2 = .12$, $F(3,127) = 5.35$, $p < .01$; however, learning agility was not a significant predictor [$t(124) = .44$, *ns*], thus, hypothesis 1a was not supported. Tenure [$t(124) = 1.82$, $p = .07$] and job role [$t(124) = 1.92$, $p = .06$] were marginally significant predictors of performance. See Table 5.

Table 5

Multiple Regression Predicting Performance From Learning Agility Scores

Predictor	B	*SE B*	β	t	p
Constant	3.44	.35		9.70	.00
Learning Agility	.03	.07	.04	.44	.66
Tenure	.01	.01	.18	1.82	.07
Job Role	.25	.13	.20	1.92	.06

Note: $\Delta R^2 = .12$, $F(3,127) = 5.35$, $p < .01$

Hypothesis 1b. To test whether learning agility predicted risk for low performance, a binary logistic regression was conducted in which risk for low performance was regressed on learning agility controlling for tenure and job role. The results were not significant $\chi^2(3) = .83$, *ns*. See Table 6 for analysis results.

Hypothesis 2a. Although Hypothesis 1a and Hypothesis 1b were not supported, it was possible that a moderation effect was present. Therefore, Hypothesis 2 (that those who score higher on learning agility will achieve the highest performance when perceptions of their climate as psychologically safe are higher) was examined with a multiple regression using PROCESS, a statistical extension that can enhance the interpretability of moderation analyses (Field, 2009). As with the previous analysis, learning agility and performance were included as independent and dependent variables, respectively; psychologically safe climate was included as a moderator and

both tenure and job role were included as covariates. Both learning agility and psychologically safe climate data were mean-centered prior to analysis.

Table 6

Logistic Binary Regression Predicting Performance From Learning Agility Scores

Predictor	*B*	*se*	Wald	df	p	Exp(B)
Learning Agility	.32	.55	.33	1	.57	1.37
Tenure	-.01	.08	.03	1	.87	.99
Job Role	-.61	1.08	.32	1	.57	.54
Constant	-4.25	2.73	2.43	1	.12	.01
Model χ^2 =.83, p=.84						
Pseudo R^2 = .01 (Cox & Snell)						
N = 128						

Prior to analysis, the potential for multicollinearity was assessed through a bivariate correlation between the independent variable, learning agility, and the moderator, psychologically safe climate. The relationship was moderately strong and significant (r = .42, p < .01), indicating that the independent variable and moderator were not too related to pose a multicollinearity issue.

Additionally, several residual plots were produced to examine linearity, and heteroskedasticity (see Figures 7-9). Although the data appeared linear, heteroscedasticity seemed to be an issue with the dataset.

The overall model was significant indicating that the variables in the model significantly predict performance better than chance, ΔR^2 = .14, $F(5, 122)$ = 3.97, p < .01. Both the main effect of learning agility and psychologically safe climate were not significant predictors of performance [$t(123)$ = .33, *ns*; $t(123)$ = -.23, *ns*, respectively]. However, a crossover interaction trending toward significance was observed $t(122)$ = -1.85, p = .07. Job role was a significant covariate [$t(122)$ = 2.02,

$p = .05$) and tenure was marginally significant [$t(122) = 1.78$, $p = .08$. See Tables 7 and 8. As mentioned previously, heteroskedasticity appeared to be a potential problem with the performance data, therefore this hypothesis was also examined using an ordinal logistic regression, and the results were similar.[1]

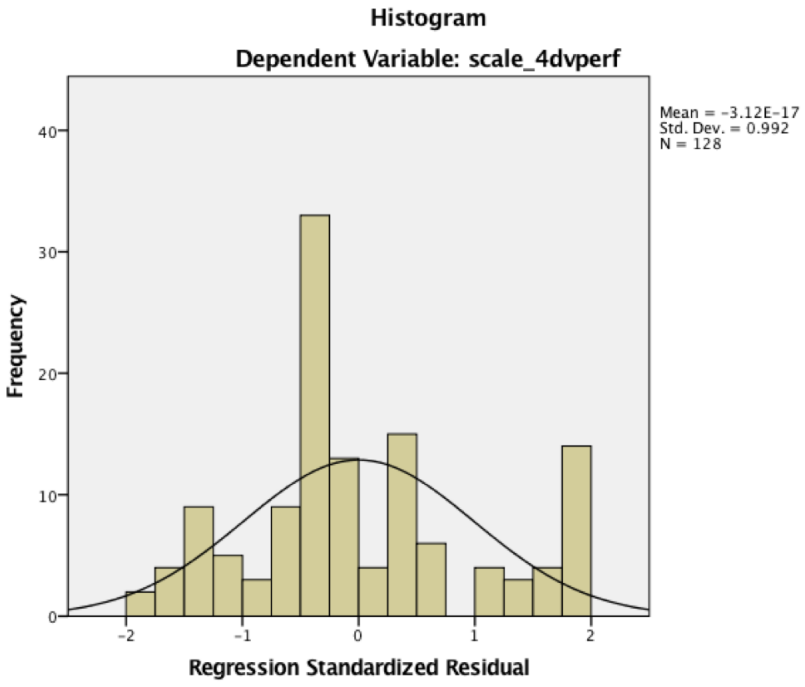

Figure 7. Histogram of performance composite residuals

[1]An ordinal logistical regression was conducted to alleviate issues associated with heteroskedascity. The results were significant $\chi^2(5) = 20.47$, $p<.01$; Both learning agility ($b = 2.11$, Wald $\chi^2(1) = 4.22$, $p=.04$) and psychologically safe performance significantly ($b = 3.20$, Wald $\chi^2(1) = 4.30$, $p=.04$) predicted performance. In particular, the interaction between learning agility and psychologically safe climate significantly predicted performance, $b = -.65$, Wald $\chi^2(1) = 4.56$, $p=.03$. These results follow a similar pattern to the linear regression analysis, which suggests that the interaction in present; however, the ordinal logistical regression results are not reported as part of the main analyses in an effort to simplify interpretations. See Appendix G for the results.

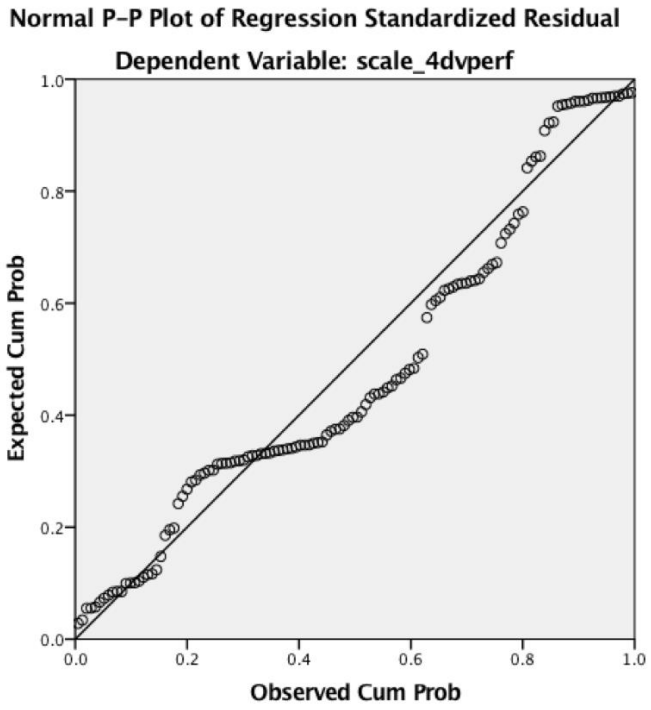

Figure 8. P-P plot of performance composite standardized residuals

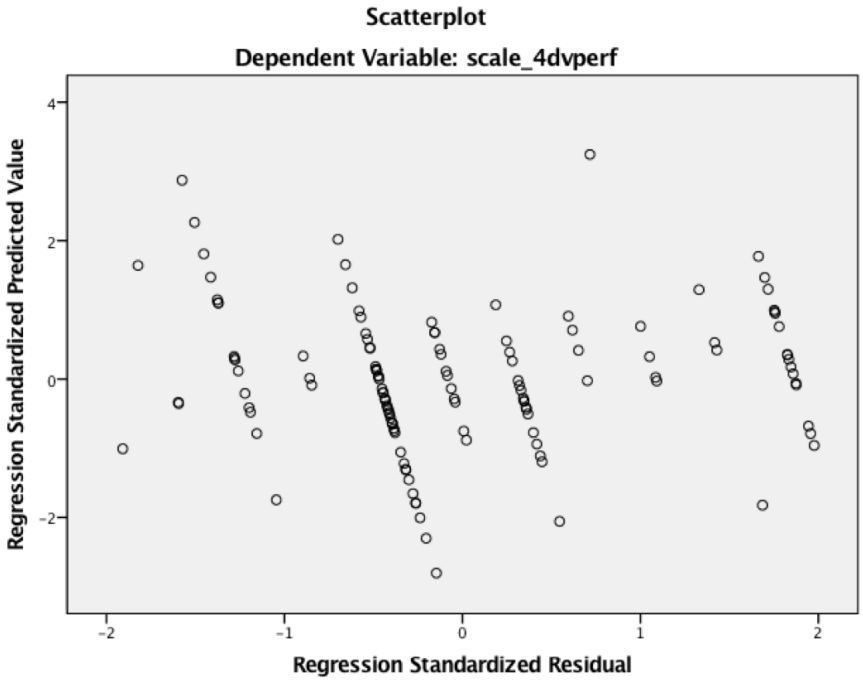

Figure 9. Scatterplot performance composite standardized residuals

Table 7

Performance Predicted From Learning Agility and Psychologically Safe Climate

Predictor	β	*Se*	t	p	LLCI	ULCI
Constant	3.62	.08	46.42	.00	3.47	3.78
Learning Agility	.03	.08	.33	.74	-.14	.19
Psychologically Safe Climate	-.03	.12	-.23	.82	-.25	.20
Learning Agility * Psychologically Safe Climate	-.19	.10	-1.85	.07	-.39	.01
Job Role	.26	.13	2.02	.05	.01	.52
Tenure	.01	.01	1.78	.08	-.01	.03

Note: $\Delta R^2 = .14$, $F(5, 122) = 3.97$, $p < .01$

Research Questions. To answer research questions 1 and 2 which focused on the nature of the interaction between learning agility and psychologically safe climate on performance, a closer examination of the conditional effects of learning agility at -1SD and +1SD revealed more information about the nature of the interaction (Table 8 and Figure 10).

Table 8

Conditional Effects of Learning Agility on Performance

Psychologically Safe Climate	β	*se*	t	p	LLCI	ULCI
One *SD* below mean	.12	.09	1.36	.18	-.06	.30
At the mean	.03	.08	.33	.74	-.14	.19
One *SD* above mean	-.07	.10	-.69	.49	-.27	.13

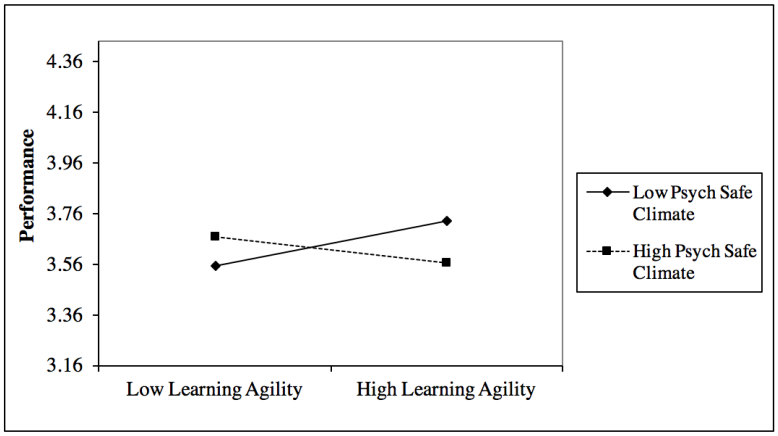

Figure 10. Interaction effects of learning agility and psychologically safe climate on performance

For example, Research Question 1 inquired about the extent that psychologically safe climate moderated performance for those who scored lower on learning agility. From an examination of the simple slope, it appears that for individuals who scored lower on learning agility and higher on perceptions of a psychologically safe climate, performance was slightly higher than for those who scored lower on learning agility and lower on perceptions of a psychologically safe climate.

Research Question 2 inquired about the effect of lower perceptions of psychological safety when learning agility scores were higher. Simple slopes indicated that when learning agility scores were higher and perceptions of psychologically safe climate were higher, performance was slightly lower than when psychologically safe climate was perceived as lower. These counterintuitive findings are discussed in more detail in the Discussion chapter.

Hypothesis 2b. To test whether learning agility, psychologically safe climate, and the interaction predicted risk for low performance, a binary logistic regression was conducted using tenure and job role as covariates. The results were not significant $\chi^2(5) = 1.26$, *ns*. See Table 9.

Table 9

Logistic Binary Regression Predicting Performance From Learning Agility and Psychologically Safe Climate Scores

Predictor	*B*	*se*	Wald	df	p	Exp(B)
Learning Agility	1.18	2.37	.25	1	.62	3.25
Psychologically Safe Climate	.88	4.05	.05	1	.83	2.40
Learning Agility x Psychologically Safe Climate	-.25	.75	.11	1	.74	.78
Tenure	-.01	.08	.03	1	.86	.99
Job Role	-.53	1.08	.24	1	.63	.59
Constant	-7.32	12.83	.33	1	.57	.00
Model $\chi^2 = 1.26$, $p = .94$						
Pseudo $R^2 = .01$ (Cox & Snell)						
N = 128						

Exploratory and Post-Hoc Analyses

Performance by Participation

A one-way MANOVA was conducted to assess whether there was a difference in the performance of individuals who participated in the study versus those who did not participate. For this analysis, a participation variable was created to identify those who participated in the survey versus those who did not. The participation variable was run as a predictor variable. The dependent variables run in this analysis were all four Likert scale items (e.g., overall performance, team performance, potential, creativity and innovation). Results indicated that there was a difference in at least one of the performance measures, Wilk's $\lambda = .94$, $F(4, 203) = 3.23$, $p = .01$. Follow-up univariate tests indicated that individuals who participated in the study were rated

significantly higher on three of the four performance dimensions (overall performance $F(1,203) = 12.50$, $p < .01$; team performance $F(1,203) = 9.32$, $p < .01$; potential $F(1,203) = 6.55$, $p = .01$) than those who did not participate in the study. Study participants were rated higher than non-study participants on their ability creativity and innovation in solving challenging problems; however, the difference was marginal $F(1,203) = 3.67$, $p = .06$. See Table 10 for mean comparisons. The implications of these findings are further discussed in the following chapter.

Table 10

Mean Comparisons for Study Participants vs. Non-Participants

	Group	Adjusted Mean	Difference
Overall Performance	Participated	4.02 (.64)	
	Did not participate	3.62 (1.00)	.40*
Team Performance	Participated	4.05 (.64)	.33*
	Did not participate	3.72 (.91)	
Potential	Participated	3.55 (.81)	.32*
	Did not participate	3.23 (.96)	
Creativity and Innovation	Participated	3.60 (.76)	.23†
	Did not participate	3.38 (.93)	

Note: * denotes that the difference was significant at the p<.05 level. † denotes that the difference was marginally significant at the p<.10 level.

Job Role as Moderator

When considering contextual variables that influence the relationship between learning agility and performance, an individual's job role as an individual contributor as opposed to a manager makes sense as a moderator. Therefore, an exploratory analysis was conducted to explore this notion. Similar to the method for Hypothesis 2, a multiple regression was conducted using

PROCESS. Learning agility and performance were included as independent and dependent variables, respectively; job role was included as a moderator and tenure was included as a covariate. PROCESS automatically mean-centered learning agility and dummy-coded job role prior to analysis.

Results revealed that the overall model was significant, indicating that the variables in the model predicted performance better than chance, $\Delta R^2 = .12$, $F(4, 123) = 4.18$, $p < .01$. There was no main effect for learning agility $t(123)=.34$, *ns*; however, there was a significant main effect for job role, $t(123) = 1.96$, $p = .05$. An interaction between learning agility and job role was not observed $t(123) = -.85$, *ns*. Tenure was marginally significant, $t(123) = 1.83$, $p = .06$. See Table 11.

Table 11

Exploratory Analysis Examining Job Role as a Moderator

Predictor	β	*Se*	t	p	LLCI	ULCI
Constant	3.73	.07	50.88	.00	3.58	3.87
Learning Agility	.03	.08	.34	.74	-.12	.17
Job Role	.26	.13	1.96	.05	-.01	.51
Learning Agility* Job Role	-.13	.15	-.85	.40	-.43	.17
Tenure	.01	.01	1.83	.07	-.01	.03

Note: $\Delta R^2 = .12$, $F(4, 123) = 4.18$, $p < .01$

Given these findings in combination with the significant mean differences in performance between individual contributors and managers, a post-hoc analysis was conducted to examine each hypothesis by job role. Across all roles and hypotheses, the overall models were not significant. The tables appear in Appendix H.

Gender as a Covariate

As an exploratory analysis, gender was examined as a covariate for several reasons. First, a one-way ANOVA revealed that there was a significant difference between men and women at the study organization with respect to their perceptions of psychologically safe climate $F(1,124) = 5.21$, $p = .02$. In particular, women at the participating firm perceived the climate to be significantly less psychologically safe ($M = 3.22$, $SD = .54$) than their male counterparts ($M = 3.48$, $SD = .50$). Additionally, although gender was not correlated with the performance composite, it was correlated with risk for low performance ($r = -.26$, $p = .01$), suggesting that at this firm, women were more likely to be at risk for low performance than their male counterparts. A follow-up logistic regression predicting risk for low performance from gender supported this notion. The overall model was significant $\chi^2(1) = 6.56$, $p = .01$; Gender, $b = -2.23$, Wald $\chi^2(1) = 6.18$, $p = .01$. Thus, to better understand how gender might have influenced the study hypotheses, each was re-run with gender as a covariate (in addition to tenure and job role). Overall, the results were similar with one exception. When the dependent variable was risk for low performance (Hypotheses 1b, 2b), gender was a significant predictor; however, the overall models were not significant. The results are presented in Appendix I and will be further discussed in the next chapter.

Chapter V

DISCUSSION

This chapter will discuss the background of the current study emphasizing its purpose relative to extant literature and research. The study findings will be discussed and interpreted given the context of Dawson and Hughes. Study imitations along with future research directions will be presented. Finally, implications applicable to organizations will be offered.

Overview

Over the past 10 years, learning agility has become a buzzword in theory and practice, as organizations explore how to stay relevant and competitive in a constantly changing business environment. Not surprisingly, organizations want to cultivate their talent at all levels in order to respond to these changes proactively. Enter learning agility, which De Meuse and his colleagues (2010) pointedly described as "a construct whose time has come."

Even though research efforts have been underway for almost two decades, researchers struggle to consistently define and measure this concept. Recall that even though learning agility has been found to be associated with a number of individual and outcomes such as potential (Dries et al., 2009; Eichinger & Lombardo, 2004) and career success (Dai et al. 2013), definitions for and methods to measure learning agility vary widely. This enviably underscores a significant problem for practitioners who want to cultivate and maximize learning agility in their organizations.

The present study was part of a multi-year effort beginning with refining the construct of learning agility, developing an inventory to assess it, and examining its reliability and validity (Drinka et al., 2017; Mitchinson & Morris, 2012). Therefore, this study contributed to the existing body of research and literature by examining performance using an inventory that addresses many

measurement limitations posited by DeRue and his colleagues (2012). Even more, despite the variety of findings supporting the relationship between learning agility and performance, to the author's knowledge no research has been conducted to examine the role of contextual variables in influencing the relationship between learning agility and performance, albeit positively or negatively (DeRue et al., 2012). The findings from this research highlight an important next step in understanding *when* learning agility leads to performance. In particular, organizational climate was examined with regard to the extent in which it is perceived to be psychologically safe.

Learning Agility and Performance

Based on previous research, a relationship between learning agility and performance was expected (Smith (2015). Recently, Smith (2015) implemented the same inventory to measure learning agility as in the present study and found a positive relationship between learning agility and performance, thus lending support to the hypothesis that learning agility would be related to performance. However, in this study, statistical support for the relationship between learning agility and performance was not found (hypothesis 1a). Moreover, there was lack of statistical support for low learning agility leading to risk for low performance (hypothesis 1b). These findings, although inconsistent with Smith (2015)'s study, further underscore that the relationship is likely dependent upon contextual variables that are driving the relation to performance (Lewin, 1936).

Psychologically Safe Climate as a Moderator

Lack of support for hypothesis 1a and hypothesis 1b provide further rationale for why the empirical examination of the relationship between learning agility and performance is dependent upon perceptions of psychologically safety in the organizational climate was needed (hypothesis 2a). Neither learning agility nor perceptions of a psychologically safe climate predicted performance at this organization. However, the interaction between the two variables trended toward significance indicating that when the organization's climate is perceived as low in

psychological safety, those who are highly learning agile slightly outperform those who score lower on learning agility. Therefore, in organizational climates that are low in psychological safety, as expected, performance suffers particularly for those who score lower on learning agility. Although it should be highlighted that those who score lower on learning agility, perform better when their organizational climate is perceived as higher versus lower in psychological safety. Taken together, perceptions of psychological safety are particularly important for those who score lower on learning agility, as it appears a climate perceived as psychologically safe provides an increase in performance, compared with those who perceived the climate as low in psychological safety.

Further examination of the nature of this interaction, specifically when perceptions of psychological safety in the organization's climate are higher, reveal an unexpected finding. In particular, highly learning agile individuals perform better when the organizational climate is perceived as low in psychological safety and they perform worse than low learning agile individuals when the organizational climate is perceived to be higher in psychological safety.

Hypothesis 2b examined the same hypotheses against the dependent variable, risk for low performance, however, these results were not significant; therefore, in this study, it does not appear that the combination of learning agility and psychologically safe climate leads to a risk for low performance. However, it appears that some limitations associated with the 'risk for low performance' measure may be responsible for this finding. See the Study Limitations and Future Directions section for further discussion.

Given the unexpected directionality of the aforementioned interaction found for hypothesis 2a, one might conclude that perceptions of psychological safety in an organization's climate are not important. Though, it can be argued that something more nuanced may be driving these findings. Lewin's (1936) formula has been referenced throughout this paper, and simply put, the "E" in his formula is at the crux of the present research. Perhaps, the conceptualization of "E" (the

environmental factor or variable) in the study was interpreted too narrowly. If we consider the "E" in Lewin's formula two ways, it may afford a more nuanced and helpful interpretation of the findings with respect to context.

First, consider Lewin's equation with the "E" or environmental variables to be localized at the organizational level and referred to here as "lower-case e." Therefore, the finding in which highly agile individuals were found to perform worse when the organizational climate is perceived to be higher in psychological safety is particularly meaningful because over the past few years, psychological safety in groups and organizations has been recommended as a necessary ingredient for high performing teams and organizations (Edmondson, 1999). To reiterate, psychological safety in groups, teams, and organizations involves individuals feeling comfortable revealing shortcomings and mistakes, surfacing disagreements and conflict, and taking risks in support of creativity, innovation, and learning (West & Anderson, 1996). Thus, the results from the present study suggest otherwise—for some groups/organizations such as Dawson and Hughes, *too* much safety could result in negative outcomes. In fact, Bunderson and Sutcliff (2003) suggested that focusing too much on learning can negatively influence performance simply because the time and effort devoted to the learning and trial-and-error of new ideas can prevent groups from reaching a viable solution. Building on this idea, one can speculate that although psychological safety has been shown to be associated with positive outcomes such as innovation and performance (Edmonson, 1999; West & Anderson, 1996), organizations may struggle to fully adopt this model because the benefits are not immediately realized.

Next, consider a more far-reaching application of the "E" in Lewin's formula, referred to here as "upper-case E." In the context of this study, the results are interpreted through the lens of the engineering profession writ large. In this study, core engineering work involved precise design and calculations to ensure quality of the resulting product—usually a building or other structure.

Given this, it is likely that in an engineer's day-to-day job there is not much room for flexibility—simply put, work products are either right or wrong. However, like most professions, the job is not limited to one task (e.g., design and calculations); engineers at this particular firm, and other engineering firms, are expected to manage projects, work in teams, and improve operational processes—tasks that would benefit from a climate of psychological safety. One possible explanation for the findings in this study might be that due to the nature of this firm's engineering work, which is characterized as both task-oriented and "black-and-white," engineers may be ambivalent about the value of a psychologically safe climate as they may feel it takes time away from the bottom line. While it is true that engaging in behaviors that promote psychological safety takes time, and perhaps takes time away from the task at hand, the learning that comes from behaviors such as admitting mistakes or "owning" incompetence in a particular area strengthen team (and department/organizational) learning and thus lead to higher performance (Edmonson, 1999). Therefore, it is more likely that the impact of psychologically safe climate may in fact depend on the *type* of engineering. For example, recent research conducted at Google which also used a sample of engineers surfaced different findings—in particular, they found that psychological safety in groups and teams of engineers was a critical determinant of performance (Duhigg, 2016). One reason for this discrepancy may be because the nature of the work between design engineers and software engineers/data programmers is quite different. With the latter, it is likely more acceptable to "operate in the gray area" in service of solving problems. Furthermore, the nature of performance among these types of engineering might be different. One would likely expect that creativity and innovation are more likely to be outcome variables among software engineers/data programmers rather than design engineers. For design engineers, it may seem that focusing on the bottom line absent of psychologically safe climate may lead to high performance in the short term; however, as demonstrated with Google, failure to incorporate a psychologically safe climate may

not be as beneficial for solving complex problems as navigating the ambiguous business environment that exists today.

Study Participation and Performance

Aside from the main analyses, several exploratory and post-hoc analyses were conducted to better understand what factors might be driving the observed results. One key analysis examined whether there was a difference in performance between those who participated in the survey and those who opted out. The results suggest that, on average, individuals who participated in this study were significantly higher performers than individuals who did not participate. Therefore, it is likely that the data has been truncated with an emphasis on higher scores rather than a full range of scores that would be expected with mandatory participation. This suggests that there is something unique about these individuals relative to their non-participating peers. In particular, this study was presented to participants as a professional development opportunity to increase awareness around their learning behaviors. Therefore, it is possible that individuals who were more likely to engage in many of the learning agility behaviors naturally chose to participate in the study.

Study Limitations and Future Directions

While it is a strength that the data was collected from one organization and localized to a specific profession, this also limits the study in terms of generalizability to other organizations and professions. Therefore, it is important for future research to continue to explore how organization climate (along with other contextual variables) influences the relationship between learning agility and performance. In particular, the findings from the present study suggest that a more theoretical understanding of context is necessary to continue exploring the critical question about when learning agility leads to performance, or similarly, when learning agility might lead to *lower* performance. As previously discussed, the environmental factor in Lewin's formula may be more nuanced than previously thought such that types of environment (i.e. lowercase e vs. uppercase e)

may influence the relationship differently. Finally, it is important to examine a multitude of contextual variables in addition to organizational climate, for instance, types of industry, nature of the work (e.g. sales versus research and development), and/or organizational culture. To that end, theory-building specifically focusing on context is recommended for future research.

Performance

Another limitation of this study is how performance was conceptualized and measured. First and foremost, it was critical to obtain subjective measures of performance as past research indicated that the reliance of performance evaluations with solely objective criteria was problematic when exploring the relationship between learning agility and performance because it did not explain the entire story (Catenacci-Francois, Kim, Drinka, & Burke, unpublished data). In the best-case scenario, the items used to measure performance would be actual performance appraisal items that had been developed and validated over time Dawson and Hughes. However, like many organizations, the firm did not have a formal method for assessing performance appraisal at the time of the study. Instead of creating a performance measure that may not be reliable or valid, Buckingham and Goodall's (2015) performance items designed for Deloitte were adopted given that they had demonstrated success in managing important organizational decisions. An additional benefit of using the aforementioned items was that while they were subjective in nature, they had been carefully designed to avoid rater bias (Buckingham & Goodall, 2015). While objective data were not available in this particular organization, it would have been ideal to have a combination of both subjective (e.g. manager evaluations) and objective performance data (e.g. number of designs produced, number of dollars billed, etc.). Even more, given that the participants in this study are consulting engineers—consulting on design and the implementation of design into buildings, a performance measure that examined client satisfaction would have been helpful; thus,

incorporating this type of performance measure in future research is strongly recommended, especially for service-driven contexts.

Additionally, the application of Buckingham and Goodall's (2015) items for the purpose of this study was not as straightforward as anticipated. For example, the performance item assessing potential ("This person is ready for a promotion") was not applicable due to the timing of promotions at the participating firm, thus the item needed to be rewritten to capture the essence of potential (i.e. "This person is a leader and capable of more influence in the organization"). In particular, when the study was administered, the firm had completed their promotion cycle one month prior, therefore, anyone who was ready for promotion would have just been recently promoted rather than identified as ready for promotion. In addition, it takes approximately 5-7 years for junior level staff to be promoted from Engineer to Associate, which is a mid-level management position (mid-level). Of the Associates, only about 1% are promoted, and if applicable, that would happen approximately 12-14 years into their career. Therefore, after achieving the Associate promotion, an increase in compensation rather than a promotion is typical. Furthermore, individuals who are Partners will not be promoted again. In retrospect, the item was likely skewed toward those who are in a management role rather than individual contributors. Potential is an important outcome to consider, so future research should continue to examine this variable using items that can adequately assess potential regardless of role.

The importance of job role. Relatedly, it is important to discuss ad-hoc analyses that were conducted to better understand the influence of job role. From preliminary analyses, it was clear that there was a significant correlation between job role and the performance composite, which suggested that managers are associated with higher performance. This, combined with a subsequent, significant one-way ANOVA guided the decision to re-run the main analyses isolating individual contributors and managers into separate analyses. The results were not significant

suggesting that in cases where the overall model was significant and job role was marginal or significant (Tables 5 and 7), it was likely accounted for by variance in job role. Recall that the exploratory analyses, examining job role as a moderator revealed a significant main effect for job role (Table 11); therefore, given that managers directly influence their department climates, which ultimately leads to performance (Burke & Litwin, 1992), future research should continue to examine how job role influences this relationship in different organizations, industries, and potentially in cases where the dependent variables unique measure performance related to job role.

The Potential Importance of Gender

While past research has indicated that there is no relationship between gender and learning agility (Kim, Catenacci-Francois, & Burke, unpublished manuscript), an exploratory analysis revealed that women at this firm felt significantly less psychologically safe in their climates compared to men. This, in combination with the fact that women made up 20% of the sample (n = 25) and only 15% (n = 9) of all managers, highlighted the importance of a closer examination of the role of gender in this firm and the overall analysis. While statistical support was not found for the relationship between gender and overall performance (as measured by the performance composite variable), there was a significant relationship between gender and risk for low performance, indicating that men were significantly less likely to be at risk for low performance than women. Furthermore, the data revealed that only n = 6 participants were identified as "at risk for low performance." The small number of individuals identified at risk for low performance is not too surprising as one would expect viable organizations to have more high and average performers than low performers. In this firm, only six (n = 6) of N = 128 employees were identified as at risk for low performance. However, n = 4 of these participants were women. Of the four female participants who were determined to be at risk for low performance, n = 3 were

individual contributors and $n = 1$ was a manager. The low numbers of women in this sample (and in the participating firm) in combination with their lower perceptions of psychological safety in their climates and likelihood of being identified as at risk for low performance is concerning, but not necessarily unique to this organization. As a STEM (Science, Technology, Engineering, and Mathematics) profession, this underrepresentation of women is common (Beede et al., 2011). Although gender and learning agility have not been found to be related, these findings underscore the need for firms in STEM contexts like Dawson & Hughes to examine gender further when it comes to learning agility and performance.

To that end, future research efforts should continue to test the implications of learning agility on performance in field studies. However, it is recommended, that organizations participating in the research have a structured, performance appraisal process from which actual performance data can be examined. At a minimum, performance data should incorporate subjective manager evaluations and in the best scenario, both subjective and objective data should be included.

Snapshot Data

Finally, the timeframe for the present study may have influenced the results. Data were collected over a period of a few weeks, thus providing snapshot results that may not tell the whole story about learning agility and perceptions of psychologically safe climates. In particular, the executive partner provided a point in time judgment of performance two-weeks after participants had completed the learning agility and psychologically safe climate measures. DeRue and his colleagues (2012) posited that the benefits from learning agility are likely reaped over time, therefore, one key recommendation for future research is to collect performance data at intervals and over a longer period of time. This type of study would be especially helpful in providing a

more accurate picture of how performance is influenced by learning agility and psychologically safe climate (or other contextual variables).

Organizational Implications

As Lewin (1952) once said, "There is nothing so practical as a good theory" (p. 169). This quote underscores the sheer importance applying these findings into organizational implications, so that practitioners can begin to explore learning agility and hopefully, proliferate refinements to learning agility theory.

Since learning agility was not significantly related to performance, it would appear that the contextual variables under examination in this study do not tell the whole story, especially because previous research has found a relationship with performance (Smith, 2015). Thus, one implication of this research is the need for practitioners to explore contextual variables in their own organizations that may uniquely influence the relationship between learning agility and performance. That information could be instrumental in furthering theory-building with regard to learning agility and when its positive influence on performance can be expected.

Furthermore, when organizations embark upon developing a learning agile workforce, more awareness and discrimination should be placed on the value of the climate that is cultivated. For instance, practitioners should not adopt a "one-size-fits-all" approach when it comes to cultivating a psychologically safe climate because it appears that in some professions and industries, the concept of psychologically safe climate may not be at the forefront of individual's minds. Although the results are not conclusive, this is especially relevant for highly agile individuals. Furthermore, for organizations dealing with individuals who score lower on learning agility, cultivating a climate of psychological safety would appear to increase performance. While the results were marginally significant, organizations are encouraged to pay close attention to factors related to psychological safety in order to support these particular individuals.

Conclusion

This study considered how perceptions of a psychologically safe climate moderate the relationship between learning agility and performance. This study was among the first to empirically investigate a contextual variable, particularly psychologically safe climate, on the relationship between learning agility and performance. Counter to expectations that psychologically safe climates would boost performance regardless of learning agility scores, results only supported the benefit of psychologically safe climate for those who score low on learning agility, and instead indicated that performance suffers for highly learning agile individuals. It is important to understand that these results are from one organization; however, in interpreting the results, it appears that the profession of engineering writ large may inadvertently influence how engineers think about psychological safety relevant to the task at hand. It is recommended that future research consider the nuance of environment especially as it pertains to variables that moderate the relationship between learning agility and performance. In so doing, practitioners and organizations may truly be able to leverage learning agility through careful cultivation of their climates.

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Appendix A

Informed Consent and Participant Rights

Protocol Title: Learning in the Workplace
Principal Investigator: Lauren Catenacci-Francois, PhD Candidate, Teachers College, Columbia University
ltc2108@tc.columbia.edu

INTRODUCTION

You are being invited to participate in this research study called "Learning in the Workplace." You may qualify to take part in this research study because you are an employed individual over 18 years of age and you work in the Engineering practice at **(Organization Name).** Approximately 200 people will participate in this study and it will take approximately 10 minutes of your time to complete.

Funding for this study has been provided by the Teachers College Provost Fund.

WHY IS THIS STUDY BEING DONE? The current research seeks to understand learning in high-performing organizations. You are invited to participate in this research study, which will consist of an online survey in which you'll be asked a series of questions about how you learn and the climate of your department. The research will be conducted by Lauren Catenacci, a PhD candidate at Teachers College, Columbia University, under the supervision of her advisor Dr. W. Warner Burke.

WHAT WILL I BE ASKED TO DO IF I AGREE TO TAKE PART IN THIS STUDY?

If you decide to participate, you will be asked to complete an online survey in which you'll be asked a series of questions about how you learn and the climate of your department at **(Organization Name)**.

WHAT POSSIBLE RISKS OR DISCOMFORTS CAN I EXPECT FROM TAKING PART IN THIS STUDY? This is a minimal risk study, which means the harms or discomforts that you may experience are not greater than you would ordinarily encounter in daily life while taking routine physical or psychological examinations or tests. **However, you do not have to answer any questions or divulge anything you are not comfortable sharing. You can stop participating in the study at any time without penalty.**

WHAT POSSIBLE BENEFITS CAN I EXPECT FROM TAKING PART IN THIS STUDY?

There is no direct benefit to you for participating in this study. Participation may benefit the field of leadership.

WILL I BE PAID FOR BEING IN THIS STUDY? In exchange for your participation, you will receive a $10 Amazon E-Gift Card within 48 hours of successfully completing the survey. Additionally, you will receive a confidential, personalized report of your learning scores in addition to an interpretative guide for understanding what your scores mean and behaviors you may want to consider for your professional development. This report will only be shared with you and **not** (Organization Name). There are no costs to you for taking part in this study.

WHEN IS THE STUDY OVER? CAN I LEAVE THE STUDY BEFORE IT ENDS?

The study is over when you have completed the survey. However, you can leave the study at any time by exiting from the survey.

PROTECTION OF YOUR CONFIDENTIALITY If you choose to participate, **(Organization Name) will not see your individuals scores**, therefore, your responses are completely confidential. Please note that we will need your name in order to 1) enter you in the raffle and 2) provide you with your learning scores; however, **this information will never be shared with (Organization Name).** The data will be stored in a password-protected file only accessible to Lauren Catenacci-Francois. This data will be stored for seven years.

HOW WILL THE RESULTS BE USED?

This study is being conducted as part of the dissertation of the principal investigator. The results of this study *may* be published in academic journals or presented at academic conferences. However, your name, and your organization's name will not be published.

WHO CAN ANSWER MY QUESTIONS ABOUT THIS STUDY?

If you have any questions about taking part in this research study, you should contact the principal investigator, Lauren Catenacci-Francois, at 646-342-8896 or at ltc2108@tc.columbia.edu You can also contact her faculty advisor, Dr. Warner Burke at 212-678-8109 or by email at wwb3@tc.columbia.edu.

If you have questions or concerns about your rights as a research subject, you should contact the Institutional Review Board (IRB) (the human research ethics committee) at 212-678-4105 or email IRB@tc.edu. Or you can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY 1002. The IRB is the committee that oversees human research protection for Teachers College, Columbia University.

PARTICIPANT'S RIGHTS

- I have read and discussed the informed consent with the researcher. I have had ample opportunity to ask questions about the purposes, procedures, risks and benefits regarding this research study.
- I understand that my participation is voluntary. I may refuse to participate or withdraw participation at any time without penalty.
- The researcher may withdraw me from the research at his or her professional discretion if s/he believes you are not actively participating in the study.
- If, during the course of the study, significant new information that has been developed becomes available which may relate to my willingness to continue my participation, the investigator will provide this information to me.
- Any information derived from the research study that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- I should receive a copy of the Informed Consent document.

By typing my name below and clicking the "Next" button on the bottom right hand corner, I am consenting to participate in this study.

Appendix B

Participant Recruitment Correspondence

From: Executive Partner
Subject: Mindset Study

As many of you are aware from our recent staff meeting, (Organization Name) continues to allocate attention and resources to strengthening our culture of engagement with a focus on enhancing the employee experience, elevating our managers' and leaders' effectiveness and emphasizing merit-based rewards. In keeping with this new focus, I'd like to ask for your participation in a research study that will be led by Lauren Catenacci from The Catalano Group.

Lauren is interested in exploring "growth mindset" (a mindset characterized by the belief that one can learn and grow through persistence and hard work). Specifically, the goal is to identify learning behaviors associated with this mindset. This research will serve as the basis of her doctoral dissertation (Lauren is completing her Ph.D. in Social-Organizational Psychology at Columbia University) and afford all participants the opportunity to learn more about themselves (an excellent professional development opportunity!).

This time commitment is minimal (~10 minutes). Lauren will compensate each participant with a $10 Amazon e-Gift Card and provide you with a report to help you understand your learning style at work. There is no obligation to participate and no penalty if you choose not to, but I'd like you to consider participating so you can have more insight into some behaviors that may be beneficial to your career growth.

Lauren will be reaching out to you in the next day or so with a survey link. I hope you will participate.

From: Lauren Catenacci-Francois
Subject: Mindset Study (Earn $10 & Receive a Customized Professional Development Report)

Greetings!
I hope this email finds you well. By now, you should have received (Partner Name)'s email introducing you to my dissertation study. If you are interested in participating, please access the link here.

As a small token of my sincere gratitude for your participation in my dissertation study, you will receive a $10 Amazon E-Gift Card within 48-72 hours of successful completion of the survey. Additionally, you will receive a personalized report of your learning behavior scores and an interpretive guide that will help you understand your learning behaviors at work, which can help you in terms of professional development.

Remember that participation in the survey is completely optional. If you choose to participate, you can rest assured that your individual responses to the survey will be confidential and not shared with (Organization Name).

Of course, if you have any questions or concerns, please do not hesitate to reach out to me.

Thank you in advance!
Lauren

Appendix C

Measures—Burke Learning Agility Inventory (BLAI)

Instructions: Please consider how often you engage in the following behaviors at work.

1	2	3	4	5	6	7
Not at all			Occasionally			Very Frequently

Feedback Seeking

1. Ask my peers to provide me with feedback on my performance
2. Seek feedback from my manager about my performance
3. Discuss my potential for advancement within the organization with my manager
4. Directly ask others for their thoughts on how I can improve my performance

Information Seeking

1. Seek new information on topics related to my job or field
2. Update my knowledge and expertise through formal training or education
3. Read trade journals, newspaper articles, books, or other sources to stay informed
4. Collect data to increase my knowledge, evaluate my progress, and inform my next steps

Performance Risk-Taking

1. Take on new roles or assignments that are challenging
2. Engage in tasks that are ambiguous in terms of how to succeed
3. Embrace work that is risky, even if the outcomes are uncertain
4. Volunteer for assignments or projects that involve the possibility of failure

Interpersonal Risk-Taking

1. Bring up problems and tough issues with others
2. Ask others for help when needed
3. Discuss my mistakes with others
4. Challenge others' ideas and opinions even when they are shared by many people

Collaborating

1. Look for ways to leverage the unique skills, knowledge, and talents of others
2. Work with colleagues from different backgrounds or job functions to share perspectives
3. Collaborate with people in other parts of the organization
4. Ask a variety of stakeholders for their points of view

Experimenting

1. Evaluate new techniques or different ways of solving problems
2. Experiment with unproven ideas by testing them out
3. Try different approaches to see which one generates the best results
4. Jump into action and learn by trial and error

Reflecting

1. Stop to reflect on work processes and projects
2. Take time to reflect on how to be more effective
3. Consider the reasons for and consequences of my actions or recent events
4. Critically evaluate work-related events with others in order to understand what happened

Flexibility

1. Consider many different options before taking action
2. Switch between different tasks or jobs as needed
3. Find common themes among opposing points of view
4. Articulate seemingly competing ideas or perspectives
5. Propose solutions that others see as innovative

Speed

1. Quickly develop solutions to problems
2. Get up to speed quickly on new tasks or projects
3. Acquire new skills and knowledge rapidly and easily
4. React well to unexpected problems
5. Readily grasp new ideas or concepts

Appendix D

Measures—Psychologically Safe Climate

(Portions taken from Garvin, Edmondson, & Gino, 2008)

Instructions: Please think about your primary group or department at work. Then, rate the extent to which you agree or disagree with the following items:

1) In my workunit, it is easy to speak up about what is on your mind.
2) If you make a mistake, it is often held against you. (R)
3) People in this unit are usually comfortable talking about problems and disagreements.
4) People in my unit are eager to share information about what does and does not work.
5) Keeping your cards close to your vest is the best way to get ahead in this unit. (R)
6) Differences in opinion are welcome in this unit.
7) Unless an opinion is consistent with what most people in this unit believe, it won't be valued. (R)
8) This unit tends to handle differences of opinion privately or off-line, rather than addressing them directly with the group.
9) In this unit, people are open to alternative ways of getting work done.
10) In this unit, people value new ideas.
11) Unless an idea has been around for a long time, no in this unit wants to hear it. (R)
12) In this unit, people are interested in better ways of doing things.
13) In this unit, people often resist untried approaches. (R)
14) People in this unit are overly stressed. (R)
15) Despite the workload, people in this unit find time to review how the work is going.
16) In this unit, schedule pressure gets in the way of doing a good job. (R)
17) In this unit, people are too busy to invest time in improvement. (R)
18) There is simply no time for reflection in this unit. (R)

Appendix E

Measures—Performance

1. Given what I know of this person's performance, and if it were my money, I would award this person the highest possible compensation increase and bonus.

   Strongly Disagree Disagree Neither disagree nor disagree Agree Strongly Agree

2. Given what I know of this person's performance, I would always want him or her on my team.

   Strongly Disagree Disagree Neither disagree nor disagree Agree Strongly Agree

3. This person is at risk for low performance: ____Yes _____No

4. This person is a leader and capable of more influence in the organization.

   Strongly Disagree Disagree Neither disagree nor disagree Agree Strongly Agree

5. This person constantly finds new ways of dealing with challenging problems.

   Strongly Disagree Disagree Neither disagree nor disagree Agree Strongly Agree

Appendix F

Measures—Demographics

Please indicate your gender: _____female _____male _____

What is your age? ____

How long have you worked at [organization]? _____

What department do you work in?

- HVAC (including BATC)
- Electrical
- Plumbing & Fire Protection
- Information Technologies (Including AV, DAS, Cyber Security)
- Commissioning & MEP Advisory

Which of the following best describes your role:

- I manage others
- I am an individual contributor

Appendix G

Ordinal Logistic Regression on Performance Composite

Predictor	*B*	*SE B*	Wald	df	P	LLCI	ULCI
Learning Agility	-.10	.24	.16	1	.69	-.56	.37
Psychologically Safe Climate	.06	.34	.03	1	.86	-.60	.72
Learning Agility*Psychologically Safe Climate	-.65	.30	4.56	1	.03	-1.24	-.05
Job Role	.80	.39	4.32	1	.04	.05	1.56
Tenure	.04	.02	2.96	1	.09	-.01	.08

Note: The dependent variable is the 4-item performance composite; The-2 log likelihood = 478.85; Cox & Snell R Square = .15; Nagelkerke R Square = .15

Appendix H

Main Analyses Split by Job Role

Table H-1

Multiple Regression Predicting Performance From Learning Agility Scores for Individual Contributors

Predictor	β	*Se*	t	p
Constant	3.20	.41	7.90	.00
Learning Agility	.09	.08	.1.02	.31
Tenure	.01	.04	.27	.79

Note: *n*=68 individual contributors

Table H-2

Logistic Regression Predicting Risk for Low Performance from Learning Agility for Individual Contributors

Predictor	*B*	*se*	Wald	df	P	Exp(B)
Learning Agility	.20	.74	.07	1	.79	1.22
Tenure	.41	.21	3.86	1	.05	1.50
Constant	-4.85	3.64	1.77	1	.18	.01
Model χ^2 = .3.51, p = .17						
Pseudo R^2 = .05 (Cox & Snell)						
N = 68						

Table H-3

Performance Predicted From Learning Agility and Psychologically Safe Climate for Individual Contributors

Predictor	β	*Se*	t	p	LLCI	ULCI
Constant	3.67	.11	32.64	.00	3.44	3.89
Learning Agility	.08	.09	.86	.40	-.10	.26
Psychologically Safe Climate	-.09	.13	-.74	.46	-.35	.16
Learning Agility*Psychologically Safe Climate	-.18	.10	-1.74	.09	-.39	.03
Tenure	-.01	.04	-.23	.82	-.09	.07

Note: $n = 68$; $\Delta R^2 = .08$, $F(4, 63) = 1.29$, *ns.*

Table H-4

Logistic Regression Predicting Risk for Low Performance From Learning Agility and Psychologically Safe Climate for Individual Contributors

Predictor	*B*	*se*	Wald	df	p	Exp(B)
Learning Agility	.37	2.76	.02	1	.90	1.44
Psychologically Safe Climate	-.30	4.91	.01	1	.95	.74
Learning Agility x Psychologically Safe Climate	-.05	.95	.01	1	.96	.95
Tenure	.38	.21	3.19	1	.07	1.46
Constant	-3.83	14.31	.07	1	.79	.02
Model $\chi^2 = 3.81$, p = .43						
Pseudo $R^2 = .05$ (Cox & Snell)						
N = 68						

Table H-5

Multiple Regression Predicting Performance From Learning Agility Scores for Managers

Predictor	β	*Se*	t	P
Constant	4.07	.68	.599	.00
Learning Agility	-.04	.13	-.33	.75
Tenure	.01	.01	1.60	.12

Note: n = 60 managers; ΔR^2 = .04, $F(2, 57) = 1.31$, *ns.*

Table H-6

Logistic Regression Predicting Risk for Low Performance From Learning Agility for Managers

Predictor	*B*	*se*	Wald	df	p	Exp(B)
Learning Agility	.47	.93	.26	1	.61	1.60
Tenure	-.08	.13	.42	1	.52	.92
Constant	-5.12	5.20	.97	1	.33	.01
Model χ^2 = .97, p = .62						
Pseudo R^2 = .01 (Cox & Snell)						
N = 60						

Table H-7

Performance Predicted From Learning Agility and Psychologically Safe Climate for Managers

Predictor	β	*Se*	t	p	LLCI	ULCI
Constant	3.90	.14	27.35	.00	3.62	4.19
Learning Agility	-.05	.16	-.33	.74	-.36	.26
Psychologically Safe Climate	.09	.22	.42	.68	-.35	.53
Learning Agility*Psychologically Safe Climate	-.27	.30	-.92	.36	-.86	.32
Tenure	.01	.01	1.47	.15	-.01	.03

Note: $n = 60$; $\Delta R^2 = .06$, $F(4, 55) = .91$, *ns.*

Table H-8

Logistic Regression Predicting Risk for Low Performance From Learning Agility and Psychologically Safe Climate for Managers

Predictor	*B*	*se*	Wald	df	p	Exp(B)
Learning Agility	36.04	33.25	1.18	1	.28	4.503E+15
Psychologically Safe Climate	50.53	45.92	1.21	1	.27	8.805E+21
Learning Agility x Psychologically Safe Climate	-9.49	8.78	1.17	1	.28	.00
Tenure	-.10	.14	.56	1	.45	.90
Constant	-194.21	174.43	1.24	1	.27	.00
Model χ^2 = 3.70, p = .45						
Pseudo R^2 = .06 (Cox & Snell)						
N = 60						

Appendix I

Study Analyses With Gender as a Covariate

Table I-1

Multiple Regression Predicting Performance From Learning Agility Scores With Gender as Covariate

Predictor	B	*SE B*	β	t	p
Constant	3.47	.40		8.77	.00
Learning Agility	.03	.08	.03	.36	.72
Tenure	.01	.01	.18	1.79	.07
Job Role	.24	.13	.19	1.79	.07
Gender	.01	.14	.01	.09	.93

Note: $\Delta R^2 = .11$, $F(4,120) = 3.63$, $p < .01$

Table I-2

Logistic Binary Regression Predicting Performance From Learning Agility Scores With Gender as Covariate

Predictor	*b*	*se*	Wald	df	p	Exp(B)
Learning Agility	.10	.62	.03	1	.88	1.10
Tenure	.00	.08	.00	1	.99	1.00
Job Role	-.43	1.12	.15	1	.70	.65
Gender	-2.16	.93	5.45	1	.02	.12
Constant	-2.01	3.10	.42	1	.52	.13
Model $\chi^2 = 6.75$, $p = .15$						
Pseudo $R^2 = .05$ (Cox & Snell)						
N = 128						

Table I-3

Performance Predicted from Learning Agility and Psychologically Safe Climate with Gender as Covariate

Predictor	β	*Se*	t	p	LLCI	ULCI
Constant	3.58	.13	26.94	.00	3.32	3.85
Learning Agility	.03	.09	.39	.70	-.14	.20
Psychologically Safe Climate	-.06	.12	-.48	.63	-.30	.19
Learning Agility*Psychologically Safe Climate	-.19	.10	-1.78	.08	-.01	.03
Job Role	.25	.13	1.85	.07	-.02	.51
Tenure	.01	.01	1.74	.09	-.01	.03
Gender	.07	.15	.46	.65	-.22	.36

Note: $\Delta R^2 = .13$, $F(6, 118) = 3.04$, $p < .01$

Table I-4

Logistic Binary Regression Predicting Performance From Learning Agility and Psychologically Safe Climate With Gender as Covariate

Predictor	*B*	*se*	Wald	df	p	Exp(B)
Learning Agility	.29	2.68	.01	1	.92	1.33
Psychologically Safe Climate	.41	4.56	.01	1	.93	1.50
Learning Agility x Psychologically Safe Climate	-.06	.84	.01	1	.94	.94
Tenure	.00	.09	.00	1	.99	1.00
Job Role	-.41	1.17	.12	1	.73	.67
Gender	-2.18	.96	5.15	1	.02	.11
Constant	-3.25	14.56	.05	1	.82	.04
Model $\chi^2 = 6.76$, $p = .34$						
Pseudo $R^2 = .05$ (Cox & Snell)						
N = 128						