

Uncovering the Relationship between Perceptions of Psychological Safety, Entrepreneurial Self-Efficacy, and Entrepreneurial Bricolage Behaviors

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Abstract

While a significant amount of research has identified individual founder traits and perceptions that significantly affect startup trajectory, relatively little work has investigated the interactions between these variables. Specifically, while prior research has shown that psychological safety, entrepreneurial self-efficacy, and entrepreneurial bricolage skills are correlated with firm performance, the linkages between these variables is unknown. The purpose of this study was to investigate the relationship between these variables leveraging data from 71 startup founders. Results suggest that team psychological safety and entrepreneurial self-efficacy can individually predict entrepreneurial bricolage, with the combination of the two yielding a stronger predictive relationship. Finally, findings suggest that psychological safety, entrepreneurial self-efficacy, and entrepreneurial bricolage are not correlated with firm performance, contradicting prior findings.

Keywords: Entrepreneurial self-efficacy, entrepreneurial bricolage, psychological safety, startups.

1. Introduction

US startups employ 1.5 million people, and account for an estimated 2.8% of all US businesses (Wu & Atkinson, 2017). Startups, particularly deep technology ventures, have significant broad direct and indirect economic impacts, often at national and global scales (Wu & Atkinson, 2017). Universities and academic institutions are uniquely positioned to have far reaching economic impacts via transfer of fundamental discoveries and novel research into deep technology ventures (Hayter, 2011). As such, a significant amount of attention has been paid to university technology transfer practices (Swamidass, 2013). Yet, estimates indicate that 75% of university inventions remain unlicensed. The failure to translate fundamental discoveries into commercialized

technologies can minimize or negate return on research investments (Merrill & Mazza, 2011).

University spinoffs and startups remain a promising avenue for academics and universities to increase the dissemination and broader impacts of foundational discoveries, and prior work suggests that university startups have a higher survival rate as compared to other startups (Swamidass, 2013). Startups, in general, however face a variety of obstacles that prevent long-term success (Wu & Atkinson, 2017). Post-mortem analyses show that startups fail due to a number of internal and external factors (Cantamessa et al., 2018; Williams, 2014), including individual differences (Charan & Useem, 2002; Scott-Young & Samson, 2008; Yazdipour & Constand, 2010), team composition (Scott-Young & Samson, 2008), founder expertise and background (Delmar & Shane, 2006), entrepreneurial eco-system (Jarohnovich, 2013; Nelsen, 2010), and available resources (Cantamessa et al., 2018). University startups face additional challenges due to academic culture, norms, and beliefs (Hayter, 2011); the main goal of academic research is the creation of fundamental knowledge not the creation of commercial technologies.

In the current work, we focus on understanding how individual perceptions of team climate and founder ability may interact, as well as discuss the implications of these interactions from the perspective of university spinouts. We will subsequently review three specific factors of interest: perceptions of psychological safety, entrepreneurial self-efficacy, and entrepreneurial bricolage.

Psychological safety is the shared belief that a team is safe for interpersonal risk taking and a measure of team climate. Prior work by Edmondson (A. Edmondson, 2011) found that psychological safety is particularly critical to team performance when tasks are complex, demand creativity, and involve sense-making. We argue, therefore, that the psychological safety of a startup is critical to the success of the startup overall. Further, psychological safety is a pre-

requisite for positive social development, as an individual needs to first feel psychologically safe in an environment to enable inter-personal risk taking and growth.

Self-Efficacy refers to an individual's beliefs in his or her abilities to achieve a given objective or execute a course of actions (Bandura, 1994). Problem-solving studies have linked higher levels of self-efficacy with more efficient and effective problem solving (Zheng et al., 2009). Further, self-efficacy has been linked to higher motivation to persevere in uncertain or ambiguous environment. Self-efficacy is particularly important for startups as they pitch companies or ideas, as a belief in one's ability to successfully fundraise or communicate a technical concept is likely tied directly to performance.

Entrepreneurial bricolage is the ability of startup teams to "make do by applying combinations of the resources at hand to new problems and opportunities" (Baker & Nelson, 2005). As startups represent firms often under extreme resource constraints, the ability of founders and startup teams to be "resourceful" and leverage limited resources effectively, is critical.

We are motivated in the current work to explore the theoretical linkages between these constructs. Due to the competitive and resource scarce nature of the startup climate, we hypothesize that psychological safety and self-efficacy are necessary pre-requisites for higher levels of entrepreneurial bricolage. As such, we suspect that founder perceptions of psychological safety and entrepreneurial self-efficacy will predict entrepreneurial bricolage and be strongly linked with financial performance of the startup.

2. Literature review

Entrepreneurial bricolage, or the use of limited resources to explore problems and find new opportunities (Baker & Nelson, 2005), has been linked with startup firm performance (Kariv & Coleman, 2015). In a study of 29 startup firms, (Baker & Nelson, 2005) found that successful firms consistently adapted, recycled, or reimagined resources in novel ways to meet ever-changing demands and needs. Stenholm and Renko extended this work, finding evidence that successful "bricoleurs" were less likely to quit entrepreneurial endeavors and a strong positive correlation was found between entrepreneurial bricolage and entrepreneurial passion (Stenholm & Renko, 2016). Little work, however, has explored the connections between entrepreneurial bricolage and self-efficacy or perceptions of psychological safety.

Drawing from Dweck and Legget's social cognitive theory of achievement motivation (Dweck & Leggett, 1988), an individual's behaviors, cognition,

and affective state are affected by implicit beliefs regarding the malleability of their own intelligence or abilities. Social cognitive theories of achievement motivation are often used to describe two distinct groups of individuals, those with entity beliefs (intelligence is fixed and cannot be changed) or those with incremental beliefs (intelligence is able to be changed). Education researchers posit that incremental beliefs may serve as a buffer against challenging environments, enabling individuals to persist (Snyder et al., 2018). Consequently, higher levels of entrepreneurial self-efficacy, or a belief in one's abilities to successfully accomplish entrepreneurial tasks, have consistently been identified as a driver of persistence and success in entrepreneurial endeavors (Cardon & Kirk, 2015; Santoro et al., 2020). Countless studies have connected increased levels of entrepreneurial self-efficacy with firm performance (Hmieleski & Baron, 2008), and resource management (McGee et al., 2009).

We also ground this work in Edmondson's theory of psychological safety (A. Edmondson, 1999, 2011). Psychological safety refers to the shared belief that the team is safe for interpersonal risk taking. Edmondson proposed psychological safety as a team-level construct, that is particularly critical to team performance when tasks are complex, knowledge intensive, and involve creativity and sense-making. Willingness to share knowledge or ideas, openly communicate, and a belief that team members are working towards a common goal depend on the formation and maintenance of psychological safety within teams (A. Edmondson, 2011). The interaction between self-efficacy and psychological safety is particularly critical within the context of startup teams. Implicit beliefs shape the fundamental ways founders perceive and react to failure, while team psychological safety dictates the willingness and comfort of the team to openly communicate failures with teammates or test new ideas that may lead to failure.

While psychological safety, self-efficacy, and entrepreneurial bricolage have been extensively studied, the relationships between these constructs have not been uncovered. To address this gap, we hypothesize that the interaction between these variables may support or hinder the ability of startup teams to engage in bricolage. If founders or team members do not feel psychologically safe or perceive teams as psychologically safe spaces, they are less likely to take creative risks. This phenomenon is detrimental to entrepreneurial bricolage, which requires the creative application of limited resources in novel ways. Further, we hypothesize that lower levels of entrepreneurial self-efficacy may stymie entrepreneurial bricolage, as founders may perceive

themselves incapable of successfully adapting or reallocating limited resources appropriately.

The following hypotheses drive the current proposal:

H1: Perceptions of team psychological safety predicts greater entrepreneurial bricolage.

Environments with high levels of psychological safety foster creativity and risk taking (A. C. Edmondson & Lei, 2014). The construct of entrepreneurial bricolage fundamentally relies on creative risk taking to make something from nothing. Thus, we hypothesize that psychological safety positively affects entrepreneurial bricolage.

H2: Entrepreneurial self-efficacy predicts greater entrepreneurial bricolage.

According to Bandura's theory of self-efficacy (Bandura, 1986), belief in one's own abilities to accomplish a task greatly predicts actual task performance. As founders often face resource scarcity (Elnadi & Gheith, 2021), the ability to make something from nothing (entrepreneurial bricolage) is critical to firm survival and founder persistence (Pollack et al., 2019). Thus, we hypothesize that entrepreneurial self-efficacy, or a belief in one's abilities to perform startup specific tasks, will significantly predict levels of entrepreneurial bricolage, as bricolage skills are likely leveraged day-to-day by founders.

H3: The combination of perceptions of team psychological safety and entrepreneurial self-efficacy more strongly predict entrepreneurial bricolage.

Enhanced psychological safety has previously been found to improve entrepreneurial self-efficacy (Javadian et al., 2018). Grounded on this finding and our previous hypotheses, we postulate that when studied together, psychological safety and entrepreneurial self-efficacy will more strongly predict entrepreneurial bricolage.

H4: Perceptions of team psychological safety, entrepreneurial self-efficacy, and entrepreneurial bricolage will be positively correlated with financial performance by the startup team.

Greater entrepreneurial bricolage has previously been linked with positive firm performance (Senyard et al., 2009). Based on this finding, and our previous hypothesis that perceptions of psychological safety and entrepreneurial self-efficacy positively predict

entrepreneurial bricolage, we further hypothesize that the combination of these constructs are correlated with firm performance.

The remainder of this paper is organized as follows. Section 3 outlines the data collection and survey methodology used in this study. Quantitative findings are presented in Section 4 and implications of these findings are discussed in Section 5. Finally, Section 6 serves to conclude our findings, present limitations, and identify possible areas of future work.

3. Methodology

To determine the relationships between startup founders' psychological safety, entrepreneurial self-efficacy, entrepreneurial bricolage skills, and startups' financial outcomes, a survey was distributed to startup founders engaged in the National Science Foundation's Innovation Corps program. Responses from 71 founders across the northeastern United States were collected and analyzed. This section serves to present the methodological approaches of our study.

3.1. Participants

Seventy-one startup company founders that participated in the National Science Foundation's (NSF) Innovation Corps (I-Corps) program were recruited for this study. Each participant completed a survey that was distributed following the conclusion of their I-Corps program. To mitigate the obstacles university startups face and increase the broader impacts of foundational scientific discoveries, particularly in the private sector, NSF introduced the I-Corps program in 2011. To date, the I-Corps program has trained over 5,000 researchers (Nnakwe et al., 2018) and cultivated a national innovation network through I-Corps Nodes and Sites that has had far reaching economic impacts. Collectively, over 1,700 startup teams have participated in I-Corps programming, resulting in the creation of over 644 companies that have raised over \$301M in startup funding (Foundation, 2019).

Participants were recruited from 10 Universities participating in the Mid-Atlantic NSF I-Corps Hub (*NSF I-Corps Hub: Mid-Atlantic Region*, n.d.). Researchers worked with individual program directors to recruit participants via email. Participants in the current study ranged in age from 18 to 65+ years old, see Figure 1. Racial and gender demographics for the sample are shown in Figure 2.

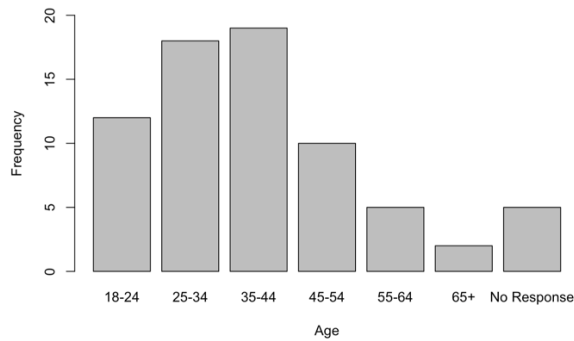


Figure 1. Distribution of participants' age.

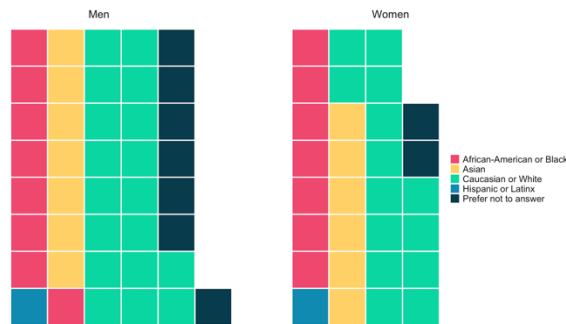


Figure 2. Distribution of participants' race and gender.

3.2. Data collection

A survey was created and distributed to capture entrepreneurial characteristics of startup founders, specifically perceived psychological safety of the startup team, entrepreneurial self-efficacy, and entrepreneurial bricolage behaviors of the startup. The survey was completed by one founder from each startup. At the beginning of the survey, the purpose of the study was presented, and consent was obtained from each participant, in accordance with Penn State's Institutional Review Board.

Participants first responded to a set of nineteen questions developed to quantify one's entrepreneurial self-efficacy (ESE) (McGee et al., 2009). The ESE construct measures one's confidence in their ability to succeed in entrepreneurial ventures and activities. Prior work found that a higher degree of ESE results in higher entrepreneurial performance as a result of increased confidence in entrepreneurial specific tasks (Chatterjee & Das, 2015). Participants were asked how much confidence they had in their ability to perform nineteen tasks relevant to starting a new venture (McGee et al., 2009). Examples of these tasks include their confidence in their ability to "brainstorm (come up with) a new idea for a product or service", and to "design an effective marketing or advertising campaign for the new product or service".

Participants responded to the ESE statements on a five-point scale ranging from 1 (very little confidence) to 5 (a great amount of confidence).

Following the ESE portion of the survey, participants responded to a second set of questions regarding entrepreneurial bricolage. Prior work suggest that practicing entrepreneurial bricolage skills can reduce the risks of developing a new product, thus leading to a greater startup success rate (Ravishankar & Gurca, 2016). Greater levels of entrepreneurial bricolage have also been associated with higher levels of innovation resulting in a more sustained competitive advantage (Salunke et al., 2013). Participants responded to nine entrepreneurial bricolage statements and were asked if the statements represented how they would go about doing things for their startup (Baker & Nelson, 2005). Examples of the statements include "we are confident in our ability to find workable solutions to new challenges by using our existing resources", and "by combining our existing resources, we take on a surprising variety of new challenges". Participants responded to the entrepreneurial bricolage items on a five-point scale ranging from 1 (never) to 5 (always).

Participants responded to a third set of questions regarding psychological safety. Prior work has demonstrated a positive relationship between psychological safety and creative performance with self-efficacy as a moderator (Choi et al., 2021). Furthermore, it has been found that psychological safety is positively related to firm performance, specifically for return on assets and firm goal achievement (Baer & Frese, 2003). Participants were asked to rate their agreement with seven statements regarding their perceived psychological safety (A. Edmondson, 1999). Examples of the statements include "members on this team are able to bring up problems and tough issues" and "working with this team, my unique skills and talents are valued and utilized". Participants responded to these statements on a seven-point scale ranging from 1 (very inaccurate) to 7 (very accurate).

In addition to the ESE, entrepreneurial bricolage, and psychological safety question sets, participants were asked how much business venture funding, if any, they had raised. Specifically, participants were asked to indicate funds obtained from founders' capital, grants, friends and family, Angel investors, venture capital, and startup competitions.

4. Analysis

This section presents the results of our hypothesis testing. Statistical analyses were computed using R CRAN v. 4.2.0. Hierarchical multiple regressions

were employed as the most appropriate method of analysis in line with previous work (Cole et al., 2020). A significance level of $p = 0.05$ was used in all analyses. Table 1 outlines the descriptive statistics that were calculated on the founders' average perceived psychological safety, average entrepreneurial self-efficacy, and average entrepreneurial bricolage skills.

For perceived psychological safety, three items on this scale portray negative psychological safety, and thus were reverse coded. The overall scores for perceived psychological safety, entrepreneurial self-efficacy, and entrepreneurial bricolage behaviors were calculated as an average of the individual survey item scores.

Table 1. Descriptive Statistics

Average Perceived Psychological Safety	Mean	SD	6.036	0.965
Average Perceived Entrepreneurial Self-Efficacy	Mean	SD	3.538	0.565
Average Perceived Entrepreneurial Bricolage Skills	Mean	SD	3.917	0.704

4.1. Perceptions of psychological safety and entrepreneurial bricolage

H1: Perceptions of team psychological safety predicts greater entrepreneurial bricolage.

To test our first hypothesis, a hierarchical multiple regression was computed with the independent variable being average perceived psychological safety, the covariates being gender and race, and the dependent variable being perception of entrepreneurial bricolage skills. Due to pervasive structural inequities that disadvantage women and racially minoritized groups, prior work suggests that significant differences in entrepreneurial bricolage behaviors may be observed across gender and race (Kariv & Coleman, 2015).

The results of the hierarchical multiple regression showed that the addition of psychological safety improved the prediction of entrepreneurial bricolage skills over and above gender and race alone. See Table 2 for full details on the hierarchical regression models. The full model of gender, race, and average perceived psychological safety of startup teams to predict founders' perceptions of entrepreneurial bricolage skills (Model 2) was statistically significant, $R^2 = 0.191$, $F(3, 67) = 5.269$, $p = 0.003$, adjusted $R^2 = 0.155$. The addition of average perceived

psychological safety to the prediction of startup founders' perceived entrepreneurial bricolage skills (Model 1) led to a statistically significant increase in R^2 of 0.182, $F(1, 67) = 15.112$, $p < 0.001$.

Table 2. Hierarchical multiple regression predicting perceived entrepreneurial bricolage skills from gender, race, and perceived psychological safety.

	Variable	Entrepreneurial Bricolage Skills		
		B	β	p
Model 1	Constant	3.936**		<0.001
	Gender	-0.086	-0.061	0.620
	Race	0.022	0.063	0.604
	R^2	0.008		
	F	0.288		0.751
	ΔR^2	0.008		
	ΔF	0.288		0.751
Model 2	Constant	2.263**		<0.001
	Gender	-0.237	-0.168	0.145
	Race	0.011	0.031	0.781
	Average Perceived Psychological Safety	0.322**	0.441	<0.001
	R^2	0.191		
	F	5.269*		0.003
	ΔR^2	0.182		
	ΔF	15.112**		<0.001

Note: $N=71$. * $p < .05$, ** $p < .001$

4.2. Entrepreneurial self-efficacy and entrepreneurial bricolage

H2: Entrepreneurial self-efficacy predicts greater entrepreneurial bricolage.

To test our second hypothesis, a hierarchical multiple regression was computed with the independent variable being average entrepreneurial self-efficacy, the covariates being gender and race, and the dependent variable entrepreneurial bricolage behaviors. Prior work has demonstrated that women and racially minoritized groups exhibit lower levels of self-efficacy in fields more heavily dominated by white men (Santoro et al., 2020; Wilson et al., 2007), such as entrepreneurial endeavors.

The results of the hierarchical multiple regression showed that the addition of entrepreneurial self-efficacy improved the prediction of entrepreneurial bricolage skills over and above gender and race alone. See Table 3 for full details on the hierarchical regression models. The full model of gender, race, and average perceived self-efficacy to predict founders'

perceptions of entrepreneurial bricolage skills (Model 2) was statistically significant, $R^2 = 0.165$, $F(3, 67) = 4.420$, $p = 0.007$, adjusted $R^2 = 0.128$. The addition of average perceived self-efficacy to the prediction of startup founders' perceived entrepreneurial bricolage skills (Model 1) led to a statistically significant increase in R^2 of 0.157, $F(1, 67) = 12.586$, $p < 0.001$.

Table 3. Hierarchical multiple regression predicting perceived entrepreneurial bricolage skills from gender, race, and perceived self-efficacy.

	Variable	Entrepreneurial Bricolage Skills		
		B	β	p
Model 1	Constant	3.936**		<0.001
	Gender	-0.086	-0.061	0.620
	Race	0.022	0.063	0.604
	R^2	0.008		
	F	0.288		0.751
	ΔR^2	0.008		
	ΔF	0.288		0.751
Model 2	Constant	1.903*		0.005
	Gender	-0.012	-0.008	0.942
	Race	0.051	0.145	0.210
	Average Perceived Self-Efficacy	0.507**	0.407	<0.001
	R^2	0.165		
	F	4.420*		0.007
	ΔR^2	0.157		
	ΔF	12.586**		<0.001

Note: $N=71$. * $p < .05$, ** $p < .001$

4.3. Entrepreneurial self-efficacy, psychological safety, and entrepreneurial bricolage

H3: The combination of perceptions of team psychological safety and entrepreneurial self-efficacy more strongly predict entrepreneurial bricolage

To test our third hypothesis, a hierarchical multiple regression was computed with the independent variables being entrepreneurial self-efficacy and perceived psychological safety, the covariates being gender and race, and the dependent variable being perception of entrepreneurial bricolage skills.

A hierarchical multiple regression was run to determine if the addition of average perceived psychological safety of startup teams improved the prediction of entrepreneurial bricolage behaviors over and above gender, race, and average entrepreneurial self-efficacy alone. See Table 4 for full details on the

hierarchical regression models. The full model of gender, race, perceived psychological safety, and entrepreneurial self-efficacy to predict entrepreneurial bricolage behaviors (Model 3) was statistically significant, $R^2 = 0.295$, $F(4, 66) = 6.899$, $p < 0.001$, adjusted $R^2 = 0.252$. The addition of psychological safety to the prediction of entrepreneurial bricolage behaviors (Model 2) led to a statistically significant increase in R^2 of 0.130, $F(1, 66) = 12.132$, $p < 0.001$.

Table 4. Hierarchical multiple regression predicting perception of entrepreneurial bricolage skills from gender, race, psychological safety, and entrepreneurial self-efficacy.

	Variable	Entrepreneurial Bricolage Skills		
		B	β	p
Model 1	Constant	3.936**		<0.001
	Gender	-0.086	-0.061	0.620
	Race	0.022	0.063	0.604
	R^2	0.008		
	F	0.288		0.751
	ΔR^2	0.008		
	ΔF	0.288		0.751
Model 2	Constant	1.903*		0.005
	Gender	-0.012	-0.008	0.942
	Race	0.051	0.145	0.210
	Average Perceived Self-Efficacy	0.507**	0.407	<0.001
	R^2	0.165		
	F	4.420*		0.007
	ΔR^2	0.157		
	ΔF	12.586**		<0.001
Model 3	Constant	0.817		0.234
	Gender	-0.154	-0.109	0.319
	Race	0.037	0.103	0.337
	Average Perceived Self-Efficacy	0.420*	0.337	0.003
	Average Perceived Psychological Safety	0.276**	0.378	<0.001
	R^2	0.295		
	F	6.899*		<0.001
	ΔR^2	0.130		
	ΔF	12.132**		<0.001

Note: $N=71$. * $p < .05$, ** $p < .001$

4.3. Financial outcomes

H4: Perceptions of team psychological safety, entrepreneurial self-efficacy, and entrepreneurial bricolage will be positively correlated with financial performance by the startup team.

To understand the practical implications of these variables for startup firms and based on prior literature suggesting that perceptions of psychological safety, entrepreneurial self-efficacy, and entrepreneurial bricolage skills were positively associated with startup firm performance, we sought to identify the correlations between financial capital and revenue generated by startup firms and these variables.

Firm performance was calculated as a sum of the business venture funding of each startup along with any reported annual revenue. Participants were asked on the survey to report any funds raised or revenue generated. This data was used in addition to secondary data collected through LexisNexis, a news, business, and legal database. Of the 71 total firms in our study, 10 were too nascent to report and revenue or capital raised, and 1 outlier was identified and removed, leaving 60 firms to analyze.

A Pearson's correlation was run to assess the relationship between startup founders' entrepreneurial self-efficacy and firm financial performance. The relationship between the two variables was linear and one outlier was identified and removed via visual inspection of the scatterplot. There was no statistically significant correlation between startup founders' self-efficacy in entrepreneurial tasks and firm financial performance, $r(60) = -0.169$, $p = 0.196$, with self-efficacy explaining 2.86% of the variation in firm performance.

A second Pearson's correlation was run to assess the relationship between startup founders' entrepreneurial bricolage skills and firm performance. The relationship between the two variables was linear and one outlier was identified and removed via visual inspection of the scatterplot. There was no statistically significant correlation between startup founders' entrepreneurial bricolage skills and firm performance, $r(70) = -0.029$, $p = 0.828$ with entrepreneurial bricolage skills explaining 0.08% of the variation in firm performance.

A third Pearson's correlation was run to assess the relationship between startup founders' psychological safety and firm performance. The relationship between the two variables was linear and one outlier was identified and removed via visual inspection of the scatterplot. There was no statistically significant correlation between startup founders' psychological safety and firm performance, $r(70) = 0.071$, $p = 0.588$

with psychological safety explaining 0.50% of the variation in firm performance.

5. Discussion

The main goal of this study was to explore the ability of perceived psychological safety of startup teams and founders' entrepreneurial self-efficacy to predict entrepreneurial bricolage behaviors. Because limited work has investigated the intersection of these constructs together, we sought to understand the practical implications of these variables for relatively nascent firms by identifying the relationship between these variables and financial capital raised. The main findings from the study are as follows:

- *Perceptions of startup team psychological safety predict greater entrepreneurial bricolage with a low $R^2 = 0.191$, partially supporting H1.*
- *Entrepreneurial self-efficacy predicts greater entrepreneurial bricolage with a low $R^2 = 0.165$, partially supporting H2.*
- *The combination of perceptions of team psychological safety and entrepreneurial self-efficacy more strongly predicts entrepreneurial bricolage with a moderate $R^2 = 0.295$, partially supporting H3.*
- *Perceptions of team psychological safety, entrepreneurial self-efficacy, and entrepreneurial bricolage are not correlated with financial performance by the startup team, which does not support H4.*

The first finding from this study indicates that perceived psychological safety of startup teams weakly predicts entrepreneurial bricolage. Thus, a team's feelings of safety for interpersonal risk taking predicts founders' willingness to apply available resources to new problems in their startup. However, we found the predictive ability of perceived psychological safety was weak, partially supporting our hypothesis. Previous work found that individuals who feel psychologically safe are more likely to exhibit bricolage skills (Cunha, 2005). Furthermore, psychological safety has been identified as a precondition for an increase in bricolage skills (Faia-Correia & Pina E. Cunha, 2007). Our findings, while demonstrating a statistically significant relationship between psychological safety and bricolage skills, demonstrated that perceptions of psychological safety only weakly predicted bricolage behaviors. Prior work has found that the effect of psychological safety on team processes and individual behavior is weaker during the early stages of team formation and operation (Miller et al., 2019). We hypothesize that

our sample may have been skewed with more nascent entrepreneurial firms, as the aim of the NSF I-Corps program is to prepare founders to better meet the needs and challenges of entrepreneurship. Future work should evaluate the moderating role of the lifespan of a firm on the relationship between psychological safety and entrepreneurial bricolage behaviors.

The second finding from this study indicates that entrepreneurial self-efficacy predicts startup founders' entrepreneurial bricolage skills. Thus, one's belief in their ability to successfully complete entrepreneurial tasks predicts their willingness to apply available resources to new problems in their startup in creative ways. This is in line with prior work which suggests that founders with lower levels of entrepreneurial self-efficacy likely experience cognitive overload when engaged in entrepreneurial tasks and fail to exhibit entrepreneurial skills (Hmieleski & Corbett, 2008). Moreover, prior work found entrepreneurial self-efficacy moderated the relationship between firm bricolage and business model innovation (Butt et al., 2021). Our results partially support this past work, as we found entrepreneurial self-efficacy only weakly predicted entrepreneurial bricolage behaviors. In combination, perceived psychological safety of startup teams and entrepreneurial self-efficacy moderately predicted entrepreneurial bricolage behaviors, supporting our third hypothesis.

The fourth finding from this study indicates that startup founders' entrepreneurial self-efficacy, entrepreneurial bricolage behaviors, and perceived psychological safety of startup teams are not correlated with the financial outcomes of their startup company. This does not support our hypothesis and contradicts prior work, which suggests the individual entrepreneurial traits of startup founders impacts the financial outcomes of their startups. Specifically, multiple studies have linked psychological safety with firm performance (Baer & Frese, 2003; Choi et al., 2021). We hypothesize, that due to the relatively nascent nature of most of the firms in the current work, psychological safety may not be a salient factor in firm performance. Further, while past work has demonstrated that task specific self-efficacy is strongly predictive of actual task performance, our findings suggest that entrepreneurial self-efficacy has no bearing on financial performance. Finally, we anticipate a strong positive relationship between entrepreneurial bricolage behavior and financial performance, as higher levels of bricolage behaviors are indicative of effective resource management. These findings warrant deeper investigation and will be more thoroughly reviewed in future work.

Though our findings did not indicate that perceptions of team psychological safety,

entrepreneurial self-efficacy, and entrepreneurial bricolage are not correlated with firm performance, a practical implication of our work is that characteristics of startup teams and founders can affect the startup's ability to utilize resources. Specifically, greater psychological safety and greater entrepreneurial self-efficacy can predict greater entrepreneurial bricolage behaviors. This finding is relevant to startup founders because our findings suggest that fostering greater psychological safety and self-efficacy among startup teams may help them to more effectively make use of limited resources and "make something from nothing". This skill is particularly critical for startups facing significant resource constraints.

6. Conclusion

The main goal of this study was to uncover the relationships between perceptions of psychological safety, entrepreneurial self-efficacy, entrepreneurial bricolage, and firm performance. To achieve this goal, an empirical study was conducted on 71 startup founders from the National Science Foundation's Innovation Corps program. Our results indicate that perceptions of both psychological safety and entrepreneurial self-efficacy predict greater entrepreneurial bricolage and that these constructs do not correlate with firm performance.

The current study was limited by in two significant ways. First, many of the startups engaged in the NSF I-Corps program are incredibly nascent. As previously noted, the main goal of academic research is the creation of fundamental *knowledge* not the creation of commercial technologies. As such, many of the founders in the current study may be more risk averse or less likely to continue with entrepreneurial endeavors, as prior work has demonstrated the hesitation exhibited by faculty to engage in entrepreneurship (Grünhagen & Volkmann, 2014). Thus, the nature of our sample may have biased findings, and future work should endeavor to compare results with more general populations of entrepreneurs. Additionally, all founders recruited for this study were engaged in some way with the NSF I-Corps program. Thus, this work may be skewed due to self-selection bias.

This research was also limited by a relatively small sample size that was geographically clustered in the northeastern United States. Prior literature has demonstrated that geographic location affects cultural norms and resource availability (Peng et al., 2022). Future work will compare findings to results from a broader representation of geographic locations across the United States.

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