

The Effects of Mentoring in Entrepreneurial Career Choice

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Abstract:

Mentorship programs are increasingly on the agenda for policymakers and universities interested in fostering entrepreneurship. However, there are few studies examining the causal effects of mentorship on potential entrepreneurs. We investigate the impact of the type of mentorship on the likelihood that university students will become entrepreneurs. We test whether being mentored by an entrepreneur has a different impact in entrepreneurship education compared with mentoring from a non-entrepreneur with relevant industry experience. We use a longitudinal field experiment with a pre-test/post-test design where students in an entrepreneurship class were randomly assigned to receive mentorship from either entrepreneur or non-entrepreneur mentors. To our knowledge, this is the first randomized trial of a mentoring program in entrepreneurship. We find significant positive effects of mentorship, particularly by certain types of mentors. However, the effects are not uniform among the group of participating students. Results show that entrepreneur mentors have a significant positive influence on the rate of entrepreneurship, with the greatest influence on students with specific risk orientation and family backgrounds.

Introduction

Universities and policymakers around the world increasingly seek to foster entrepreneurship in order to increase economic growth and job creation. Academic programs are more mixed however, on both whether entrepreneurship can spur growth, and what mechanisms can best increase entrepreneurship. Perhaps rather than encouraging greater entrepreneurship, it may be more important to emphasize specific types of entrepreneurship. Recent studies have focused on the economic impact of university-based entrepreneurship as particularly important (Harhoff, 1999; Shane, 2004; Roberts and Eesley, 2011; Eesley and Miller, 2012). Many universities, governments and industry participants have started programs which include mentorship as a key component in increasing entrepreneurship. In recent years there has been a proliferation in the number of accelerator programs, entrepreneurship education initiatives and government-sponsored small business mentorship programs in the US and abroad (Bruneela et al. 2012).¹ Accelerator and incubator programs outside of universities, such as YCombinator, TechStars and the Founder Institute typically pitch potential entrepreneurs on the benefits of the mentorship component of their programs. In the US, the JOBS Act and Startup America has allocated \$400M dollars for mentorship and funding.² Alongside these government and industry-led initiatives, universities, which increasingly feel pressured to demonstrate their contribution to economic impact, have been creating courses and programs which feature mentorship components (Fayolle, 2000; Kuratko, 2005). However, few studies have directly examined the effects of mentorship as part of entrepreneurship education. As mentorship programs proliferate,

¹ The SBA, in partnership with the Department of Energy (DOE) and Advanced Research Projects Agency-Energy (ARPA-E), is funding four business accelerators. These accelerators will provide intensive mentorship from seasoned entrepreneurs to a selection of the most promising new companies. This pilot program is the first step in the development of a large, distributed network of entrepreneurs, mentors, and accelerators. The Department of Veterans Affairs (VA), in partnership with SBA and the Department of Labor, will establish two of the first integrated business accelerators focused solely on helping Veterans launch their own businesses. The program includes a business incubator facility, located in Waukesha, Wisconsin, where early-stage Veteran-owned businesses are mentored by experienced entrepreneurs and trained to develop the skills needed to build successful businesses.

² <http://s.co/press-release/april20commitments>

mentors are increasingly becoming a scarce resource. Knowing which characteristics to look for in mentors and which students are most likely to be influenced by them is vital.

The effects of social networks on entrepreneurial career choice are still not well understood, particularly the causal effects of adding network connections and the mechanisms by which such effects may occur. Using observational data, prior work has examined the exposure to entrepreneurship via parents or coworkers, indicating that it increases entrepreneurial behavior (Stuart and Ding, 2006; Sorensen, 2007; Nanda and Sorensen, 2010). By contrast, a recent study using quasi-experimental design found that MBA students randomized to class sections with former entrepreneurs were *less* likely to start businesses after graduation (Malmendier and Lerner, 2013). However, we do not know if the results imply that these former entrepreneurs influence their MBA peers in screening away low-quality projects, or bring negative sentiments towards the startup career into the classroom, as successful entrepreneurs rarely return to school to pursue advanced degrees.

Literature on mentorship yields mixed results. Generally, studies have suggested that informal mentoring is more effective than formal programs and provides some evidence that mentorship can improve self-efficacy and leadership (Ragins, Cotton and Miller, 2001; Raabe and Beehr, 2003). However, these studies have mainly focused on career development within organizations, leaving unexamined the question of whether the characteristics of mentors influence the subsequent career choices of mentees in making the transition from conventional careers (i.e. waged employment) to entrepreneurship (i.e. founding a venture as an employer).

Our contribution in this paper theorizes as to the effects of mentorship approaches on the mentees' choices between conventional careers and entrepreneurship. This paper provides a research model which offers a more optimal and better identified test of the causal effects of entrepreneur vs. non-entrepreneur mentors on mentees' actual career decisions. The research design has two key advantages: First, we employ a randomized experiment where teams are assigned a mentor type. The randomization allows us to control selection bias resulting from

mentors selecting teams and teams selecting mentors. Mentees more inclined towards entrepreneurship might otherwise have matched with a certain type of mentor, potentially resulting in bias in purely observational data. Second, the design is longitudinal, in that we follow the mentees through graduation and for years afterwards, enabling us to observe their actual career choices rather than mere career intentions. We highlight two key findings. First, mentors with entrepreneurial experience have a significant, positive impact on their mentees' likelihood of founding or joining early stage startups. Second, this effect is particularly strong for mentees who are less risk-averse and whose parents are not entrepreneurs. From a ten-week course of mentorship, we find significantly stronger effects on career decisions for mentees who were randomly assigned to mentors who were former or current entrepreneurs.

Literature on Entrepreneurship Education

While entrepreneurship education has proliferated, high quality research on the subject is still nascent (Gorman et al. 1997). While many early studies were descriptive (Vesper and Gartner 1997), recent work has begun to show a positive link between entrepreneurial education and outcomes, such as attitudes and intentions towards entrepreneurship or entrepreneurial activity (Fayolle et al. 2006; Tkachev and Kolvereid 1999; for exception, see Von Graevenitz, Harhoff, and Weber, 2010). Initial results have suggested that entrepreneurship programs encourage students to start businesses and increase their entrepreneurial self-efficacy (McMullan et al., 2002; Gorman et al. 1997). Peterman and Kennedy (2003) find that students in an enterprise education course who had weak ex-ante entrepreneurial intentions had a stronger increase in those intentions than the students with strong ex-ante intentions. Souitaris et al. (2007) find that a semester-long entrepreneurship program resulted in an increase in entrepreneurial intentions. Oosterbeek et al. (2010) use a differences-in-differences framework to show that the effect of an entrepreneurship course on students' self-assessed entrepreneurial skills was insignificant, and the effect on entrepreneurial intentions was negative. Von Graevenitz, Harhoff,

and Weber (2010) find that while the average effects of an entrepreneurship course were negative on intentions, the effects were not uniform, with some students either increasing or decreasing their entrepreneurial intentions. Their results are consistent with students receiving informative signals about their entrepreneurial aptitude.

This literature generated significant insights and laid groundwork for further analysis. Several scholars have observed the need for more work on the impact of entrepreneurship education (sometimes called business “coaching”) due to the preliminary state of knowledge (Weaver, Dickson and Solomon 2006; Cumming and Fischer 2012). As von Graevenitz and colleagues (2010: p. 103) write, “While entrepreneurship education has been introduced and promoted in many countries and at many institutions of tertiary education, little is known at this point about the effect of these courses. In particular, it is largely unknown how the courses impact students’ willingness to engage in entrepreneurial activity and what kind of learning processes are responsible for these effects. Instead, the literature has focused on an analysis which studies outcomes, but does not consider the causes or the path of learning.”

There are at least two limitations in the literature: 1) Research has predominantly focused on the impact of entrepreneurship education on students’ entrepreneurial orientation, but not whether their classroom knowledge is applied to real-world startup careers after graduation; 2) In focusing on whether entrepreneurship education produces results, much of this work neglects the great variation across such courses and programs. In particular, little work that we are aware of has examined whether the type of mentorship matters.

Mentorship literature

Eby (2010: p. 505) defines mentorship as a “developmentally oriented interpersonal relationship that is typically between a more experienced individual (i.e., the mentor) and a less experienced individual (i.e., the protégé).” A number of scholars and certainly numerous practitioners have noted the importance of mentorship in promoting leader development and career opportunities (e.g., McCauley & Van Velsor, 2004; Srivastava 2013). In a sense,

entrepreneurship is new to the idea of mentorship within large companies. It is estimated that at least a third or more of major companies have formal mentoring programs (Bragg 1989; Murray 1991). A small but growing literature on mentorship exists and has been utilized by both psychologists and management scholars. This literature has focused predominantly on the impact of career mentoring in large companies and within academia. According to Kram's mentor role theory (1985), mentors provide two types of functions: career development in order to advance within the organization, and psychosocial advancement, contributing to the protégé's personal growth and professional development. The literature has found that receiving mentorship has been associated with positive career outcomes (Scandura 1992; Srivastava 2013).

Yet, within the mentorship literature, there is debate on the effectiveness and optimal format of formal mentorship programs. Prior work suggests that the most effective mentoring relationships are those that occur organically via self-selection within the organization, and formal programs compelling participation are mostly ineffective (Johnson, 2007; Johnson & Anderson, 2010). For instance, Ragins and Cotton (1999) find no differences in career outcome between non-mentored and formally mentored individuals, but that informally mentored individuals view their mentors as more effective and their mentees receive greater compensation. Formal mentorship was defined as assigned, intensive, regular meetings over a short period of time (6 months to a year) versus informal mentoring, which was self-selected, less frequent and longer-term (3-6 years).

Dreher and Ash (1990) find that individuals who received mentorship reportedly had more promotions, higher incomes, and greater satisfaction with their compensation than non-mentored individuals. Kram and Isabella (1985) find that peers could provide an alternative to mentors in offering psychosocial and career development benefits. Lester et al. (2011) ran a field experiment over six months where one group received leadership mentoring and the other received a group-based leadership education program. They found that the mentored group resulted in higher levels of leadership self-efficacy and performance compared with the educated

group. The protégé's preferences for feedback and trust in their mentors were important moderators.

Of the two mentorship functions, advancement within the organization is less relevant to entrepreneurship. Both career advancement and professional development increases the protégé's opportunity costs, potentially deterring entrepreneurship. While many of the insights may apply to mentoring in entrepreneurial education, thus far the field has not explored unique issues that arise in the context of mentorship for entrepreneurship programs and courses.

One drawback shared by much of the prior literature on mentorship and on entrepreneurship education is the use of observational data (one exception is Srivastava 2013). This empirical drawback also limits the theoretical insights that are possible. With purely observational data it is difficult to disentangle several competing explanations on the observed effects of mentorship. For instance, there is a selection process where mentors choose protégés and protégés choose which mentors to approach. Those left without mentors may be less talented or motivated individuals. It could also be that more talented mentors tend to pair up with more talented protégés, inflating the effects of mentorship and making it difficult to identify which characteristics of mentors or protégés are important. Theoretically, both career and psychosocial development factors are then conflated. The closest study to ours examined mentorship in the context of academia and made different theoretical assessments. This experimental approach shares a longitudinal, randomized, controlled trial approach. Blau and colleagues (2010) find that female economists randomized to receive mentorship (in this case, attending a two-day workshop to improve a paper with senior faculty) experienced significant, positive career benefits (more grants and publications) relative to a control group. While significant differences resulted from such a short workshop is perhaps surprising, the authors find evidence that mentorship relationships lasted well beyond the workshop.

To summarize, scholarship on the impact of mentorship on entrepreneurial education has begun to make progress, but is still in its infancy. Mentors typically do not work in the firm where

the mentee is the founder, so the type of mentorship to enable advancement in an organization is not applicable. Mixed results and methodological limitations plague both streams of literature, giving us little guidance on whether mentorship is effective in encouraging entrepreneurship and if so, how and for whom. The proliferation of policies and university programs providing mentorship in entrepreneurship education highlights the importance of better understanding of the theory and phenomena behind it. This is the gap that we seek to fill through a longitudinal, randomized field experiment matching students with mentors.

Theory Development and Hypotheses

Prior work has not systematically examined the influence of the type of mentor, particularly how their prior career experiences may influence the effectiveness of mentorship. Entrepreneurship scholars have shown that experienced entrepreneurs raise money faster (Hsu, 2007) and generate greater firm growth (Eesley and Roberts, 2012). Thus, we suggest that mentorship by former or current entrepreneurs may have different effects from mentorship by other types of professionals. Mentors who do not have direct entrepreneurship experience may work in venture capital (VC) firms or as middle or upper level managers in established organizations. Some VCs have previously been entrepreneurs, and can thus be considered entrepreneur mentors. However, not all VCs have direct entrepreneurial experience (and were not coded as entrepreneur mentors) and it is this direct entrepreneurial experience that we argue is important in mentoring potential entrepreneurs. Indeed, prior work finds that VCs with previous startup experience are more likely to be active investors (Bottazzi, Da Rin and Hellmann 2008) and have higher returns in their portfolios (Zarutskie, 2010). In contrast, VCs with MBA degrees and general human capital outside of startups have relatively lower performance in their portfolios. Corporate managers and venture capitalists may be likely to have similar industry, technology or market knowledge. They are also likely to have similar networks. Compared with non-entrepreneur mentors, those with entrepreneurial experience have seen with direct experience the steps (and missteps) in the firm formation process. These are the elements that are missing or

there to a lesser extent in mentors who lack direct experience of starting a business. This distinction allows us to better isolate the impact of these factors on the mentees.

By clarifying the potential roles of mentors in the transition to entrepreneurship, it is helpful to outline the four main obstacles (resulting from information or perception) that potential entrepreneurs face when making decisions about starting a new venture. These include: 1) stigma, or fear of failure, 2) concerns about entrepreneurial ability or self-efficacy, 3) general lack of information about entrepreneurial careers, and 4) lack of social connections to resource providers in entrepreneurship. Compared with conventional careers, entrepreneurship is a different, less well-understood type of career experience and as a result is often not covered by conventional career coaching or career centers at the university. As a consequence of this difference in entrepreneurial career options, individuals are constrained by their lack of information, resulting in ambivalence to the idea of starting a company.

Stigma, or fear of failure is the concern that if one creates a new venture and it fails, then ones' future career is ruined (Landier 2005; Simmons, Wiklund and Levie 2013). Experienced entrepreneur-mentors may help their mentees to understand that a failed venture is not the end of a career, but rather an important part of their entrepreneurial training. Mentorship from an entrepreneur can provide students with a greater level of security and inspiration. It can be inspiring for students to hear how a business was created directly from its founder, and can be more effective than being mentored by an employee or an investor. Even the story of an unsuccessful business venture can offer students inspiration, particularly if it was a bold idea, or the entrepreneur went on to create other interesting ventures.

Entrepreneur mentors, especially serial entrepreneurs who have failed before, can help their mentees reduce their fear of failure, because they can help them to develop a more realistic assessment of the possible career choices in event of venture failure (Nanda and Sorensen 2010:1117). These factors tend to increase the likelihood of entrepreneurial activity on the part of the mentee.

Second, concerns that an individual may have about their own ability or capacity for entrepreneurship may hinder them from trying. Unlike many careers, there is no straightforward way to develop your skills as an entrepreneur or discover which skills are necessary without trying it (Lazear 2005). Experienced entrepreneur-mentors can demonstrate to mentees that these necessary skills to being a successful entrepreneur can be learned. In part, this inspiration comes from the idea that the mentor is now going to share the ‘secrets’ of the startup process with the mentee. Imparting information on the startup process from someone who has been there and done it can increase the mentee’s confidence in his or her own abilities, and entrepreneurial self-efficacy (Zhao, Seibert, & Hills, 2005), increasing the likelihood and level of success. The entrepreneurial mentor can thus become a role model.

Third, is the important role that experienced entrepreneur-mentors play in providing missing or tacit information about entrepreneurship as a career choice. For more conventional careers such as investment banking or consulting, various career services are available on campus and there are well-established routes for people to follow. In conventional careers, students can be very clear about professional criteria and their alternatives within the industry. However, such guidelines are missing or unavailable in entrepreneurship, with most career services and curriculums not set up to guide students to embrace a career in entrepreneurship. Close interaction with experienced entrepreneur mentors may play a particularly important role in alleviating this constraint.

In addition, mentoring, particularly by entrepreneur mentors provides the mentee with behavioral information. Entrepreneur mentors are in a unique position to acknowledge the challenges, long hours, marital strife, and other difficulties associated with entrepreneurship. They can also talk about the personal characteristics and behaviors necessary to cope with these challenges. On the positive side, they can also speak directly to the non-monetary rewards arising from entrepreneurship in terms of creating innovation and change in an industry; solving real problems and having an impact.

Mentors of all types may help mentees to evaluate ideas, either by giving them direct feedback or by suggesting courses of action or people to talk with. Malmadier and Lerner (2013) find that MBA students at Harvard who were in class sections with a higher proportion of former entrepreneurs were less likely to start firms. They provide evidence consistent with the idea that former entrepreneurs may be better able to identify weaknesses in new business ideas and convince their classmates not to pursue them. Entrepreneur mentors might play a similar role in discouraging low quality business ideas.

Finally, there is the lack of social connections to resources necessary for entrepreneurship. Particularly students do not have prior coworkers or friends who are angel investors, venture capitalists or startup lawyers. Beyond the stage of brainstorming ideas, it is difficult for them to know whom to turn to for help in gathering the initial resources necessary to get started. This is another constraint for prospective entrepreneurs that experienced entrepreneur-mentors can be better positioned to alleviate.

On balance, we expect entrepreneur mentors to have a greater impact on addressing the constraints that potential entrepreneurs face, thus, increasing the likelihood of their mentees engaging in entrepreneurship.

Hypothesis 1. Mentorship by a former entrepreneur increases the likelihood of engaging in entrepreneurship.

While we do not hypothesize about the direct effect of risk-aversion on entrepreneurship, we do expect that influencing concerns about startup risk may be one of the effects that entrepreneurial mentors have on their mentees. One might expect that entrepreneur mentors cause mentees to be even more risk-averse by pointing out all of the things that could go wrong in their startups, or describing in detail the struggles and challenges they have had to endure. However, most entrepreneurial mentors are likely to be those who have had some degree of success in entrepreneurship, otherwise they would be less likely to sign-on to mentor future entrepreneurs. This success is likely to do more to reassure mentees that the risks are not so bad. By contrast,

non-entrepreneur mentors are individuals who in their own lives have decided to pursue safer paths and have not become entrepreneurs. They are less likely to be able to reassure their mentees about the risks of entrepreneurship.

The mentor effect may be expected to have a larger influence on the more risk-averse mentees. Since risk-averse mentees might be interested in pursuing entrepreneurship, yet their risk-aversion holds them back, anything that contradicts the perceived risks is likely to affect them more strongly. On the other hand, the risk-loving mentees may already be less concerned about risks, and may be interested in entrepreneurship precisely because it appears risky. A reduction in the risk perception due to an entrepreneur mentor is less likely to have an influence on these individuals. If they are hesitating to become entrepreneurs, then it is likely to be for reasons other than the riskiness of entrepreneurship.

Hypothesis 2a. The positive effect of mentorship by a former entrepreneur is negatively moderated by risk propensity of the mentee.

We may also expect that entrepreneur mentorship will have a greater effect in encouraging those who are low enough in risk-aversion that they are seriously considering entrepreneurship. Entrepreneurs are generally thought to be more risk-loving than the general population (Lucas 1978; Kihlstrom and Laffont 1979) and studies have proposed that risk-averse individuals will choose the wage sector over entrepreneurship, as the rewards for the latter are more variable and less certain than the former (Iyigun and Owen 1998).³

Even risk-loving individuals face obstacles in entering entrepreneurship. They may lack the information about how to start a firm, where to locate resources and how to reach customers.

³ While the theoretical prediction has many empirical supports (e.g. De Wit 1993; Stewart and Roth 2001), there are also studies showing no difference in risk attitudes between entrepreneurs and non-entrepreneurs (Brockhaus 1980; Masters and Meier 1988; Miner and Raju 2004). Yet some have shown that when measured in certain ways, entrepreneurs may be risk-takers (Sarasvathy, Simon and Lave 1998; Cramer, et al 2002; Holm, Opper and Nee 2013). Individuals lower on uncertainty (risk) avoidance were more likely to become entrepreneurs (McGrath, MacMillan and Scheinberg 1992). Wu and Knott (2006) find that the type of risk matters, specifically, entrepreneurs are risk-averse in terms of market uncertainty, but risk-loving with respect to uncertainty over the impact of their personal ability.

Once this information becomes available, they are more likely to start their own ventures since they are more risk loving relative to their risk-averse peers. Or put it another way, both risk-loving and risk-avoiding potential entrepreneurs face uncertainty in information regarding how to start new ventures; once such information becomes public via mentorship, uncertainty is reduced and (to some extent) transformed into risks. As a result, an individual's risk propensity will become more salient in influencing his/her career choices. By contrast, the truly risk-averse individuals are not likely to be close enough to the borderline to be influenced by the mentors.

Hypothesis 2b. The positive effect of mentorship by a former entrepreneur is positively moderated by risk propensity of the mentee.

We might also expect that the role of entrepreneur mentorship is moderated by the mentee's social background. If social influence from different sources is complementary then a cumulative effect may exist between parental entrepreneurial experience and mentors. However, if social influence from different sources is substitutive then entrepreneur mentors may be expected to have a stronger effect for those students from non-entrepreneurial family background.

Prior literature has shown that having parents who were entrepreneurs is one of the strongest determinants of whether an individual will become an entrepreneur or not (Sørensen 2007; Greenberg 2009). This effect may be due to a combination of genetics (pre-birth) and nurture (post-birth) factors. Using adopted children in the sample, Lindquist and Sol (2012) find that the post-birth effect is twice as large as the genetic effect. Much of this post-birth (nurture) effect appears to be due to exposure and role modeling by the parents.

For children of non-entrepreneurial parents, they must find these entrepreneurial role models elsewhere. Entrepreneur mentors may play this role. However, as in the risk aversion case above, one might expect that it is the children of entrepreneurs who are closer to the edge of deciding to become an entrepreneur. They may be relatively more affected by having an entrepreneur mentor because the mentor's influence can nudge these individuals who are already more inclined for an entrepreneurial career. In contrast, students from other family backgrounds

might be less “primed” for an entrepreneur career; without the prior influence of entrepreneurial parents, these students are not only less inclined to the option of a startup career but also lack the absorptive capability towards the advice and help provided by their entrepreneur mentors.

However, prior work provides evidence that peer influence appears to substitute for other social sources of entrepreneurial influence. Nanda and Sorensen (2010) find that having coworkers who had been entrepreneurs increased the likelihood of entrepreneurship. The effect was particularly strong for those who did not have entrepreneurial parents. In contrast to this work, we focus on the influence of mentors that do not directly work with the mentees. Yet, we expect a similar effect where entrepreneurial mentors can substitute for the positive influence of entrepreneurial parents for those who lack parents as entrepreneurial role models.

Hypothesis 3a. The positive effect of mentorship by a former entrepreneur is positively moderated by the influence of parental entrepreneurship.

Hypothesis 3b. The positive effect of mentorship by a former entrepreneur is negatively moderated by the influence of parental entrepreneurship.

Data

To study the relationship between type of mentorship and entrepreneurial activity, we use a longitudinal, randomized, controlled field experiment. Prior literature on entrepreneurship education suffers from several methodological limitations, including lack of control groups, not using pre-test/post-test designs and surveying participants with a predisposition for entrepreneurship. Our design overcomes many of these challenges, but not all of them. One of the authors of this paper teaches a class on entrepreneurship for two sections of 40-60 students during a quarter each year. The course is in the School of Engineering and meets one of the general requirements for engineering majors. As a result it draws students from a wide variety of engineering majors and some non-engineering majors as well. The course is taught within a Management Science & Engineering department, so the course contains many students who might be classified as business undergraduates at other universities as well. Table 1 shows the

descriptive statistics of the class participants. Just under half of the students had parents or relatives with startup experience. Nearly three quarters of the students are male. A few of the students (less than six percent) are in Masters or doctoral programs. Nearly three quarters of the students in the class have plans at the start of the class to form a startup business at some point in their careers. The mean age (by 2012) was 23.7 (median=24). The class typically is selective since more students apply than there are openings available. Seniority (co-terms, seniors and then juniors) guides the class admission decisions. Most of the students are juniors and seniors.

Mentorship may be particularly important during the early stage of one's career development and especially important during the years of higher education. As anyone who has worked with them knows, students at this stage in their education are planning their careers and searching for directions in their work lives. Thus developing and running experiments with individuals during this stage in their education and careers is particularly compelling and appropriate. Prior work has also noted the importance of socialization during the university years and its role in future career decisions, including entrepreneurship (Hsu, Roberts, & Eesley 2007; Roach and Sauermann 2010). However, prior literature has not systematically examined the mechanisms behind this effect.

Students applying for the class filled out a pre-class survey including questions about entrepreneurial intentions, demographic and educational characteristics and behavioral questions. The course ran for ten weeks during which students formed their own teams in the first two weeks and were paired with two mentors who were as closely related as possible to the industry area of interest where the teams expected to work on their startup project. During the class, students worked on a startup project and made one presentation to external judges at week four and a final presentation to a different set of judges at week ten. Students also undertook individual assignments and case discussions. They were explicitly told at the beginning of the course that the purpose was to expose them to entrepreneurship and let them decide whether it was of interest to them or not. The purpose was not to convert them into entrepreneurs. They were told that the

tools and frameworks in the class could be applied equally to careers in academia, government, large companies or non-profit organizations. Students formed their own groups.

One of the authors used a number generator to randomize which teams would be paired with mentors who were former or current entrepreneurs and which would be paired with non-entrepreneurs. The pre-survey characteristics of students randomized to the treatment (entrepreneur mentor) and control (non-entrepreneur mentor) groups were similar in key dimensions such as risk orientation, startup career plan prior to the class, and family background in startup experience (Table 1). Students were aware they were participating in a research project about entrepreneurship, but were not told that it involved mentorship. Mentors were instructed that they were expected to spend 5-10 hours approximately with the students over the course of the ten weeks and to meet with the students in person prior to their presentations. They were asked to help give feedback on student's ideas, and open up their networks to help the students. However, they were asked not to invest in any student projects (at least until after the course) as a course objective was to try to guide students to learn entrepreneurship rather than either extreme of simply telling them their ideas would not work or doing the work for them. Teams were paired with two mentors both to give multiple perspectives and in case one mentor became busy and could not meet with them. They were told that they did not need to meet with the mentors simultaneously. Missing data was filled in with another post-graduation follow-up survey.

[Table 1 inserted here]

Methods

The dependent variable is equal to one if the individual started (or joined) a startup after graduation and zero otherwise. Founding a startup was defined as “founding indicates that you were there at Day 1 and the other cofounders, if any, would consider you a founder.” Joining a startup was defined as, being one of the first thirty employees within the first two years of

operation. We use logit regressions to analyze whether the likelihood of entrepreneurship was influenced by our key independent variables.⁴

Independent variables. Our key independent variable is *ent_mentor* which is an indicator variable for whether the individual was randomized to entrepreneur or non-entrepreneur mentors. Hypothesis 1 is about the direct effect, and hypotheses 2 examine interaction effects with the risk propensity of the individuals. We measure this construct with the variable *risk*. We create this variable using a question from the survey, which asked, “Indicate the extent to which they agreed or disagreed with each statement using a 5-point scale, ranging from 1 (*disagree completely*) to 5 (*agree completely*): I am willing to take significant risk if the possible rewards are high enough.”

Risk preferences have previously been measured in several ways including numeric hypothetical lotteries over money, risky behavior in the domains of health, driving, financial matters, leisure, etc. However, such questions are influenced by framing effects (Kahneman 2003). Lottery questions require a high level of numeracy and responses may be biased toward intelligence. Thus, more recent work has tested a simple and generalized question about “willingness to take risks” (Dohmen et al. 2005; Dohmen et al. 2011). The results show that this general survey question predicts answers about other risky behaviors better than the lottery question. In addition, the general form of the question has the advantage of being free from framing effects (it does not frame the risk in a particular activity) and it does not require a high level of numeracy, so there is less bias from intelligence or statistical capabilities.

We asked respondents whether their parents or close relatives had experience in entrepreneurship and we code *family* as a “1” if either the parents or close relatives had

⁴ Some students went on to graduate studies after the class. We code them in the following fashion. For students who enrolled in a Master’s program but have not graduated by the summer of 2013 or who were still in college by the summer of 2013, we treated them as missing values, as they have not had a real chance to start their careers yet. However, we code students who enrolled in a doctoral program and did not have startup experience as “0.” Given the length of doctoral programs and the amount of time and energy commitment, we perceive it as part of one’s post-college career.

entrepreneurial experience. We use the interaction between *ent_mentor* and *family* to test hypotheses 3.

Controls. We include demographic controls, career intention controls from the pre-survey, grades, social influence from teammates, as well as section, major and class year controls. We control for the *age* of the individual as of 2012. We control for gender through the variable *male*.

The variable *master_phd* is an indicator for whether before the start of the class the respondent was intending to pursue a Master's degree or a doctoral degree. We control for *plan_before* as an indicator variable for whether before the start of the class the respondent indicated that a startup was part of her career plan. The variable *teammate_esplan* captures the total number of project teammates (self excluded) that indicated a startup was part of their career plans before the start of the class.

We control for grades via the variable *honor_degree*, which is equal to one if the student graduated with honors and via *gpa* which is a four category classification of self-reported GPA scores ranging from 2.5-2.9 to 3.67 and above. We also control for performance in the class via the variable *rank* which is the team's ranking within the class. Finally, we include fixed effects for the class section, student majors, and class year (junior, senior, co-term and other).

Empirical Results

Table 2 shows the descriptive statistics and correlation matrix among our key variables. There was a high percentage of students (>31%) in the class that founded or joined startup firms post-graduation. This is not surprising given that the class is the flagship entrepreneurship class in the Stanford engineering school. Less than 60% of students were assigned entrepreneur mentors and about half of the students self-reported to have parents or close relatives with entrepreneurship experiences. Regarding risk orientation, an average student reported a value of 3.99 on a scale of 1 (risk averse) to 5 (risk embracing). Out of the 153 students, none of them reported a value of 1 and only 6 of them reported a value of 2.

The correlation matrix is very telling. Even though entrepreneur mentors have a positive correlation with students' startup careers, this correlation has no statistical significance. In contrast, startup careers are both positively and significantly associated with a student's risk orientation and family background in .This suggests that the role of entrepreneur mentors on students' career orientation may be hinged on the latter's personal characteristics and social background.

[Table 2 inserted here]

Figures 1 & 2 provide tentative evidence supporting this speculation. Figure 1 examines how the likelihood of a student embracing startup careers is jointly affected by entrepreneur mentor and the student's risk orientation. On the one hand, students with a lower level of self-reported risk preference (i.e. risk ≤ 3) rarely forms or joins startup companies after graduation;⁵ on the other hand, among students with the highest level of self-reported risk preference (i.e. risk > 4), those assigned with entrepreneur mentors seem particularly likely to embrace startup careers.

[Figure 1 inserted here]

Figure 2 illustrates the joint effect between entrepreneur mentor and students' family background. There are three salient patterns: first, students who come from families where members have had entrepreneurial experiences are much more likely to embrace a startup career, regardless of she is assigned an entrepreneur mentor or not. Second, among students coming from entrepreneurial family backgrounds, assigning an entrepreneurial mentor only slightly increases their likelihood of forming/joining startup firms (i.e. from around 40% to around 48%; or around 20% in relative magnitude). Thirdly, coming from families with little entrepreneurial experience, teaming students with entrepreneur mentors dramatically increases their likelihood of embracing a startup career (i.e. from around 12% to 22%, or about 45.5% in relative magnitude). Taken together, these patterns suggest that having an entrepreneur mentor and coming from an

⁵ To be exact, 4 out of 47 students in this category had post-class entrepreneur experiences.

entrepreneurial family are two substitutive mechanisms in encouraging students to pursue startup careers.

[Figure 2 inserted here]

In Table 3, we use logit models to test our hypotheses. Hypothesis 1 posited that mentorship by a former entrepreneur increases the likelihood of engaging in entrepreneurship. Model 1 regresses students' career choice on entrepreneur mentorship. It shows a positive yet statistically non-significant association between the two ($B = 0.521$; $S.E. = 0.331$). In Model 2, we add controls both at the student level, such as individual demographics (i.e. age, gender), pre-class career plan, academic record (i.e. major, class year, GPA, and honor degree), and at the team level, such as teammates' startup plan and team's ranking within the class. Once these individual and team level characteristics are controlled, our analysis shows a positive and significant association between entrepreneur mentor and students' startup career choice ($B=1.037$; $S.E. = 0.471$). The comparison between Model 1 and Model 2 suggests that the impact of mentorship is not universal but hinges on the characteristics of the mentees. We test this speculation in the next 9 models.

[Table 3 inserted here]

Hypothesis 2 posited that the positive effect of mentorship by a former entrepreneur is moderated by risk propensity of the mentees. We first examine the association between students' risk preference and choice of startup career. Model 3 shows that, even when other individual level characteristics are controlled, students of higher risk preferences are associated with higher likelihood of creating or joining early stage ventures as career choice ($B = 1.496$; $S.E. = .335$). This positive association continues to hold when we add mentor characteristics in Model 4. We next test the interaction effect between entrepreneur mentor and student mentee's risk orientation. There are three interesting patterns in Model 5: first, the positive and significant association between entrepreneur mentor and students' startup career choice disappears ($B = -6.096$; $S.E. = 3.920$.); second, we continue to observe a positive but insignificant correlation between risk

preference and startup career ($B = 0.620$; $S.E. = 0.605$); and third, we observe a positive and statistically significant association between startup career and the interaction term of risk preference and entrepreneur mentor ($B = 1.743$; $S.E. = .937$). These patterns suggest that the impact of entrepreneur mentor is mainly channeled through their match-up with student mentees who are risk-loving and are psychologically prepared for the uncertainty and risks embodied in startup careers. Hypothesis 3 posited that the positive effect of mentorship by a former entrepreneur is negatively moderated by the influence of parental entrepreneurship. We add students' family background to regression analyses in Models 6-9. Models 6, 7 & 8 show that, on average, students from families with entrepreneurial background are more likely to start their own ventures or join early-stage ventures. Model 9 further adds the interaction term between entrepreneur mentor and family background and we find that the interaction term is negatively associated with our outcome variable ($B = -1.675$; $S.E. = 0.873$), suggesting that entrepreneur mentors have a particularly strong impact on students from families whose members do not have entrepreneurial experiences. However, unlike Model 5, adding the interaction term between entrepreneur mentor and students' family background does not negate the positive and significant impact of entrepreneur mentor per se. Model 10 is the full model and our main results of the interaction terms continue to hold. The comparison between Model 5, 9 and 10 suggests that social context and individual characteristics influence students' career choice, with students from families with entrepreneurship backgrounds are more likely to engage in startup careers post-graduation, students with high-risk preferences are less likely to do so unless they receive an extra push from mentors with entrepreneurship experiences.

Robustness and Additional Analysis

The real effect size is significant. As Graph 3 shows, when values for the other variables are arbitrarily set at the mean, matching a student of low-risk orientation (e.g. Risk = 3) with an entrepreneur mentor decreases his likelihood of post-graduation entrepreneurship experience by 12% (i.e. from 16% to 4%), although this reduction has no statistical significance. By contrast,

matching a student with high risk orientation (i.e. Risk = 5) with an entrepreneur mentor increases his likelihood of post-graduation entrepreneurship experience by 27% (i.e. from 29% to 56%) and this result has statistical significance.

Graph 4 further shows that when values for all the other variables are arbitrarily set at the mean, matching a student from a family with an entrepreneurship background with an entrepreneur mentor increases her/his likelihood of post-class entrepreneurship experience by 6% (i.e. from 37% to 43%), but this result has no statistical significance. In contrast, matching a student from a family without entrepreneurship background with an entrepreneur mentor increase this likelihood by 20% (i.e. from 11% to 31%) and this result has statistical significance.

To test if our empirical results are robust, we take two steps. First, to reduce the concern that students might misinterpret our survey questionnaire, we use students' answer to a parallel question as alternative measures of risk orientation. This alternative questionnaire asks a student to indicate the extent to which she/he "agree(s) or disagree(s) with the following statement using a 5-point scale, ranging from 1 (disagree completely) to 5 (agree completely): I enjoy the excitement of uncertainty and risk." The correlation between this variable and Risk is reasonably high (.55). Second, to test the robustness of the impact of family members, we narrow down our definition of family background in entrepreneurial experience and focus only on the students' parents. We code *parent_entrepreneur* as 1 if either parent of a student had any startup experience. Models 11, 12 and 13 in Table 4 use these alternative definitions of risk orientation and family background and re-run the analyses of Models 5, 9 and 10 in Table 3. Our main results on the interaction effects between entrepreneur mentor and risk orientation, and between entrepreneur mentor and family background continue to hold.

To reduce the concern that our measurement of risk orientation may pick up other personal characteristics such as individual's competitiveness and optimism, we add student answers to the following two questions to our analyses: 1) "I try to perform better than my co-

workers” and 2) “In uncertain times, I usually expect the best.” Once again, these two questions are answered on a 5-point scale.

Models 14 and 15 add these two variables and rerun the analyses in Model 13 and Model 10. The results show that students with higher-level of competitiveness are more likely to embrace entrepreneur career. Once again, our main results about the interaction effects do not change in any substantively meaningful way.

Discussion and Conclusion

The effects of different types of mentorship in entrepreneurship education are still poorly theorized and empirically not well understood. Previous literature finds that exposure to entrepreneurial parents and coworkers increases entrepreneurial behavior. However, altering one’s parents or coworkers are difficult (if not impossible) interventions for policy or educational programs to achieve. Much more common are interventions where mentorship is used. Yet, our understanding of mentorship effects and the optimal structure of such programs is still incomplete. Our research contributes to this literature by using a longitudinal, randomized controlled trial, which finds that mentorship by entrepreneurs yields a significantly higher likelihood of entrepreneurship after graduation, particularly for less risk-averse students from non-entrepreneurial families.

Contributions to Mentorship Literature

Prior literature on mentorship has produced mixed results. Studies have made progress in conceptualizing the roles that mentors play in promotion within an organization and in psychosocial development. Progress has also been made in conceptualizing mentorship as a constellation of relationships where the content and type of mentor may matter more than the presence or absence of a mentor. Empirical work has found that informal, long-term mentorship may be more effective in career advancement than formal, short-term mentoring. However, this literature has not addressed which mentees are most influenced by which types of mentors.

We contribute to this literature by further developing theory on the types of mentoring and the types of mentees that are most likely to experience positive effects. We show that short-term, formal mentorship can be effective, particularly when mentors with most relevant career experience are used for individuals with the fewest entrepreneurial role models in their social sphere. Mentorship also appears to have its strongest effects for those who are less risk-averse or close to the margin of undertaking the activity of interest (founding in this case).

Empirically, we help to resolve some of the prior mixed findings by better isolating the psychosocial development role of mentors, particularly when promotion within the existing organization is not an issue. We perform what we believe to be the first longitudinal, randomized, controlled trial of mentorship in entrepreneurship. This allows us to better isolate the theorized impact of the type of mentorship from selection effects, which can potentially bias the results of other studies.

Mentoring is a complex subject to study, partly because people tend to look to many people around them, not just one, for advice. Early work by Levinson et al. (1978: 97) proposed that the mentor is one of the “most complex and developmentally important relationships ... the mentor is ordinarily several years older, a person of greater experience and seniority.” However, recent work has proposed that there are limits to focusing on a single mentor, prompting scholars to revisit Kram’s (1985) idea that individuals rely on multiple influences, and it is the specific content of these “relationship constellations” that matters (Baugh & Scandura 1999; Higgins 2000; Higgins & Kram 2001). In this light, our focus is not on whether an individual has a mentor or not. Rather, we focus more on the “content” and type of mentor in the student’s network. The intensity of the mentorship we analyze is a middle ground between career mentorship programs (which may last as long as the individual is with the employer, or longer) and the two-day workshop mentoring experience analyzed by Blau and colleagues (2010).

Contributions to Entrepreneurship Literature

A large and diverse literature has examined the characteristics and educational and career experiences of those who are most likely to become entrepreneurs (e.g., McGrath, MacMillan and Scheinberg 1992; Sørensen 2007). Only recently have scholars begun to examine which types of educational experiences foster entrepreneurship.

The impact of education on alumni entrepreneurship has been left largely unexplored, despite the proliferation of entrepreneurship courses and programs (Katz 2003). This research contributes to the literature by examining mentorship by entrepreneurs vs. non-entrepreneurs, effects entrepreneurial behavior. Much of the prior work on education and entrepreneurship has focused on the level of education. Yet, a meta-analysis of this work finds that education has no bearing on entrepreneurship (van der Sluis et al. 2008). Very few scholars attempt to link the content or type of education to entrepreneurship. Baumol (2004) argues that a different type of education may be needed for entrepreneurship. We contribute to this literature by showing that entrepreneurship education which includes mentorship can have a strong, positive impact on entrepreneurial behavior. Yet, to achieve this maximum impact, entrepreneur mentors should be selected whenever possible.

All types of mentors can potentially aid mentees in their future fundraising efforts. Entrepreneur and investor mentors can both coach mentees on fundraising pitches and advise on what to do once in front of an early-stage investor. Mentors who are or have been investors provide the most direct link, however, entrepreneurs and even employees often have investors in their personal networks whom they can make introductions to if needed (Wang 2013). Faculty and organizers of mentorship programs also have investors in their networks to introduce potential entrepreneurs to. It may be that employees at larger firms have fewer investors in their personal networks relative to venture capitalists or entrepreneurs.

Finally, mentoring in entrepreneurship is different from the typical career mentorship that has been studied, in that it lacks the “getting ahead in this organization” element of mentorship. Typical career mentorship often has an element of guiding the mentee on how to get promoted

and move up within the current organization. Since entrepreneurial mentorship is geared towards helping the mentee create his or her own organization, personal development is emphasized to a greater degree. Mentorship in entrepreneurship does not involve a larger organization, so guiding the mentee on how to get promoted does not factor in. The fact that mentorship in entrepreneurship focuses more on personal development regarding starting one's own firm (and less or not at all on how to get promoted in the current organization), would cause it to generate less upward impact on opportunity costs. This is because there is no higher position within the current organization that mentors are trying to help their mentees achieve. Nonetheless, mentors might recruit talented students to work in their firms or in their portfolio companies, which would tend to increase opportunity costs. Mentors who are entrepreneurs would not appear to result in a significant difference in terms of the job opportunities that they could provide to mentees. Investors and employees could just as easily recruit promising mentees into their organizations as entrepreneurs.

The literature appears to indicate that an individual's propensity for entrepreneurship is largely determined by aspects outside of the control of policymakers and universities, such as gender, family background, coworker networks, and work experience. Literature on mentorship seems to cast doubt that short-term, formal mentorship programs have an impact, even on promotion within an organization. Yet in contrast to this literature, we show that mentorship by entrepreneurs, even in a short ten week course, does positively contribute to entrepreneurial activity, particularly for students not otherwise exposed to entrepreneurship, and who are not averse to taking on new risks and challenges.

In conclusion, as efforts to foster entrepreneurship proliferate both in the private sector and academia, we must seek out a better theoretical and empirical understanding of their dynamics and eventually their optimal design. Mentorship is a common element in these programs whether in university courses or incubators and accelerators. Yet, the field is in its infancy in conceptualizing and understanding what types of educational experiences may increase

entrepreneurship, if any. Prior studies that help to inform us typically suffer from several methodological challenges. We suggest a potentially effective mechanism for increasing entrepreneurship and guidance on which types of mentors to recruit and which types of individuals are most likely to increase their propensity for entrepreneurship as a result of mentorship. It is important to take into account that some mentors can be more effective than others with students, and these programs will encourage entrepreneurship among a certain segment of the student and alumni population. We hope that further studies take advantage of randomized field experiments to further our understanding of mentorship and which types of educational experiences are most effective.

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