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## Article

# Does more education lead to better startup funding outcomes?

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# Does more education lead to better startup funding outcomes?

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## ABSTRACT

Much of the extant research on the relationship between founder education level and entrepreneurial success finds that more education is associated with increased success. Using a unique data set of startups from a large startup competition, this paper specifically explores funding success and empirically confirms that more education is associated with an increased likelihood of funding. Additionally, we also find a negative curvilinear aspect to that relationship, meaning that although education generally improves funding, too much education may actually impair funding outcomes.

## IMPACT STATEMENT

Portrayals of startup founders in entertainment media often show scrappy university dropouts battling to get funding - and then finally bringing their new product successfully to market. This article asks and answers the question as to whether or not this anti-education scenario is truly the norm. Is higher education helpful or not in getting funded? Using data from a large startup competition, where some startups ultimately get funded and others do not, we have the required treatment and control groups to be able to shed light on that research question. A primary impact of this paper is that it shows academics, founders and investors that education level is a positive factor in getting funded. A secondary impact is that there appears to be a negative curvilinear relationship between years of education and funding success. This means that there may be an optimal level of education after which additional education no longer helps attract professional investors, but may actually begin to be an impediment.

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## 1. Introduction

Does more education lead to better startup funding outcomes? The answer to this question depends on investors' opinions and experience about whether the possession of an advanced degree helps or hinders founder success. This paper explores the relationship between the educational level of the founder and startup funding, extending the research from a variety of disciplines, including: finance, economics, entrepreneurship, and management.

Although there has been previous research that studies founder education, there has been relatively little that addresses its effect on the binary outcome of funding success. The extant research either focuses on educational effect on startup valuation (Hsu, 2007), or startup success (Eesley & Roberts, 2012). The limited research on education and funding uses deal data to look at the association of education on funding levels, rather than the binary fact of funding/no-funding. There is a form of survivorship bias inherent in that kind of study, since the observations do not generally include rejected deals (Pinelli et al., 2022).

### 1.1. Literature review

Signaling theory, as outlined by Connelly et al. (2011), is often referenced in the context of startup funding. Higher educational qualifications can serve as a positive signal to investors, reducing information

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asymmetry, and hence potentially influencing funding decisions. If a founder is highly educated, particularly at prestigious/selective institutions, then there is a certification effect that implies that the founder must also be of high quality. This is an example of investors betting on the jockey vs. the horse, where the jockey is the founder and the horse is the startup.

Kaplan et al. (2009) find evidence that investors more heavily consider the jockey (founder) when making the decision about proceeding to due diligence, but during the due diligence phase itself, they emphasize the horse (startup).

In terms of jockey vs. horse, since our study is about founder education, we are focused primary upon the jockey's impact on funding success.

There are numerous studies that suggest a positive correlation between founder education level and startup funding. Brush et al. (2001) note that Palm founder Jeff Hawkins' impressive education in Neurobiology was a significant factor in the positive decision by early investors. His education was perceived as a significant factor in both his technical ability as well as his reputation. That paper, although supportive of our conclusion, is primarily anecdotal and therefore has limited empirical evidence.

Åstebro and Bernhardt (2005) find that human capital components such as education and experience have a positive impact on overcoming the credit constraint for startups, but that the effect of education on loan approvals is non-linear. The benefit of education is reduced as the founder achieves higher degrees. Their study is highly relevant to ours, since they find that education is positively associated with funding success. However, since their funding measure is debt rather than equity, their conclusions cannot speak to equity investment, which is the predominant form of startup funding. Lenders are understood to be generally much more risk averse than equity investors.

Pinelli et al. (2022) pursue the concepts of cognitive rigidity and cognitive distance created by the educational levels and educational heterogeneity (variety of disciplines) among the founding team. They find that both education level and education heterogeneity are positively associated with funding level when considered independently, but the presence of both moderates that association. Since the dependent variable in their study is funding level, rather than funding success, their study supports our conclusions but does not exactly answer our research question.

Shane (2003) argues that the relationship between founder education and startup funding might be influenced by various other factors. For example, the sector of the startup, cultural context, and the specific form of funding (angel investors, venture capital, etc.) may significantly mediate this relationship. Our study acknowledges these various other factors through our explanatory and control variables.

Eesley and Roberts (2012) use education level as a proxy for founder talent and find a positive and statistically significant relationship between education and entrepreneurial success. In their article, they attempt to delineate the determinants of success (measured by log revenue) between talent and experience. They find that both are important to success, while not being correlated with each other. Their findings are indirectly supportive of our results, although our dependent variable is not quite the same. They use the log of revenue as a proxy for startup success, whereas our study is about *funding* success. Although funding should be correlated with revenue (eventually), it is certainly the case that not all startups succeed which have been funded. Also, there may be an issue with endogeneity in their explanatory variables of talent and experience. Intuitively, experience should add to talent, but the fact that the authors do not find a correlation between experience and talent suggests that perhaps education is not the best proxy for talent. Often education and experience, especially for young founders, are direct tradeoffs. Any years dedicated to additional education are, necessarily, years taken away from experience.

A study by Hsu (2007) found that founder education is positively correlated with pre-money valuation. Using OLS regression on survey data with 149 observations, the author finds that having an MBA degree is positively associated (and significant) with valuation. A PhD is also significant, but only when interacted with an internet sector dummy variable. The author attributes this to a signaling effect to investors. The Hsu (2007) approach is directly applicable to our research question, as long as level of valuation is highly correlated with the investors' funding decision (i.e. the investors believe that the equity offer is undervalued).

In their study of digital startups in India, Nigam et al. (2020) do not look at the impact of education level on funding, but rather whether or not the founder was graduated from an elite vs. non-elite institution. They consider this as a signaling effect regarding the quality of the founder and they indeed find

a positive effect on funding success. Thus, the primary hypothesis of this article is that founder education level and funding are positively related. Although their study is somewhat related to ours, the significant difference is that because they are specifically looking at elite versus non-elite educational institutions, their hypothesis is based on the network effect of the founders' education. Our paper, on the other hand, is more concerned with level of education and how it might add to the founders' skill level (real or perceived).

## 1.2. Hypothesis development

The first hypothesis is not novel, but rather a confirmation of results from previous studies. Namely, that our unique data set also shows that higher founder education levels are positively associated with startup outcomes. A positive relationship between education and funding will lend credence that this new data set may be representative of the population.

**Hypothesis 1:** The higher education level of the founder, the more likely the startup will receive outside funding.

The major contribution of this article is that, due to a possible perception by investors that the highest levels of education lead to cognitive rigidity, education may have diminishing returns. Thus we should see a negative curvilinear relationship between education and funding. Our theory is that venture capital investors may perceive that founders that are too highly educated (e.g. doctorate level) may be too cognitively rigid to take counsel from the investors, when, for example, a pivot is required. This would be consistent with social constructivist theory that suggests that prolonged immersion in a particular environment of intellectual influences tends to reinforce a person's mental models and consequently "freeze" their cognitive maps (March, 1991; Leonard-Barton, 1992; Fiol et al., 1985; Lei et al., 1996). If a venture capital investor worries that a PhD founder could be stuck in a certain way of thinking due to their education, then high levels of education could inhibit investment. This leads to the second hypothesis.

**Hypothesis 2:** The overall positive relationship between education and funding is negatively curvilinear.

This paper uses a novel and unique data set from the 2019 Pepperdine Graziadio Business School's Most Fundable Companies (MFC) competition. MFC is not a pitch competition, but rather a light due diligence competition. Thus, a great deal of useful information is gathered about each company. The only requirements for entry into the competition are that the startup is based in the United States and has less than ten million USD in annual revenue.

We track the results of these companies starting in 2019 over the next three years. Using a cross-sectional probit approach, We indeed find that education level is positively associated with funding outcomes, consistent with much of the extant literature that addresses funding levels. However, we also find a negative curvilinear shape to this relationship, meaning that there may be a point where additional education does more harm than good in attracting investors.

The primary contribution of this paper is that, rather than looking at successful deals to gain insight into the association between education level and funding level, we look at a population of startups for which we had no idea, a priori, whether or not they would be funded. Thus, this paper gives unique insight into the real world of the determinants of startup funding - a world where most startups fail to obtain outside investment. A secondary contribution of this article is confirmation that the relationship between founder education level and equity funding success is not linear, but rather shows evidence of the existence of an optimal level of education. Previously, this effect had only been shown with debt funding (Åstebro & Bernhardt, 2005).

## 2. Materials and methods

### 2.1. Sample and procedures

Our baseline data about startups and founders comes from the 2019 Pepperdine Graziadio Most Fundable Companies competition (MFC). Startups compete every year in hopes of being named one of

the 15–20 annual “most fundable companies.” Startups from all fifty U.S. states participate. For the purposes of this research, we sent out a follow-up survey three years later (2022) to the founders that completed the main phase of the competition asking for the current status of their startup and any funding activities that had occurred during those intervening years.

The three-year term of the study is admittedly limiting. If the article had been studying firm outcomes, such as acquisition or successful exit, three years would not have been enough time to transpire in order to identify trends. But this article is only looking at funding at the outcome. All startups participating in the competition were actively seeking funding. Although there may be instances of some of these startups getting their first professional funding outside that three-year window, we can reasonably assume that after three years of unsuccessfully pursuing outside investment, most founders will either close the business or continue the business on a smaller scale.

The MFC data set is essentially survey data, which has the potential for bias. Founders voluntarily participate in the competition, which begs the question of whether or not our survey sample is representative of the startup population as a whole. This potential for bias is a known limitation of this study. It should be noted, however, that it is not readily apparent what the direction of the bias, if any, would be. It is not obvious whether the founders who participate in the MFC competition are more likely to be funded, or less likely to be funded, than the founder population as a whole.

There were a total of seventy-two (72) survey responses. The summary statistics and correlations are reported in Table 1. Fifteen of the startups were able to receive professional funding, which we define as funding from investors that typically have some sort of due diligence process. This is the dependent variable in our analysis. Due to the sample size and the Boolean nature of the dependent variable, probit analysis was the appropriate tool for our study.

## 2.2. Measures

The following is a description of the dependent and explanatory variables of this study:

**funded** is a Boolean dependent variable that takes a value of one if the startup has received professional funding and zero if it has not. Professional funding is defined as coming from a source that typically has a robust due diligence process, which for the purposes of this article are: venture capital, angel investment, private equity, grants and bank loans. This variable takes a value of zero if no funding has occurred, or the funding comes from friends & family or crowdfunding (i.e. we exclude friends & family and crowdfunding as professional funding sources since those funding sources are likely to be more influenced by loyalty and emotion than by due diligence).

**ed yrs** is an integer explanatory variable that takes a value between zero and eight, representing the number of years of founder education beyond high school. A high school diploma (or less) is coded as zero, some college is one, associate’s degree is two, bachelor’s degree is four, master’s degree is six, and a doctorate is eight.

**ed yrs sq** is an integer explanatory variable that is the square of *ed yrs*.

**founder age** is an integer explanatory variable that is the founder’s age as of 2019.

**c-corp** is a Boolean explanatory variable that is coded as one if the startup is organized as a C- corporation and coded as zero otherwise.

**Table 1.** Summary statistics and correlations.

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. funded	0.208	0.489	1.000								
2. ed yrs	4.806	2.218	−0.017	1.000							
3. ed yrs sq	27.944	19.593	−0.095	0.963	1.000						
4. founder age	48.264	12.879	−0.216	−0.055	−0.013	1.000					
5. c-corp	0.444	0.500	0.229	0.104	0.074	−0.093	1.000				
6. revenue	0.514	0.503	0.020	0.040	−0.050	−0.076	−0.081	1.000			
7. patents filed	1.736	5.528	0.131	0.196	0.237	0.042	−0.089	0.085	1.000		
8. bod mbrs	0.986	1.614	0.431	−0.064	−0.049	0.044	0.426	0.061	0.273	1.000	
9. patent × bod	4.111	16.531	0.115	0.146	0.190	0.023	−0.062	0.137	0.953	0.382	1.000

**revenue** is a Boolean explanatory variable that is coded as one if the startup has any amount of revenue.

**patents filed** is an integer explanatory variable that represents the number of patent applications filed as of 2019.

**bod mbrs** is an integer explanatory variable that represents the total number of members of the startup's board of directors as of 2019.

**patent  $\times$  bod** is an integer interaction variable calculated as *patents filed* times *bod mbrs*.

### 2.3. Descriptive statistics

Table 1 contains the mean and standard deviation of each of these variables, as well as the correlations between each of the variables. Noteworthy results from Table 1 include the fact that the mean years of education beyond high school in the sample is 4.8 years, the average age of the founders is 48, and about half of the startups have revenue.

Figure 1 shows the distribution of funding success with respect to education years. It clearly shows that more of the successfully funded startups have more highly educated founders.

## 3. Results

We performed four probit analyses with *funded* as the dependent Boolean variable and the results are presented in Table 2. In order to test our hypothesis at the most basic level, the first model, Model (1), looks only at years of education beyond high school (and years squared) as the explanatory variable with no other control variables. We indeed find a positive overall relationship between education level and funding with a negatively curvilinear shape. The coefficients of both *ed yrs* and *ed yrs sq* are significant at the 5% level, consistent with our hypothesis.

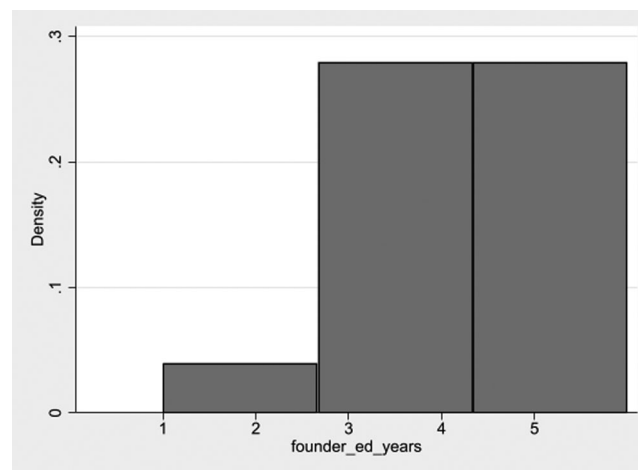


Figure 1. Distribution of funding successes across education years beyond high school.

Table 2. Determinants of professional funding for startups.

Variable	(1)	(2)	(3)	(4)
ed yrs	1.0028**	1.0366**		2.4158**
ed yrs sq	-0.1217**	-0.1260**		-0.2811**
founder age		-0.0267*		-0.0624**
c-corp			0.1733	-0.0995
revenue			0.0846	-0.1877
patents filed			0.2007*	0.2537*
bod mbrs			0.4325***	0.7466***
patent x bod			-0.0693*	-0.0709
constant	-2.3947***	-1.2129	-1.5873***	-3.4078
Pseudo-R <sup>2</sup>	0.1104	0.1519	0.2184	0.5075

Note. Each of the four models are probit models with professional investor funding as the Boolean dependent variable. \*, \*\*, and \*\*\* indicate that the coefficients are statistically significantly different from zero (based on *p*-values) at the 10, 5, and 1% level, respectively.

The other three models also confirm the hypothesis, but add more insight into the determinants of funding. Model (2) adds the only other demographic control variable in our dataset, which is the age of the founder in years. We find that age is negatively associated with funding success, and significant at the 10% level. The older the founder, the less likely the startup will be funded by a professional investor. Azoulay et al. (2020) contradict this result in their study where they find that in the fastest growing new ventures, the mean age of the founders is 45 years. Similarly, Wadhwa et al. (2008) find that the mean age of tech founders is 39.

There are other studies that are consistent with our result that older founders may be at a disadvantage. Ng and Stuart (2016), using LinkedIn profiles, find that new tech ventures are typically launched at around five years after college graduation. Frick (2014) looks at unicorns (startups valued at higher than one billion USD) and finds a mean founder age of 31.

Model (3) instead looks at company characteristics as the control variables, including whether or not the company is organized as a C corporation, whether or not the company has revenue (not the amount of revenue), how many patent applications have been filed, how many members comprise the board of directors, and an interaction variable between board members and patents filed.

We found that patents and board members were positively associated with startup funding and were statistically significant. Entity type *c-corp* and *revenue* were not significant. The *c-corp* result is not surprising, since a startup's legal entity type may be easily changed. The *revenue* result is somewhat surprising, because revenue is generally considered a standard de-risking attribute by early stage investors. Revenue can be interpreted as a signal that the new product or service has been validated by customers and thus must have at least some degree of product-market fit. Thus, our results appear to be inconsistent with studies such as Hadley et al. (2017), who find a positive correlation between revenue and VC funding, but do not make any claims about the direction of causality, if any.

The fully specified model is Model (4), where both founder and company characteristics are considered. The same explanatory variables are significant as with the previous models. To estimate the optimal level of education for a founder, regarding the attraction of funding from professional investors, we take the first derivative of the linear model suggested by Model (4) with respect to education years and set it equal to zero. Since the coefficient of the squared term is negative (−0.2811), the function represents a negative u-shape, so solving for *ed yrs* will yield the curve's maximum. The result is approximately 4.3 years beyond high school, meaning that the estimate for the ideal number of years of founder education must be beyond a bachelor's degree. Since our data is coded categorically (e.g. bachelor's degree = 4 and master's degree = 6, etc.), it is reasonable to round the result to the next highest category since there are no partial degrees in the survey. Thus, the optimal level of education, based on our data, is interpreted to be a master's degree.

Model 4 is presented here as a function (1) with respect to *ed yrs* with *funded* as "y" and *ed yrs* as "x". Other control variables will drop out of the partial derivative with respect to x (2). Solving for *ed yrs* (3), we find that the optimal education level presented by our data is 4.3 years beyond high school.

$$y = 2.4158x - 0.2811x^2 - 3.4078 \quad (1)$$

Take first derivative, setting y equal to zero:

$$.5622x = 2.4158 \quad (2)$$

Solving for x:

$$x = 4.3 \text{ years beyond high school} \quad (3)$$

## 4. Discussion

### 4.1. Contributions

This article confirms previous research regarding the relationship between founder education level and funding. We find that more education is indeed associated with an increase in the likelihood of funding. The main contribution of this finding is that it firmly establishes the relationship between education and equity funding, not just debt funding. Previous analyses (Pinelli et al., 2022; Shane, 2003) focus on

funding *level* as the dependent variable, whereas we use a binary fact of funding. This is important because our dataset mostly consists of startups that did not receive professional funding, i.e. we included many startups in our analysis that were rejected by VC investors. The presence of this control group is critical for valid hypothesis testing.

An important secondary contribution is that we find a negative curvilinear aspect to that relationship. This means that although education generally improves funding, too much education may actually impair funding outcomes. Åstebro and Bernhardt (2005) found a similar negative curvilinear relationship between education and loan approvals, but our results add to the literature by finding support for this upside down u-shape with venture funding as well. Having the squared term for education years in our model allowed us to take the first derivative of the model and solve for the optimal level of education. The curvilinear relationship is actually more intuitive for equity investment than for lending, since lenders are understood to be more dependent on concrete financial history, personal history and ratios for their lending decision, whereas equity investors have the reputation as being more subjective.

The theoretical basis for Hypethesis 2 (the curvilinear relationship) is the idea that excessive education can produce cognitive rigidity, as proposed by Pinelli et al. (2022). This would only affect funding if the investors believe that this cognitive rigidity has negative operational impacts (e.g. reluctance to pivot). Our study does not provide evidence that education level is associated with this rigidity, but merely provides evidence that investors might perceive that this association exists. Additional research is required to test whether or not the investors are correct, perhaps by comparing funding success to eventual (and measurable) operational success.

## 4.2. Limitations

There are two significant limitations to this study. The first, which was discussed in the introduction is the potential bias when using survey data. The second is the limited sample size. The sample was not large enough to study industry effects, which we suspect could have been potentially significant. For example, it would be reasonable to hypothesize that investors in the biotech industry may be more impressed by education than investors in the retail industry would be.

## 5. Conclusion

This article supports the idea that higher founder education level is generally viewed as a positive factor for investors, but also that there may be a point where founders are viewed by investors as too educated. It would be impractical to suggest to founders that they go back to school, but they might be wise to consider education as one factor when choosing co-founders.

This article does not (nor tries to) answer the question of whether or not higher education impacts the ultimate success of the startup. Rather, it affirmatively answers the question of whether higher education matters to investors. This means, in the practice of entrepreneurship, that founders shouldn't assume that level of education is irrelevant, and perhaps they should build their team accordingly.

In terms of future research, ascertaining how the combined effects of founder education and other factors (e.g., experience, network, skills) impact startup funding could provide a more comprehensive picture. A larger sample size would also be very helpful in order to be able to control for industry, since very high levels of education are likely to be more important in some industries than others. In biotech or other research-related industries, for example, founders with doctorates might understandably have higher credibility with investors.

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## About the author

**Craig R. Everett** is a finance professor at the Pepperdine Graziadio Business School. He is the Director of the Pepperdine Private Capital Markets Project ([privatecap.org](http://privatecap.org)) and Executive Director for the Pepperdine Most Fundable Companies competition ([privatecap.org](http://privatecap.org)). His teaching and research interests include entrepreneurial finance, business valuation, private capital markets, and entertainment finance. Dr. Everett He holds a Ph.D. in Finance from Purdue University, an MBA from George Mason University, and a B.A. in Quantitative Economics from Tufts University. Dr. Everett is the author of the children's financial literacy thriller *Toby Gold and the Secret Fortune*, which incorporates such financial topics as saving, investing, banking, entrepreneurship, interest rates, return on investment, and net worth.

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## Data availability

The data that support the findings of this study are available from the corresponding author, Craig R. Everett, upon reasonable request. This data set contains confidential financial data from startup companies. Every effort has been made to redact any identifying information from each record, but there still may be ways, in some cases, to deduce the identity of the companies or founders. Thus, any requests for data must be solely for academic purposes.

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