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Ruiz Dotras, Elisabet & Lladós Masllorens, Josep (2022). Entrepreneurial Self-Efficacy and Financial and Calculation Skills can Shape Different Profiles of Venture Intentions. *Journal of Entrepreneurship*, 31(1), 153-183. doi: 10.1177/09713557211069319

DOI

<https://doi.org/10.1177/09713557211069319>

<http://hdl.handle.net/10609/146267>

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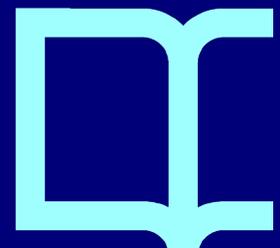
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Entrepreneurial self-efficacy and financial and numeracy skills can shape different profiles of venture intentions

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Abstract

The complexity of finances and access to financial markets is one of the main challenges facing an entrepreneur. However, not many studies examine the effect of financial skills on entrepreneurial intentions. Our research describes venture intentions considering motivations, contextual factors and personal traits in different clusters based on the strong sense of entrepreneurial self-efficacy and the levels of financial literacy and numeracy skills.

Results demonstrate that financial and numeracy skills and self-efficacy shape different profiles of potential entrepreneurs. The study exhibits that social motivations exerts a favourable impact on entrepreneurial intentions only for those who firmly believe in their abilities or have high financial and numeracy skills. For those without outstanding skills or high self-efficacy, contextual factors play a key role in the decision to launch a new venture. The paper provides empirical evidences on the influence of self-efficacy and cognitive skills in promoting different entrepreneurial intention profiles.

Keywords: Financial literacy, Numeracy skills, Risk literacy, Venture intentions, Entrepreneurial self-efficacy

Introduction

Entrepreneurship is considered a critical element to create employment opportunities and improve economic wealth in a country's economy (Wong, Ho, and Autio 2005; Landström, Harirchi, and Åström 2012; van Praag and Versloot 2007). Policy makers have already highlighted that economic growth and employment depend on public support for new business creation (European Commission, 2006). Hence, a large body of empirical works has been studying entrepreneurship and entrepreneurship intentions.

Entrepreneurship studies mainly focuses on how and why opportunities are discovered and exploited as new ventures (Puhakka, 2012). However, recently entrepreneurship research has been focusing on attitudes and beliefs that predict intentions and behaviours. Thus, the intention of an individual to start a new venture is crucial to understanding entrepreneurship (Schlaegel & Koenig, 2014). Related to attitudes, the concept of self-efficacy emerges as a key element when it comes to entrepreneurial action, and has been widely studied during the last few years (Mcgee et al. 2009; Brändle et al. 2018; Engel et al. 2014; Akadiri et al. 2017). Following Bandura (1997), self-efficacy is the subjective conviction that one is capable of action in a given situation. Research shows that individuals with a strong belief in their own abilities and skills to start a business are more likely to exhibit a positive attitude to start up a business (Barba-Sánchez & Atienza-Sahuquillo, 2011). Hence, entrepreneurial self-efficacy (ESE), a factor related to personality, is considered a crucial predictor of venture intentions (Shane, Locke, & Collins, 2003).

However, entrepreneurial intentions are not only shaped by personality characteristics (Zhao, Hills, & Seibert, 2005), but also by education (Liñán, Rodríguez-Cohard, & Rueda-Cantuche, 2011). In addition, according to Solomon, Dickson, Solomon and Weaver (2008), entrepreneurial aptitude is not necessarily innate or inborn. Following the idea of Rapidere (2012) and Weber (2013), we propose to analyze entrepreneurial intentions based on objective and subjective traits. We use entrepreneurial self-efficacy as a subjective factor since it is a motivational construct that reveals entrepreneurs' perceptions about their capacities (Zhao et al., 2005). And as a novelty, we consider three cognitive skills as an objective trait. These skills related to the creation of a new venture are financial literacy, numeracy ability and risk literacy.

An appropriate set of skills for financial management is one of the most critical competencies in new venture creation and development (Timmons & Spinelli, 2004), since the lack of financial literacy hinders entrepreneurial activity (Bosma & Harding, 2006). This deficiency is seen more important in the case of young and inexperienced entrepreneurs (Kojo Oseifuah, 2010) and among young people. Similarly, more numerate individuals may be better able to process information and make complex optimal decisions. Financial skills also contribute to greater entrepreneurial self-confidence (Kotzè & Smit, 2008) and, as entrepreneurs engage in risky behaviour, individuals with a favourable risk assessment show a higher tendency towards entrepreneurial behaviour (Norton & Moore, 2006). Therefore, financial knowledge, numeracy abilities and risk literacy are essential components of business decisions and, consequently, individuals with the intention to start up a business should be prepared to embrace them effectively.

Besides, the European Commission points out that the first two challenges entrepreneurs face are education, which should provide the appropriate foundations for developing entrepreneurial skills; and the difficulties in accessing finance coupled with the complexity of financial markets. Despite several public and private policies having been implemented, the EU report in 2012 shows that the level of entrepreneurship in many countries has not advanced much since 2007 and several financial literacy surveys conducted worldwide (Klapper, Lusardi, & Van Oudheusden, 2015; Organization for Economic Co-operation and Development, 2018) have highlighted the need to improve levels of education in financial matters, affecting both the young and adult population.

The main objective of this research is to shed light on how entrepreneurial intentions emerge when objective and subjective traits of individuals are taken into account. Differences in motivations, personal traits and contextual factors are analysed to provide valuable insights into the process of venture creation. Our study contributes to the literature in different ways. First, we analyze venture intentions considering both objective skills and perception of individuals about skills. Consequently, individuals are clustered in three different groups based on the strong sense of entrepreneurial self-efficacy and the levels of financial literacy and numeracy skills. Second, drivers explaining intentions to launch a business can be different based on these objective and subjective traits. Therefore, it contributes to previous research clarifying some mixed findings on drivers such as tolerance for risk and impulsivity. Third, as many empirical studies, we also conclude motivations are the main factor for entrepreneurial intentions. However, not all type of motivations are valid for all individuals. Social motivations are not a reason to start a business for those who do not firmly believe in their abilities or do not have high cognitive skills. Unlike others, contextual factors play a key role in the decision to start up a business for them. In conclusion, we believe clustering the sample rather than considering the overall sample provides useful insights about the venture creation process.

The paper is organized as follows. After the introduction, section 2 provides the background, a review of the related literature and the hypotheses to be tested. Section 3 describes the sample and the measures used in this investigation. Section 4 presents the findings of this study. Finally, in section 5 summarizes the conclusions drawn from this work and a discuss limitations and directions for future.

Theoretical background and research hypotheses

The influence of cognitive skills and self-efficacy on entrepreneurial intentions

Each stage of a new business process has specific demands that require particular cognitive skills or abilities. Many studies have shown that cognition is an important feature when studying entrepreneurship (Busenitz and Barney, 1997; Allinson and Hayes, 1996; Allinson *et al.*, 2000; Mitchell *et al.*, 2002). In fact, the cognitive theory of entrepreneurship supplies a framework to identify the most significant cognitive factors and behaviours for encouraging entrepreneurship intention. Entrepreneurial cognitions are defined as ‘the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth’ (R. K. Mitchell, Smith, Seawright, & Morse, 2000).

Since businesses are constantly engaged in complex decision-making activities concerning the acquisition and use of financial resources (Drexler, Fischer, & Schoar, 2010), entrepreneurs should exhibit a high level of financial literacy, certain numerical ability and they should be able to assess risk correctly. They face financial decisions nearly every day, such as purchasing new equipment, hiring new employees or acknowledging the possibility of project failure.

Several studies show that individuals with greater financial literacy and numeracy skills are more likely to participate in financial markets (Almenberg & Dreber, 2015; Almenberg & Widmark, 2011; Christelis, Jappelli, & Padula, 2010; van Rooij, Lusardi, & Alessie, 2011; Yoong, 2011). Besides, Gerardi, Götte and Meier (2010) suggest that limited numeracy skills might lead to inappropriate financial decisions. Numerical ability appears to matter to judgements and decisions in important ways (Peters *et al.*, 2006) and risk literacy likewise matters for financial decisions. Lusardi (2015) states that those who are more knowledgeable about risk are also more likely to be precautious managing finances. As a consequence, a lack of financial literacy in nascent entrepreneurs can undermines the outcomes and chances of success of their new venture. Therefore, over the recent past, different studies have recognized the need for financial education and literacy among business owners, entrepreneurs and society in general (Binks, Starkey, & Mahon, 2006; Fatoki, 2014; Hussain, Matlay, & Scott, 2008; Njoroge, 2013; Wise, 2013).

While cognitive skills are important in starting and running a business, the behavioural aspects of an individual should not be underestimated. There is broad consensus among researchers on the importance of ESE as a personal trait that appears to be a particularly important antecedent to new venture intentions (Arenius & Minniti, 2005; Barbosa, Gerhardt, & Kickul, 2007; Boyd & Vozikis, 1994; Hockerts, 2017; Zhao et al., 2005). According to Bandura (1997) self-efficacy refers to ‘the belief in one’s capabilities to organize and execute the courses of action required to produce given attainments’. As Zhao et al. (2005) stated, entrepreneurial self-efficacy is a multidimensional construct that exhibits entrepreneurs' perceptions about their abilities to adequately respond to particular entrepreneurial challenges, particularly in uncertain environments. Hence, Entrepreneurial Self-Efficacy (ESE) can be a useful measure of the strength of an individual’s belief that they are capable of successfully performing the tasks of an entrepreneur. The capacity of self-influence through goal setting and evaluative reaction to one's own performance provides a mechanism of motivation and self-directedness (A Bandura, 1991; Locke & Latham, 1990).

Both financial and numeracy skills, and entrepreneurial self-efficacy seem to shape entrepreneurial intentions. Consequently, influencing students’ cognition is becoming one of the main pillars in entrepreneurial education, and entrepreneurial self-efficacy has emerged as the most widely discussed feature of entrepreneurial intentions (Baum & Locke, 2004; Newman, Obschonka, Schwarz, Cohen, & Nielsen, 2019). While financial literacy and financial management skills are a pre-requisite to effectively plan the enterprise (Wise, 2013), according to Fayolle and Gailly (2015), little is known regarding the link between individuals’ educational backgrounds and the antecedents of entrepreneurial intentions. In particular, efficacy beliefs can shape causal attributions and those people who consider themselves to be highly effective, identify their limitations with reasons, such as inadequate strategies, unfavourable circumstances or insufficient effort. On the other hand, people with low levels of self-efficacy usually impute their failures to a lack of skills. However, these traits don’t necessarily have to be present in every person embarking on a new business venture. Hence, motivated by the need to fill the gap between cognitive skills and behavioral traits and venture intentions, the following hypotheses are proposed:

H1. Cognitive skills and behavioral traits outline different individuals with entrepreneurial intentions.

H1a. Entrepreneurial intention is higher among individuals with a superior entrepreneurial self-efficacy.

H1b. Financial and numeracy skills have a distinctive contribution to entrepreneurial intention.

Motivations, contextual factors and personal traits

Many researchers have examined the differences between those with and without venture intentions considering certain factors and character traits and have concluded that the entrepreneurial intention is explained as a combination of specific individual features and some surrounding influences (Gelard & Saleh, 2010; Lüthje & Franke, 2004; Segal, Borgia, & Schoenfeld, 2005). Motivations, skills, expertise, self-evaluation and contextual factors interact, shaping the identity and attitudes of individuals and finally become drivers for entrepreneurial intentions (Fauchart & Gruber, 2011). The combination of these elements could provide different patterns of entrepreneurial behaviour because entrepreneurs' social identity may impact on the opportunity option they exploit and the strategic decisions they take in the context of a business creation process. The following variables, closely associated with entrepreneurial intentions, have been considered as the focus of this study: motivations, role model, perception of being an entrepreneur, impulsivity and tolerance for risk taking. The study pursues to test whether these variables interact with ventures intentions based on the traits of an individual.

Traditionally, economic reasons have been considered as the most important motivation for starting a firm (Elfving, Brännback, & Carsrud, 2009). Recently, the existence of other reasons for venture creation have emerged. These are based on the social entrepreneurship, where social gains are the primary motivators (Carsrud & Brännback, 2011). Entrepreneurial decisions may not only be the consequence of personal and behavioural traits but also the result of the desirability or necessity of becoming a self-employed (Herron & Sapienza, 1992; Segal et al., 2005). Motivations may be related to economic necessity, the lack of employment opportunities or dissatisfaction with a current job (Kautonen & Palmroos, 2010). They could also be founded on the search for market opportunities, the need for achievement, the search for independence and the ambition to be successful, among other reasons (Barba-Sánchez & Atienza-Sahuquillo, 2012; McClelland, 1965; Sivarajah & Achchuthan, 2013). Social entrepreneurship, aimed at improving society, is also emerging as a new driver for venture intentions (Spear, 2006). As a consequence, the motivations leading people to entrepreneurship, and its perceived rewards, are probably different for each person, depending on their skills, personal values and behavioural traits (Jaén & Liñán Alcalde, 2013; Moriano & Morales, 2007). Thus, we propose the following hypotheses:

H2. Motivations to start a new venture are different depending on cognitive skills.

H2a. The search for improvement and economic opportunity is the main driving force for entrepreneurial intention.

H2b. Necessity-driven and social entrepreneurship motivations are common among individuals with high cognitive skills or with high self-efficacy.

Both potential and existing entrepreneurs capture the influence of the external environment through their motivations and perceptions, generating attitudes and intentions which, in turn, determine behaviors (Liñán, Santos, & Fernández, 2011). In particular, personal perception towards the behavior refers to the attractiveness of the proposed behavior to which the individual holds a positive or negative personal valuation about being an entrepreneur (Ajzen, 1991, 2002; Kolvereid, 1996). In this sense, positive personal perception of being an entrepreneur is an important element concerning entrepreneurial intention.

Apart from the perception, subjective norms have been a relevant variable in contextual factors research. Subjective norms comprise perceived normative expectations of social reference groups such as parents, friends, relatives or acquaintances whether a person should engage in the entrepreneurial behaviour (Kautonen, van Gelderen, & Fink, 2015; Sieger, Gruber, Fauchart, & Zellweger, 2016). Social influences can determine intentions or behaviours because individuals usually consider approval by their closest circles regarding starting a business (Liñán & Chen, 2009; Ruttman, 2012; Schlaegel & Koenig, 2014). Hence, subjective norms encompasses the perception of social pressure to perform (or not perform) as an entrepreneur (Forster & Grichnik, 2013; Shirokova, Osiyevskyy, & Bogatyreva, 2016). Several authors (Altinay & Altinay, 2006; Liao & Welsch, 2003; Pruett, Shinnar, Toney, Llopis, & Fox, 2009) suggest that the proximity of an entrepreneurial family member rises entrepreneurial intentions because such individuals can serve as role models. Whilst empirical studies have demonstrated that contextual factors influence entrepreneurial intentions, it is uncertain if this statement holds for all individual profiles. Therefore, the following hypotheses are tested:

H3. Contextual factors can shape entrepreneurial intention

H3a. Role models have a favourable influence on entrepreneurial intention

H3b. A positive perception about the social image of entrepreneurs encourages entrepreneurial intention

Finally, regarding personality traits, many empirical studies have demonstrated that personality traits of individuals influences venture creation (Koh, 1996; S. Mueller & Thomas, 2001). Indeed, individuals with personality traits such as a high need for achievement, the propensity to take risks, a tolerance of ambiguity, and an internal locus of control are more entrepreneurial and engage in entrepreneurial activities (Brockhaus, 1980; Forlani & Mullins, 2000; S. Mueller &

Thomas, 2001; Teoh & Foo, 1997). Besides, empirical studies over the last decade have shown a persistent gender gap in the level of entrepreneurial activity. International studies such as the 'Global Entrepreneurship Monitor (GEM) 2011' (Kelley, Singer, & Herrington, 2012) demonstrate remarkable differences between males and females in entrepreneurial activity. According to Mueller and Conway Dato-on (2013), previous research has suggested the existence of a gender gap in the motivation, desire and intention to become an entrepreneur.

Although different empirical works confirm that entrepreneurs are risk takers, there is no consensus in the literature about the extent of risk taking in an entrepreneurship process. In fact, some research has shown that entrepreneurs are moderate risk takers taking calculated risks to avoid uncertain situations (Koh, 1996; S. Mueller & Thomas, 2001). When comparing tolerance for risk of managers versus entrepreneurs, there seems to be little consensus in the literature with some studies suggesting that entrepreneurs seem to be involved in riskier ventures and entrepreneurial processes (L. Busenitz & Busenitz, 1999), while others have not found any substantial differences between entrepreneurs and managers or even the general population (Barbosa et al., 2007; Brighetti & Lucarelli, 2013; Low & MacMillan, 1988; Teoh & Foo, 1997).

Another personal trait is impulsivity, described as the tendency to act rapidly without consideration of negative consequences (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001). Impulsivity in an entrepreneurial context can lead to quick decisions to seek opportunities in a business environment. Also, impulsive individuals are considered to be skill at generating ideas (Fürst, Ghisletta, & Lubart, 2016), which is an important ability in the venture creation process. Despite the extant research on personality traits and venture intentions, impulsive behavior has not been receiving a lot of attention and, according to Wiklund, Yu and Patzelt (2018) there is not a uniformly positive or negative impact of the impulsivity on entrepreneurial action.

Consequently, these arguments lead to the following hypotheses:

H4. Personal traits of individuals influence entrepreneurial intention

H4a. Entrepreneurial intention is influenced by gender

H4b. Individuals more inclined to entrepreneurship show a higher degree of impulsivity.

H4c. Individuals more inclined to entrepreneurship show a higher degree of risk tolerance.

Data analysis, measures and methods

Sample description

The data for this study has been retrieved from a survey conducted in a Spanish online university during the academic year 2017/2018. We sent the questionnaire to students, tutors and academic advisors in different undergraduate, master's and other programmes. We have collected information on social-demographic variables, entrepreneurial background and entrepreneurial intention. Participants were addressed to respond if they were considering starting a new business as the dependent variable. Entrepreneurial intention was measured by a binary variable equal to one for those planning to do it in the next future or being currently involved in setting up a new business. We also include measures for entrepreneurial self-efficacy and other personal traits along with some cognitive skills, in particular financial knowledge, numerical ability and risk-assessment capacity.

After participants with missing values are removed, the final sample consisted of 332 individuals, aged between 18 and 74 years old (66% aged 25-44 years old), 57% female and 43% male. Regarding education, 22.3% are general secondary graduates, almost 30% are secondary vocational graduates and around 30% have an undergraduate degree. Most respondents are

employed (83.4%) and 15% are unemployed. Table 1 summarizes the characteristics of the sample.

Table 1 - Demographic profile of survey respondents (N=332)

Distribution	Total sample	%
<i>Gender</i>		
Male	143	43.1%
Female	189	56.9%
<i>Age</i>		
18-24 years old	49	14.8%
25-34 years old	124	37.3%
35-44 years old	95	28.6%
45-54 years old	53	16.0%
55-64 years old	9	2.7%
Above 65 years old	2	0.6%
<i>Education</i>		
High school	74	22.3%
Vocational Secondary	97	29.2%
Degree	36	10.8%
Undergraduate	109	32.8%
Doctorate	16	4.8%
<i>Occupation</i>		
Employed	277	83.4%
Out of work seeking work	32	9.6%
Out of work not seeking work	18	5.4%
Retired	2	0.6%
Unable to work	3	0.9%

Measures and definitions

Different elements have been considered in literature as drivers to explain venture intentions, however in most studies individuals with intention to start up a business are considered to be similar. Hence, our research aims to analyze if there are differences between individuals and if so, how drivers can influence entrepreneurial intentions in each cluster. Variables included in the cluster analysis are:

- Entrepreneurial cognitive skills that explain how entrepreneurs think and make decisions. In particular we use financial literacy, numerical ability and risk-assessment capability;
- Entrepreneurial self-efficacy, defined as of an individual's the perception of their capabilities for being an entrepreneur.

A growing body of literature has documented the average person's understanding of basic economic and financial concepts remains relatively low around the world (Klapper et al., 2015; A. M. Lusardi & Mitchell, 2011; A. Lusardi & Mitchell, 2008, 2014; A. Lusardi & Tufano, 2009, 2015; O. S. Mitchell & Lusardi, 2011; van Rooij et al., 2011; Van Rooij, Lusardi, & Alessie, 2012). In light of these findings and considering that certain entrepreneurial skills are necessary

when creating or managing a new business, we developed a combination of measures of entrepreneurial abilities, namely financial literacy, numerical ability and risk literacy.

The assessment about the level of credit needed, evaluation of different financial sources and their risks or the preparation of budgets are some of the basic tasks that every entrepreneur should know how to perform easily. To the best of the authors' knowledge, no prior studies consider this set of measures as an alternative approach to evaluate entrepreneurial intentions.

While a measure of real financial knowledge has been used in previous works to study financial behaviour of individuals (Allgood & Walstad, 2013; Bellofatto, D'Hondt, & De Winne, 2018; Kyrychenko & Shum, 2009; Parker, de Bruin, Yoong, & Willis, 2012), it is quite novel to assess this ability for individuals with venture intentions. The financial literacy measure included in this study is mainly based on the index described by Van Rooij, Lusardi and Alessie (2011), with questions that are an objective measure of financial literacy in order to assess how people deal with fundamental concepts at the root of managing money and investment decisions.

The survey contains two sets of questions aimed at assessing financial literacy. The first set measures basic financial literacy, essentially the ability to perform simple financial calculations. The second group of questions computes advanced financial literacy, in particular familiarity with financial products and concepts. It aims to measure a higher level of financial knowledge related to investment and portfolio choice. A dummy variable is created for each question whereby one represents a correct response and zero represents an incorrect response, a 'don't know', or a refusal to answer.

Most of these questions have previously been used in other studies such as the English Longitudinal Study of Ageing (Banks & Oldfield, 2007; Steptoe, Breeze, Banks, & Nazroo, 2013), the US Health and Retirement Survey (HRS) and the Rand American Life Panel (A. Lusardi & Mitchell, 2007).

Regarding numeracy skills, in order to measure numerical ability, we follow the cognitive reflection test (CRT) introduced by Frederick (2005), whereby respondents answer three questions involving numerical calculations. The number of questions answered correctly is a straightforward measure of numerical ability. Although risk could be measured in different domains, economic and psychological theory has long held that risk-taking decisions are those that involve known 'statistical probabilities' and quantitative 'probabilistic reasoning' (Knight, 1921; Rakow, 2010). Following Cokely *et al.* (2012), the survey includes a measure of risk literacy since we consider this to be an important cognitive skill for any entrepreneur.

Unlike previous variables, ESE is not concerned with individuals' skills but with individuals' perceived capabilities in different entrepreneurial tasks. As it has been done in the majority of studies, ESE have been measured as a multidimensional construct. Following McGee, Peterson, Mueller, & Sequeira (2009), we have computed individuals' perceived capabilities in different entrepreneurial tasks such as searching, planning, marshalling, and implementing. The searching item covers the development of a unique idea or the detection of an opportunity. The planning item entails measuring the ability of developing activities to convert an idea into a realistic business plan. The marshalling questions aim evaluating the necessary skills to assemble resources in order to bring the business into existence. And finally, the implementing item reflects management competencies and abilities to solve problems quickly and efficiently. Unlike other research, we do not include questions regarding financial capability in the implementing section. We prefer to measure it using the financial and numeracy skills previously explained.

In addition to financial and numeracy skills and entrepreneurial self-efficacy, other variables such as motivations, contextual factors and personal traits have been included in order to assess differences in venture intentions between profiles or clusters.

Motivation has been defined as the purpose or psychological cause of an action. Traditionally, reasons for starting up a business have been considered to be mainly economic. However, recent awareness has emerged in the area of social entrepreneurship evidencing the existence of other motives for an individual to launch a new venture. In this case, the social gains are the primary reasons, instead of the economic ones.

Motivations have been measured following the Global Entrepreneurship Monitor (GEM) report. Opportunity motivation has been categorized when the respondent considers that taking advantage of market opportunities or getting independence or freedom are the main drivers for starting up a business. Similarly, necessity-driven motivation has been computed when the respondent answers that dissatisfaction with the current job or lack of other employment options are the principal factors. Finally, when the answer is to make a difference in the world, then social motivation has been considered.

Role model is measured as a nominal variable (1 = yes, 0 = no) based on the question whether they have regular contact with entrepreneurs such as parents, other family members or friends. Perception of becoming an entrepreneur is defined as a categorical variable based on the question: *On a scale from 1 to 5, where 1 means 'totally disagree' and 5 means 'totally agree', do you consider being an entrepreneur a good professional option?* A dummy variable which takes value 1 is created when respondents answer 4 or 5 to this question.

Finally, to complement our study we have included the risk self-assessment or personal risk attitude as another personal trait along with impulsivity. One of the most widely used assessment instruments in the risk-tolerance literature is the self-assessment single-question measure, based on a question that reads: *On a scale from 1 to 5, where 1 means 'very low risk tolerance' and 5 means 'very high risk tolerance', how would you assess your overall tolerance for risk?* Respondents were asked to select their tolerance for risk from this question. Similarly, we have computed impulsivity with the question that reads: *On a scale from 1 to 5, where 1 means 'very low patience' and 5 means 'very high patience', how patient consider yourself?*

Prior studies suggests that demographic characteristics determine entrepreneurial intentions (Zampetakis, Kafetsios, Lerakis, & Moustakis, 2015). Therefore, in order to control for the variation for alternative explanations, variables such as gender (male=1 and female=0), age (measure in years) and employment status (dummy variable which takes value 1 whether the individual is unemployed) have been included.

Data analysis

Responses to questions related to financial literacy are reported in Table 2. Regarding basic literacy questions, the average number of questions answered correctly is around four (see Panel A of Table 2). Thus, while many respondents display knowledge of a few financial concepts, basic financial literacy is not common.

The survey also contains another module of advanced questions (see Panel B of Table 2). Results show that only a small portion of respondents, 5%, is able to answer all the advanced literacy questions correctly, most of them answer between three and four questions right out of seven. The percentage of incorrect responses or “do not know” answers is noticeable. These findings are very similar to other prior studies, confirming low levels of financial literacy.

Table 2. Financial literacy

Panel A: Basic financial literacy

Summary of responses

Weighted number of correct, incorrect and do not know answers (N=332)

Number of correct, incorrect, and do not know answers (out of seven questions)

	None	1	2	3	4	5	6	All	Mean
Correct	2.4%	3.6%	7.8%	15.4%	22.3%	24.4%	16.3%	7.8%	4.3
Incorrect	13.6%	22.6%	31.3%	19.6%	9.6%	1.8%	1.2%	.3%	2.0
Do not know	62.0%	22.6%	8.1%	3.0%	1.5%	1.2%	.3%	1.2%	0.7

Panel B: Advanced financial literacy

Summary of responses

Weighted number of correct, incorrect and do not know answers (N=332)

Number of correct, incorrect, and do not know answers (out of seven questions)

	None	1	2	3	4	5	6	All	Mean
Correct	4.8%	7.8%	18.7%	24.1%	20.5%	12.7%	7.8%	3.6%	3.3
Incorrect	14.5%	22.6%	24.1%	22.0%	12.0%	3.9%	.6%	.3%	2.1
Do not know	42.8%	17.2%	15.1%	9.3%	5.7%	5.4%	2.1%	2.4%	1.5

Considering that an entrepreneur must face complex decisions quite often, numerical ability is a feature that should not be neglected when studying entrepreneur's features. Regarding the results of this variable, the average number of correct responses is 0.8. Overall, only 6% answered all three questions correctly, 18.7% answered two questions correctly, 22.3% answered one question correctly, and the remaining 53% answered none of the questions correctly. Results show that the level of numerical ability is very low (see Table 3).

Table 3. Numerical ability

	Correct	Incorrect
None	53.0%	14.5%
1	22.3%	55.4%
2	18.7%	24.1%
3	6.0%	6.0%
Mean	0.8	1.2

Statistics summarizing responses to the questions related to risk literacy are reported in Table 4. Only 2.1% of respondents correctly answered the four questions, while 41% could not answer any questions correctly. About 48% of the respondents were able to answer right between one and two questions. On average, individuals answer incorrectly 2.9 questions against 1.1 correct answers, displaying the low ability to assess risks.

Table 4. Risk literacy

	Correct	Incorrect
None	41.0%	2.1%
1	24.1%	8.4%
2	24.4%	24.4%
3	8.4%	24.1%
4	2.1%	41.0%
Mean	1.1	2.9

Regarding risk tolerance and patience self-assessment, table 5 shows that most respondents report themselves between moderate to very patient, as well as having a moderate to high tolerance for risk. However, as pointed out earlier, most of them are not able to assess risk correctly.

Table 5. Risk tolerance and Patience

	Risk Tolerance (%)	Patience (%)
Very low	3.3%	2.11%
Low	11.7%	11.14%
Moderate	34.3%	27.41%
High	45.5%	35.84%
Very high	5.1%	23.49%
Mean	3.4	3.7

Finally, with regards to the ESE variable, the factor analysis using principal component analysis and varimax rotation with the Kaiser Normalization method reveals that all items loaded on four factors explaining 66.03% of the variance. Bartlett's test of sphericity is highly significant and the Kaiser Meyer Olkin measure indicates that the variables were appropriate for the usage of a factor analysis (KMO = .85). Results of the factor loading on these items are presented in table 6.

Table 6. Entrepreneurial self-efficacy construct

Factors and variables	Factor loading			
	Searching	Planning	Marshalling	Implementing
<i>Searching—(How much confidence do you have in your ability to ...?)</i>				
Brainstorm (come up with) a new idea for a product or service	.855			
Identify the need for a new product or service	.841			
Design a product or service that will satisfy customer needs and wants	.752			
<i>Planning—(How much confidence do you have in your ability to ...?)</i>				
Determine a competitive price for a new product or service		.857		

Estimate the amount of start-up funds and working capital necessary to start my business		.788		
Estimate customer demand for a new product or service		.776		
<i>Marshalling—(How much confidence do you have in your ability to ...?)</i>				
Network—i.e., make contact with and exchange information with others			.827	
Get others to identify with and believe in my vision and plans for a new business			.701	
Clearly and concisely explain verbally/in writing my business idea in everyday terms			.604	
<i>Implementing-people—(How much confidence do you have in your ability to ...?)</i>				
Supervise employees				.796
Recruit and hire employees				.781
Inspire, encourage, and motivate my employees				.727
Train employees				.724
Delegate tasks and responsibilities to employees in my business				.719
Deal effectively with day-to-day problems and crises				.683

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser normalization.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.854
Approx. Chi-Square		2548.098
Bartlett's Test of Sphericity	df	105
	Sig.	.000

Reliability Statistics

Cronbach's Alpha*	Cronbach's Alpha Based on Standardized Items	N of Items
.883	.884	15

* Cronbach's Alpha doesn't improve if any of the items is deleted.

Results and findings

The combination of clustering and ANOVA methods to classify individuals and analyse differences between groups provides useful information for the identification of factors boosting entrepreneurial intentions. We use this research method to test the first hypothesis.

Three distinct groups emerge from the analysis, providing information about different profiles with distinct venture intentions (see Table 7). Results show that individuals in the second cluster display high levels of financial and numeracy skills, while individuals included in the third cluster exhibit strong entrepreneurial self-efficacy. These groups of individuals share some common characteristics which are intrinsically different among clusters, as it is confirmed by the test of homogeneity of variances. Besides, entrepreneurial intentions bias is examined using one-way between group analysis of variance (ANOVA). Table 8 shows that the three groups differ in the intention to start up a business according to the F-ratio ($F(2, 329)=7.829, p=0.00$). This finding fully confirms hypothesis 1.

Thus, entrepreneurial intentions are positively affected by self-efficacy and financial and numeracy skills. Although respondents performing poorly in financial literacy are clearly less inclined to start a new business, higher levels of financial literacy are not enough to propel entrepreneurial intentions. Instead, perceived entrepreneurial ability is exerting the most distinctive impact on the decision to initiate a new venture and it is a factor that clearly makes the difference. Consequently, these results confirm hypotheses H1a and H1b.

Table 7. Cluster and ANOVA analyses considering entrepreneurial self-efficacy and financial and numeracy skills

Final Cluster Centers

	Cluster		
	1	2	3
Basic Finlit	2.28	5.61	4.31
Advanced Finlit	1.90	5.00	2.74
Numerical ability	.43	1.24	.57
Risk literacy	.62	1.58	.87
ESE Searching	-.29935	-.09031	.25669
ESE Planning	-.42726	-.12306	.36117
ESE Marshalling	-.47701	-.17688	.46683
ESE Implementing	-.30449	-.00717	.18588

ANOVA

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Basic Finlit	262.738	2	1.121	329	234.406	.000
Advanced Finlit	270.211	2	1.189	329	227.336	.000
Numerical Ability	19.987	2	.795	329	25.143	.000
Risk literacy	26.050	2	1.029	329	25.323	.000
ESE Searching	8.439	2	.955	329	8.839	.000
ESE Planning	16.852	2	.904	329	18.649	.000
ESE Marshalling	25.429	2	.849	329	29.936	.000
ESE Implementing	5.980	2	.970	329	6.167	.002

**Number of Cases in each
Cluster**

	1	79.000
Cluster	2	119.000
	3	134.000
Valid		332.000
Missing		.000

Test of Homogeneity of Variances

Entrepreneurial Intention

Levene Statistic	df1	df2	Sig.
7.374	2	329	.001

Table 8. ANOVA analysis: entrepreneurial intentions differences between clusters

Descriptives

Entrepreneurial Intention

	N	Mean	Std. Dev	S.E.	95% Confidence Interval for Mean		Min	Max
					Lower	Upper		
1	79	.4430	.49992	.05625	.3311	.5550	.00	1.00
2	119	.5546	.49911	.04575	.4640	.6452	.00	1.00
3	134	.6642	.47405	.04095	.5832	.7452	.00	1.00
Total	332	.5723	.49549	.02719	.5188	.6258	.00	1.00

ANOVA

Entrepreneurial Intention

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.488	2	1.244	5.196	.006
Within Groups	78.777	329	.239		
Total	81.265	331			

Test of Homogeneity of Variances

Entrepreneurial Intention

Levene Statistic	df1	df2	Sig.
7.829	2	329	.000

We next use an ordered probit regression approach to address the remaining research questions. This methodology provides additional information since we take into account motivations (economic and social motivations), contextual factors (perception and role model) and personal traits (risk tolerance and impulsivity) as drivers to explain venture intentions. Likewise, three control variables (gender, age and employment status) are included in the study.

Table 9 presents the impact of these variables on entrepreneur intentions for the entire sample. The results show that motivations are the main factor for shaping venture intentions, being opportunity the predominant driver. Besides, having entrepreneurial family or friends also positively affects the intention. Personality traits or social demographic variables such as gender or being unemployed do not have any relevant impact on venture creation.

Table 9. Probit regression results on entrepreneurial intention and motivations, personal traits and contextual factors for the whole sample

Variables	All sample	
	Coefficient	S.E.
Male	-0.1488	(0.1748)
Age 25-34	-0.2052	(0.2963)
Age 35-44	-0.4005	(0.2995)
Age 45-54	-0.7446	** (0.3236)
Age 55-64	-2.2935	*** (0.6831)
Unemployed	0.0731	(0.2623)
Mot-Opportunity	2.0851	*** (0.2152)
Mot-Need	1.5060	*** (0.3092)
Mot-Social	1.2043	*** (0.4064)
Positive Percp	0.7274	*** (0.2156)
Role Model	0.0254	(0.1970)
TfR Medium	0.3455	(0.2936)
TfR High	0.2392	(0.2849)
Patience Medium	0.1686	(0.2624)
Patience High	0.1643	(0.2400)
Constant	-1.6628	*** (0.4382)
Observations		332
Wald chi2(15)		124
Pseudo R2		0.401
p-Value test Age coefficients=0		0.026

In order to study if there are differences between individuals with distinct traits, we propose to analyse this set of drivers within the three groups identified in the ANOVA and cluster analyses. Table 10 exhibits the impact of motivations, contextual factors and personal traits on each of the resulting clusters.

The decomposition of the sample according to the three different clusters of individuals provides valuable information. First, venture decisions among individuals without a high level of entrepreneurial self-efficacy or poor financial and numeracy skills are clearly connected with the identification of market opportunities and contextual factors (cluster 1). Second, unlike cluster 1, any kind of motivation is suitable to launch a new venture for individuals who are highly skilled in finance and numbers or have a strong sense of self-efficacy (clusters 2 and 3). Thus, these outcomes support hypotheses H2a and H2b. Regarding social motivations, this is the most

important factor influencing the decision to launch a new business for those with high levels of financial literacy, numerical ability and risk literacy (cluster 2). Therefore, these results fulfil hypothesis H2.

Third, contextual factors are playing a relevant role in inspiring a bigger entrepreneurial intention only for those individuals without cognitive skills or a high sense of self-efficacy. These individuals perceive a positive assessment of both being an entrepreneur and also their role models and therefore, this motivates them to comply with these perceptions. Besides, being unemployed exerts pressure and propels them to act. As a consequence, hypotheses H3, H3a and H3b would be only partially corroborated.

Fourth, personal traits such as tolerance for risk and impulsivity provide different results in our study. Individuals in cluster one are significantly more impulsive, as the results show the more patient they are, the less likely these individuals are to start up a business. On the other hand, patience positively influences individuals in cluster two and has no effect on those in the third cluster. This result is in line with other studies that provide evidence that greater cognitive ability is associated with more patience (Benjamin, Brown, & Shapiro, 2013). Thus, these findings only partially support hypothesis H4b. Concerning the third group characterized by individuals with a strong sense of self-efficacy, motivations are the main driver for entrepreneurial intentions but unlike the previous clusters, moderate risk tolerance does positively affect the probability of starting a business. Therefore, this result would reject hypothesis H4c. Consequently, these findings could explain the mixed results in previous research regarding impulsivity and propensity for risk and we can conclude that the fourth hypothesis of the study is only partially fulfilled.

Finally, due to the composition of our sample, an age bias is also detected. Whilst young people tend to have greater self-confidence, which could be affecting their entrepreneurial intentions, gender is not revealed as a decisive characteristic for venture intentions in any cluster. Hence, hypothesis H4a is rejected.

Table 10. Probit regression results on entrepreneurial intention and motivations, personal traits and contextual factors by clusters

Variables	Cluster 1		Cluster 2		Cluster 3	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Male	-0.1110	(0.6079)	-0.4665	(0.3345)	0.0069	(0.3310)
Age 25-34	-0.8166	(0.6141)	-1.1146	* (0.6210)	0.5754	(0.4616)
Age 35-44	-1.6719	** (0.7055)	-1.2158	* (0.6578)	0.8691	** (0.4424)
Age 45-54	-1.7099	** (0.8475)	-1.6468	** (0.6707)	0.0189	(0.5437)
Age 55-64	-2.7586	** (1.2323)	(omitted)		(omitted)	
Unemployed	1.5470	*** (0.5926)	-0.7553	(0.4772)	0.2509	(0.4671)
Mot-Opportunity	2.7081	*** (0.6103)	2.3307	*** (0.4103)	2.6549	*** (0.3717)
Mot-Need	1.1885	(0.7799)	1.9291	*** (0.7160)	1.6301	*** (0.5042)
Mot-Social	0.8945	(1.0278)	2.6885	*** (0.8883)	1.2747	*** (0.4943)
Positive Percp	1.8749	*** (0.6031)	0.4545	(0.3737)	0.3533	(0.4109)
Role Model	1.5619	*** (0.5790)	-0.4937	(0.3567)	-0.2033	(0.2999)
TfR Medium	0.4523	(0.4965)	0.2445	(0.5720)	1.0433	** (0.4545)
TfR High	0.2042	(0.5246)	0.0115	(0.5403)	0.5499	(0.4330)
Patience Medium	-1.0807	* (0.6602)	1.0561	** (0.4473)	0.1660	(0.5520)
Patience High	-1.2172	* (0.6583)	0.9362	** (0.4568)	0.1440	(0.4488)
Constant	-2.5700	*** (0.8395)	-0.7699	(0.7675)	-2.6453	*** (0.7394)
Observations		79		116		130
Wald chi2(14)		39.64		44.74		77.84
Pseudo R2		0.535		0.416		0.428
p-Value test Age coefficients=0		0.08		0.099		0.123

Notes:

^a Variables with no observations in the cluster have been omitted.

^b *** indicate significance at the 1% level; ** indicate significance at the 5% level; and * indicate significance at the 10% level.

Conclusions and future directions

The purpose of this investigation is twofold. First is to cluster individuals from subjective and objective variables related to entrepreneurship. The objective factor is related to cognitive skills such as financial knowledge, numerical ability and risk literacy and the subjective variable is the widely studied entrepreneurial self-efficacy. The second goal of this study is to examine if drivers of venture intentions may be different based on the characteristics of individuals. Hence, we empirically assess the influence of motivations, contextual factors and personal traits on entrepreneurial intentions in the three resulting clusters. As a novelty, we have integrated in the study the influence of the following entrepreneurial cognitive skills: financial literacy, numerical ability and risk assessment capacity. Entrepreneurs face complex decisions daily and need to be well equipped in order to make the best decisions for their business. And the link between those elements and venture intentions is still poorly explored in venture intention research (Oseifuah, 2015; Wise, 2013). We choose the combination of these variables since creating a business requires financial knowledge (Timmons & Spinelli, 2004), numerical ability to process information and make complex optimal decisions and certain level of risk literacy in order to assess risk correctly. These variables are essential components of business decisions and, consequently, individuals with the intention to start up a business should be prepared to embrace them effectively.

Our findings confirm the previous empirical works which supports that motivations are the main driving factor influencing students to become entrepreneurs. Personal motivations have a crucial impact on the launching of new ventures because the intentions are the consequence of both the desirability and the necessity to become an entrepreneur. However, the results also suggest that entrepreneurial intentions may have different drivers depending on the characteristics of individuals related to cognitive skills or the strong belief in their capabilities.

Three different profiles and different inclinations to venture creation among individuals emerge from the analysis. In all three clusters, entrepreneurial intentions are mainly driven by the detection of opportunities to achieve financial freedom or higher income; dissatisfaction with current job or lack of other employment options; or willingness to make a difference by improving society. Despite this, the results also demonstrate that social motivations arise mainly from individuals with good cognitive skills or with a high sense of their entrepreneurial abilities. Likewise, our research show that venture intentions among students with inferior skills and poor ESE are manifestly lower. Given their characteristics, entrepreneurship would be closely related to economic necessity and a vulnerable labour situation. For these individuals, contextual factors play a leading role. In particular, support from social circles would become a critical factor in improving the perceived ability to become self-employed. The influence of perceptions is also reflected in their attitudes toward entrepreneurship. Thus, a positive assessment regarding the social image of entrepreneurship clearly propels venture intentions.

Finally, the study also provides information about personal traits such impulsivity and risk tolerance. While impulsive respondents have less chances to start up a business if they have inferior cognitive skills and poor ESE, probabilities are higher when they have good cognitive skills. Consequently, impulsive versus patient individuals opens a debate for further entrepreneurship research. Moreover, risk tolerance impacts on intention only when respondents have moderate tolerance for risk and high self-efficacy. Thus, clustering the sample provides evidence on different drivers propelling entrepreneurial intentions based on the characteristics of individuals.

In summary, our research provides empirical evidence on the significance of financial literacy and other numeracy skills in fostering entrepreneurial intentions, therefore going beyond entrepreneurship education programmes. Consequently, this set of cognitive skills could be a very

significant instrument in promoting a greater entrepreneurial culture in society in absence of entrepreneurial self-efficacy. The inclusion of certain financial contents in the education system would be a remarkable action to be taken by governments and policy makers. Our study also highlights how impulsivity and risk tolerance are critical attitudes to understanding entrepreneurial behaviour and that not just any option of motivation is always a driver for venture intentions.

The main limitation of the study is that it would be necessary to check the relationship between numeracy processes, financial skills, personal attitudes and contextual factors in other different environments, as well as, including managerial entrepreneurial skills apart from financial and numeracy skills.

Declarations

The Authors declare that there is no conflict of interest.

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