The Role of Cognitive Style and Risk Preference on Entrepreneurial Self-Efficacy and Entrepreneurial Intentions

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The purpose of the current study is to address the distinctive roles of cognitive style and risk preference on four types of entrepreneurial self-efficacy and entrepreneurial intentions. More specifically, we examine how both cognitive style and risk preference separately and interactively contribute to an individual's assessment of his/her own skills and abilities as well as to his/her own entrepreneurial intentions. This study investigated these relationships using an international sample of 528 entrepreneurial students across three universities. Results indicated that individuals with a high risk preference had higher levels of entrepreneurial intentions and opportunity-identification efficacy, whereas individuals with a low risk preference had higher levels of relationship efficacy, and tolerance efficacy. Individuals with an intuitive cognitive style were also found to have lower perceived self-efficacy concerning the establishment of relationship with investors, the economic management of the new venture, and their capacity to tolerate ambiguity. However, intuitive individuals who had a high preference for risk exhibited higher levels of opportunity identification efficacy. Finally, contrary to our final hypothesis, analytic individuals with a low preference for risk had higher levels of relationship and tolerance self-efficacy than intuitive individuals with a high risk preference. Implications of these findings and directions for future research are discussed.

The question of what separates those who choose to pursue entrepreneurial pursuits from those who opt not to be entrepreneurs is an intriguing issue, and investigating the role of individual differences in entrepreneurial behavior and intentions is a growing field of research. While increased understanding of the individual-level constructs that may contribute to successful entrepreneurial endeavors appears to be an essential endeavor, prior research has only begun to scratch the surface of this pursuit (Markman, Balkin, & Baron, 2002; Zhao, Seibert, & Hills, 2005). The purpose of the current study is to examine in-depth the role of two key individual differences and entrepreneurial motivation and behavior. More specifically, we examine how cognitive style and risk preference—both separately and interactively—contribute to an individual's entrepreneurial efficacy as well as to his/her own entrepreneurial intentions.

The current study examines the specific ways in which cognitive style and risk preference may affect entrepreneurial self-efficacy beliefs and entrepreneurial intentions. Drawing upon different conceptual frameworks from the literature on psychology and entrepreneurship, we formulate specific hypotheses concerning the relationships among these constructs. We then present the methodology used to test such hypotheses and the results we found. Since self-efficacy is a task-specific construct, we opted to test the effects of cognitive style and risk preference on four task-specific types of efficacy that have been found to relate to overall entrepreneurial efficacy. Finally, we discuss our findings in the light of existent conceptualizations of entrepreneurial risk and cognition.

Theoretical Background

The Unique Role of Cognitive Style

Researchers have postulated that a focus on the role of cognition has the potential to make a significant contribution to the study of entrepreneurship (Allinson, Chell, & Hayes, 2000; Baron, 1998; Mitchell et al., 2002). As defined by Mitchell et al. (2002), "entrepreneurial cognitions are the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth" (p. 97). Cognition research offers us multiple mechanisms, both theory-driven and empirically robust, to build a deeper, richer understanding of how we learn to see opportunities and further assess our skills and abilities along the entrepreneurial intentions process. An individual's cognitive style may influence his/her preferences for different types of learning, knowledge gathering, information processing, and decision making—many of the critical behaviors and actions an entrepreneur is confronted with on a daily basis. As individuals process information, they develop a sense of how capable they are to engage in a course of action (self-efficacy) and how likely it is that they will engage in the action (intention).

To date, a number of researchers have presented potential conceptualizations and dimensions of cognition and cognitive style (e.g., Kahneman, 2003; Nickerson, Perkins, & Smith, 1985; Ornstein, 1977). Early on, Ornstein (1977) referred to two modes of awareness that reflect the rational and intuitive sides of an individual. This super-ordinate dimension of cognitive style is identified as intuition-analysis (Allison et al, 2000). Drawing upon the work of a number of theorists and empirical researchers who have argued that the dimensions of cognitive style can be ordered within a unitary framework, Allinson & Hayes (1996) reported the development and validation of a new instrument, the Cognitive Style Index (CSI). Based on research with the CSI, Allinson, Chell, and Hayes (2000) found that people showing entrepreneurial behavior tend to score high on the intuition pole of the intuition-analysis dimension. Such finding is consistent with the description of a specific type of entrepreneur—the 'expert idea generator'—which has been characterized as predominantly intuitive (Miner, 1997). Additionally, an individual's cognitive style may influence their preference for different types of learning, knowledge gathering, information processing, and decision making, many of the critical intentions and actions an entrepreneur is confronted with on a daily basis.

Moreover, the assertion that entrepreneurs generally present an intuitive cognitive style is also supported by research on entrepreneurial cognition. In particular, this line of research has suggested that cognitive heuristics and biases may explain the risky ideas entrepreneurs pursue (L. Busenitz & Barney, 1997; L. W. Busenitz, 1999; Palich & Bagby, 1995). Heuristics and biases, indeed, are typical of our intuitive system, i.e., they could be described as cognitive tools of human intuition (Kahneman, 2003; Kahneman, Slovic, & Tversky, 1982). The assertion that entrepreneurs make more use of cognitive heuristics—such as overconfidence, representativeness, law of small numbers, etc.—than nonentrepreneurs, implies therefore that entrepreneurs are more intuitive than nonentrepreneurs. The explanation usually given (or simply assumed) in the literature on entrepreneurial cognition is that the use of cognitive heuristics enables fast decision making and reduces risk perception, which in turn would explain the risky ideas entrepreneurs pursue (L. Busenitz & Barney, 1997; L. W. Busenitz, 1999; Keh, Foo, & Lim, 2002; Palich & Bagby, 1995; Simon, Houghton, & Aquino, 2000). In this sense, intuitive thinking seems to create a bias toward action that favors the decision of starting a venture. If this is true, we can hypothesize that intuitive thinking will be associated with higher levels of entrepreneurial intentionality.

H1: Individuals having an intuitive cognitive style will exhibit higher levels of entrepreneurial intentions than individuals having an analytical cognitive style.

Impact of Cognitive Style on Entrepreneurial Self-Efficacy

Another important factor that may impact intentionality and risk taking is an individual's belief in his/her own capacity of executing the behavior, i.e., his/her perceived self-efficacy (I. Ajzen, 2002; N. Krueger, 1993; N. Krueger &

Dickson, 1994). Self-efficacy is defined as "an individual's belief in one's capability to organize and execute the courses of action required to produce given attainments" (Bandura, 1977, p. 3). The self-efficacy construct is derived from social cognitive theory, which states that human functioning is a result of the interplay between personal, behavioral, and environmental influences (Bandura, 1986). Social cognitive theory argues for the importance of human agency, viewing an individual as being influential in his or her own development. In keeping with this view, an individual is able to exercise control over his or her own thoughts, feelings, and actions, and this control is heavily influenced by an individual's view of self. Meta-analytic investigations have found self-efficacy to consistently and positively relate to performance across a variety of work-related contexts (Stajkovic & Luthans, 1998). In the field of entrepreneurship, self-efficacy has theoretically proposed to lead to entrepreneurial intentions and behavior (Boyd & Vozikis, 1994), and has been empirically found to relate positively to entrepreneurial intentions (Chen, Greene, & Crick, 1998).

Given the importance of self-efficacy, the examination of what individual level factors may impact efficacy perceptions continues to be an important task. To date, research has found self-efficacy perceptions to relate to a wide variety of individual differences, including conscientiousness, extraversion, openness to experience, and emotional stability (Judge & Ilies, 2002), as well as learning goal orientation, need for achievement, and locus of control (Phillips & Gully, 1997), among others. The examination of individual differences that impact entrepreneurial self-efficacy has received more limited attention. More recently, Zhao, Seibert, and Hills (2005) found entrepreneurial experience and risk propensity to positively relate to entrepreneurial self-efficacy. Our current study aims to build upon this past research and contribute to the understanding of the antecedents that lead to entrepreneurial self-efficacy perceptions.

Self-efficacy as first conceptualized by Bandura (1986) is a task-specific construct, meaning it is best assessed with regard to specific tasks and behaviors. However, since "entrepreneurial self-efficacy" is more of a broad conceptualization, we predicted it would be composed of several task-specific types of self-efficacy (see research of DeNoble et al., 1999 and Chen et al., 1998 for review of facets of entrepreneurial self-efficacy). It is these task-specific types of efficacy that may be differentially related to cognitive style. Based on understanding and insight into the entrepreneurial process, we identified four potential types of task-specific self-efficacy that would fall under the broader umbrella of "entrepreneurial efficacy" that are drawn upon the work of DeNoble et al. (1999) and Chen et al. (1998):

- *Opportunity-Identification Self-Efficacy:* the individual's perceived self-efficacy concerning his/her capacities to identify and develop new product and market opportunities.
- *Relationship Self-Efficacy:* the individual's perceived self-efficacy concerning his/her capacities to build relationships, especially with potential investors and people who are connected to capital sources.
- *Managerial Self-Efficacy:* the individual's perceived self-efficacy concerning his/her managerial capacities, especially economic and financial management.
- *Tolerance Self-Efficacy:* the individual's perceived self-efficacy concerning his/her capacities to work productively under conditions of stress, pressure, conflict, and change.

Olson (1995) introduced the notion that different approaches to information processing are more effective at different phases of the entrepreneurial life cycle. For example, when an entrepreneur is immersed in opportunity identification (e.g., attempting to develop a new product, service, or technology application), his/her thinking tends to be predominantly intuitive (Olson, 1995). Similarly, in later stages of the process as the entrepreneur shifts to evaluation of market opportunities, and the planning and implementation of the new venture, his/her information processing is predominantly rational and analytic (Cole, Field, & Harris, 2004; Olson, 1995). Since the different dimensions of self-efficacy may become more salient or relevant to different

phases of the entrepreneurial process (Kickul, Gundry, & Whitcanack, 2005), we hypothesize the following:

H2a: Individuals having an intuitive cognitive style will score higher in the types of self-efficacy that refer to the early stage of the entrepreneurial process (opportunity-identification efficacy) than those with an analytical cognitive style.

H2b: Individuals having an intuitive cognitive style will score lower in the dimensions of perceived entrepreneurial self-efficacy that refer to the latter stages of the entrepreneurial process (relationship self-efficacy, managerial self-efficacy and tolerance self-efficacy) than those with an analytical cognitive style.

The Distinct Role of Risk Preference

In addition to cognitive style, another possibly related but separate factor at the individual level is one's own preference for risk. Risk preferences consist of a general tendency, or the general desire, to pursue or avoid risks (Sitkin & Pablo, 1992). They are viewed as a determinant of risk propensity, which is defined as an individual's general tendency toward either taking or avoiding risk within a particular kind of decision context (Mullins & Forlani, 2005; Sitkin & Pablo, 1992).

This means that when faced with different situations, an individual will likely show differing risk propensities; even if his/her risk preferences do not change a great deal. At the same time, different individuals faced with the same situation may present different risk propensities/preferences. Thus, an individual's risk preferences correspond to his "risk disposition", which, if combined with contextual factors, is likely a good predictor of what his/her attitudes toward risk will be for a specific kind of context.

Throughout this text the terms risk preference and risk propensity are used almost interchangeably to designate an individual's general tendency toward either taking or avoiding risk. While risk preference more specifically describes the measure we used (from the PSED) risk propensity is the term used more frequently in the literature (although there is no consensus about how to measure this construct)[i].

In Sitkin and Pablo's (1992) conceptual model, for example, risk propensity has a preponderant role in influencing risk perception and risk behavior. The same assumption is shared by economic models in which risk seeking individuals become entrepreneurs and risk averse individuals become employees (e.g., Kihlstrom & Laffont, 1979).

Thus, in order to test those assumptions and fully examine the role of risk preferences on the pathway to entrepreneurship, we hypothesize:

H3: Individuals having a high preference for risk will exhibit higher levels of entrepreneurial intentions than individuals having a low preference for risk.

On the other hand, the relationship between risk preference and self-efficacy has been explored in the literature on entrepreneurship on a very limited basis. For instance, Krueger and Dickson (1994) showed that an increase in perceived self-efficacy leads to an increase in risk taking, by affecting perceptions of opportunities and threats. Similarly, Sitkin and Pablo (1992) suggested that risk-averse decision makers are more likely to attend to and weigh negative outcomes, overestimating threats and underestimating opportunities, whereas risk-seeking decision makers tend to attend to and weigh positive outcomes, overestimating opportunities and underestimating threats. Most recently, Zhao et al (2005) examined the relationship of risk propensity to entrepreneurial self-efficacy, finding a positive relationship. In this sense, it is unclear if risk preferences affect perceptions of self-efficacy, or if instead perceptions of self-efficacy affect risk preferences. Thus, without presuming causality, but in order to simply investigate the relationship between risk preference and self-efficacy, we state the following:

H4: Individuals having a high preference for risk will exhibit higher levels of all four types of entrepreneurial self-efficacy (opportunity-identification self-efficacy, relationship self-efficacy, managerial self-efficacy, and tolerance self-efficacy) than individuals having a low preference for risk.

The Dual – Interactive Role of Cognition and Risk Preferences on Self-Efficacy and Intentionality

As stated by MacCrimmon and Wehrung (1985), "Risk-taking has two components: the riskiness of situations and the willingness of people to take risks" (p.1). By combining cognitive style and risk preferences, our attempt is to take into account these two components of risk-taking behavior.

Stated simply, cognition is the reason why situations look more or less risky. Hogarth (1987) has clarified this point: "from a logical viewpoint, it is absurd to make a statement of the kind that one situation or venture is more uncertain than another; it is simply you who are more uncertain about one of the situations" (Hogarth, 1987, p. 13). Indeed, the author argues that it is our limited information-processing capacities that are the source of uncertainty. Analyzing cognitive style gives us a clue of how individuals process (transform, reduce, elaborate, store, recover and use) the sensory input they receive from the environment (situational factors). On the other hand, risk preferences are by definition "the willingness of people to take risks."

Together, cognitive style and risk preferences may influence the self-efficacy and the intentions of nascent and potential entrepreneurs in ways that have not yet been explored. Drawing once again upon the theoretical framework underlying self-efficacy beliefs, social-cognitive theory states that the primary source of self-efficacy beliefs is the process of enactive mastery (Bandura, 1986;1997). It is almost definitional to state, for example, that analytics tend to develop different skills through mastery experiences when compared to intuitives – enhancing therefore different types of self-efficacy. One could also hypothesize that different risk preferences are associated with different types of self-efficacy, because risk preferences may have influenced an individual's past choices and then his/her previous mastery experience, affecting the individual's beliefs about what he/she is or is not capable of.

At this point, it may be useful to think about the different combinations of risk preference and cognitive style. For instance, from the hypotheses early stated we can infer that intuitive individuals with high preference for risk will present the highest levels of entrepreneurial intentions and the strongest beliefs concerning their capacity of identifying and exploiting opportunities. Inversely, we can imagine that analytic individuals with low preference for risk will exhibit the lowest levels of entrepreneurial intentions and will not feel so confident in their capacity to recognize opportunities. In order to fully test those hypotheses, we state:

H5: Intuitive individuals having a high preference for risk will exhibit higher levels of entrepreneurial intentions than analytic individuals having a low preference for risk.

Since different task-specific types of self-efficacy relate to different stages of the venture process (Kickul, Gundry, & Whitcanack, 2005), it seems useful to investigate more in detail the dual role of cognitive style and risk preference on the different task-specific types of self-efficacy. As indicated earlier, previous research has shown that analytics and intuitives have different aptitudes that are required in different phases of the venture process. In particular, it has been pointed out that intuition is more relevant to the activities executed in the earlier phases of the process (i.e., opportunity identification), whereas analysis is preponderant in the tasks executed in the later stages of implementation and management of the new venture (N. F. Krueger & Kickul, 2006; Olson, 1995). Based on this literature, we hypothesize:

H6a: Intuitive individuals having a high preference for risk will exhibit higher levels of opportunity identification efficacy than analytic individuals having a low preference for risk.

H6b: Analytic individuals having a high preference for risk will exhibit higher levels of relationship efficacy, managerial self-efficacy and tolerance self-efficacy than intuitive individuals having a low preference for risk.

METHODOLOGY

Participants

Participants were 528 university students enrolled in entrepreneurship programs across three countries (Russian, Norway and Finland). In Russia, 324 questionnaires were gathered from students of the Baltic State Technical University in St. Petersburg. From them, 226 third-year students were enrolled in the bachelor Business Administration program with the International Industry Management Department (IIMD), 20 students were enrolled in the Master of Business Administration program and 76 students were taking the second Master of Business degree on the same IIMD (these are typically students from the engineering Departments of the University, pursuing an additional degree in Economy). Our questionnaire was administrated in December 2004. After controlling for missing values, seven questionnaires were removed due to a high percentage of missing values. Totally, 317 questionnaires obtained from Russian students were entered into the analysis. The average student age was 21.5 years, with 54% females. Twenty-three percent reported to have parents who had been self-employed, while only 7% had been self-employed personally. Forty six percent of the respondents had never been employed earlier, and about the same proportion had between one and three years of work experience.

In Norway, the data for this study was gathered from 111 third year Business administration bachelor students within Bode Graduate School of Business. It was administered as a hand-out in a lesson in a method course for third-year business bachelor students. The average student age was 28 years, with 45% being female. Forty percent reported to have parents who had been self-employed, and 17% had been self-employed personally.

The Finnish students were 100 undergraduates enrolled in the three year Bachelor of Business Administration (BBA) program at the Helsinki School of Economics - Mikkeli Campus. The questionnaires were administrated to students enrolled in a Management course given by one of the co-authors. The average student age was 22 years, with 43% being female. Fifty one percent reported to have parents who had been self-employed, and only 10% had been self-employed personally. Forty six percent of respondents have never been employed earlier, and about the same proportion had between one and five years of work employment experience.

From this brief description it is evident that while in all three cases the main group of respondents are third-year bachelor business students, a number of differences were noticed. Norwegian students were older than both Finnish and Russian students, and that may explain the higher percent of those who have tried self-employment. A higher proportion of the Norwegian and the Finnish students had self-employed parents than in the Russian sample. This may be due to the fact that entrepreneurial activities in Russia were allowed only 15 years ago. Finally, slightly more women are found among Russian students than among the samples from the other two countries.

Participants completed measures of self-efficacy, entrepreneurial intentions, cognitive style, as well as risk preferences. Prior to the main data collection, questionnaire was translated to Russian and Norwegian and tested on a smaller number of respondents. Finnish students received an English version of questionnaire. All Finnish students who participated in the project were taking a management course in English. Hence, it was assumed they could answer an English version. It was a challenge to find the correct Russian and Norwegian translation and to take into consideration all cultural and language nuances. (For example, in some cases the same expression translated from English to Russian had a slightly different meaning than the same expression translated from English to Norwegian). In order to overcome these difficulties the authors had a number of telephone conferences. The questionnaires were pretested on colleagues and students in order to discuss the wording and the meaning of the questions.

Measures

Entrepreneurial Intentions

Entrepreneurial intentions were measured by 9 items adopted from Krueger, Reilly, & Carsrud (2000) concerning intentions to start a

business. Responses were given along a 7-point scale from 1=very unlikely to 7=very likely, except for the first item, which ranged from 1=would prefer to be employed by someone to 7=would prefer to be self-employed. Another sample item read: "I plan to start and run my own business in the near future." The final scale yielded a Cronbach's alpha of .92 and was unidimensional.

Cognitive Style

Participants completed the Cognitive Style Index (CSI) (Allinson & Hayes, 1996), a 38-item measure that has a true-false response mode (true coded as '1" and false coded as '0'). The index identifies an individual's cognitive style as being either analyst or intuitive (dichotomized measurement). Allinson & Hayes (1996) found discriminant validity for their instrument and later work on the CSI by Allinson, Chell, and Hayes (2000) found that people showing entrepreneurial behavior tend to be intuitive as opposed to analytic on the CSI measure.

Entrepreneurial Self-Efficacy

A total of 18 items were included in the entrepreneurial self-efficacy scales: developing new product and market opportunities (DeNoble, Jung, & Ehrlich, 1999), economic management (Anna, Chandler, Jansen, & Mero, 2000), initiating investor relationships, and tolerance for ambiguity (DeNoble, Jung, & Ehrlich, 1999). One self-constructed item was added to the DeNoble et al. (1999) investor relationship scale. The overall Cronbach alpha reliability of the self-efficacy was .93. A factor analysis was conducted using the Principal Axis Factoring method with oblique rotation (oblimin): a total of four factors emerged, confirming the four types of task-specific self-efficacy we expected. Since all items presented loadings above .5, they were all retained, and factor scores were used in the subsequent analysis. As previously discussed, the four task-specific types of Entrepreneurial Self-Efficacy were named and interpreted as follows:

- Opportunity-Identification Self-Efficacy: the individual's perceived self-efficacy concerning his/her capacities to identify and develop new product and market opportunities.
- Relationship Self-Efficacy: the individual's perceived self-efficacy concerning his/her capacities to build relationships, especially with potential investors and people who are connected to capital sources.
- Managerial Self-Efficacy: the individual's perceived self-efficacy concerning his/her managerial capacities, especially economic and financial management.
- Tolerance Self-Efficacy: the individual's perceived self-efficacy concerning his/her capacities to work productively under conditions of stress, pressure, conflict, and change.

Risk Preference

Past research has used a great variety of risk measures (e.g., MacCrimmon & Wehrung, 1985) in order to assess risk preference and risk propensity, without making a clear distinction between them. In our research, risk preference was assessed using the same measure found in The Panel Study of Entrepreneurial Dynamics (PSED) (Reynolds, 2000) survey. To represent this preference the PSED provides a categorical measure of the risk-return preference. Specifically, the PSED measure asks: "Assuming you are the sole owner, which situation would you prefer? 1) A business that would provide a good living, but with little risk of failure, and little likelihood of making you a millionaire, or 2) A business that was much more likely to make you a millionaire but had a much higher chance of going bankrupt", which were coded "0" and "1" respectively for the two types of new businesses with different risk/return (alpha = low risk, "0"; beta = high risk, "1"). Within our own sample, approximately 72% were risk-averse (chose the alpha category).

Results

In order to analyze all of our different hypotheses, we conducted a series of tests that ranged from simple t-tests (for the main effects) to multivariate analyses of variance (MANOVA) that considered the interactive effects of cognitive style and risk preference on the four types of self-efficacy and entrepreneurial

intentions. For each of the hypotheses, we mention the tests and findings based on that type and level of analyses below.

To examine our first hypothesis, we conducted a t-test to determine whether individuals having an intuitive cognitive style would have higher levels of entrepreneurial intentions than individuals having a more analytic cognitive style. We did not find support for hypothesis 1 ($t = -.94$, p = ns). In fact, analytics had a slightly higher score on intentionality (mean = 4.05, SD 1.21) than intuitives (mean = 3.95, SD = 1.24).

In investigating both hypotheses 2a and 2b using MANOVA (dependent variables were all four dimensions of self-efficacy), we found partial support for intuitive cognitive style on several of our dimensions. More specifically, while hypothesis 2a was not supported (no significant differences between intuitives and analytics on opportunity identification; $F = 1.32$, p = ns), we did find full support of hypothesis 2b in that intuitives scored lower in the dimensions of perceived entrepreneurial self-efficacy that refer to the latter stages of the entrepreneurial process (i.e., relationship self-efficacy, $F = 6.92$, $p<.05$; managerial self-efficacy, $F = 5.39$, $p<.05$; and tolerance self-efficacy, $F = 8.03$, $p<.05$) than those with an analytical cognitive style. Table 1 reveals all of the means for each of the dimensions by type of cognitive style.

Table 1
Descriptive Statistics (Cognitive Style)

Self-Efficacy (SE)	*Cognitive style*	*Mean*	*Std. Deviation*
SE Opportunity	Intuitives	.04	.97
	Analytics	-.05	.90
SE Relationships	Intuitives	-.11	.92
	Analytics	.11	.97
SE Management	Intuitives	-.09	.93
	Analytics	.10	.99
SE Tolerance Ambiguity	Intuitives	-.11	.93
	Analytics	.12	.98

Hypothesis 3 was also supported in that results from our t-tests revealed that individuals having a high preference for risk exhibited higher levels of entrepreneurial intentions than individuals having a low preference for risk ($t = 5.04$, $p<.05$; high risk mean = 4.45 (SD = 1.16); low risk mean = 3.85 (SD = 1.20)).

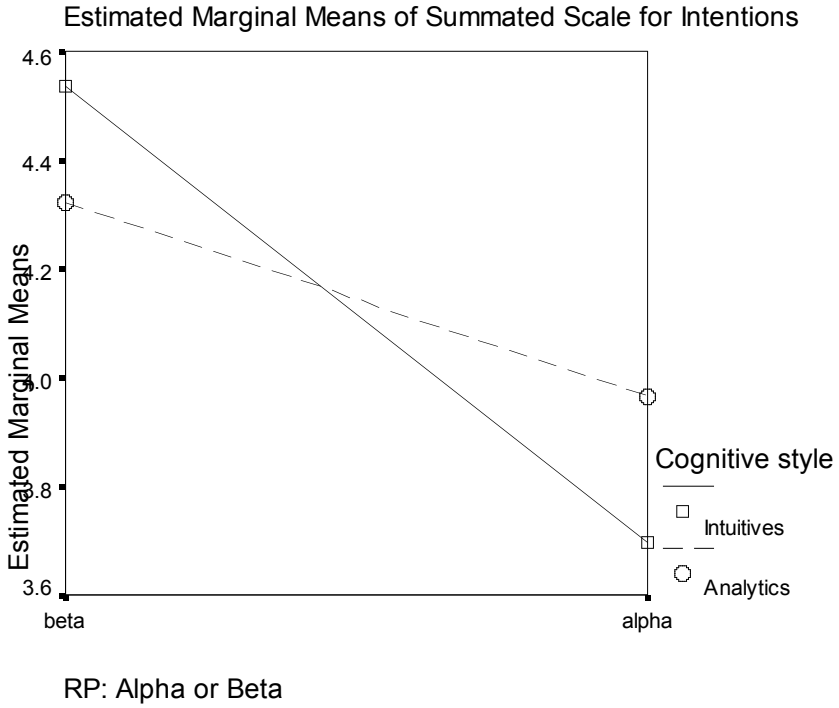
As for hypothesis 4, we found partial support. As shown in Table 2 and in our MANOVA analyses, individuals having a high preference for risk exhibited higher levels of entrepreneurial self-efficacy for opportunity-identification ($F = 22.49$, $p<.05$), relationship ($F = 18.69$, $p<.05$), and tolerance ($F= 27.44$, $p<.05$) than individuals having a low preference for risk. There were, however, no significant differences between the two types of risk preferences on our managerial self-efficacy dimension ($F = 2.49$, p = ns).

In examining the dual and interactive role of cognitive style and risk preference on intentionality and self-efficacy, we found mixed support for hypotheses 5, 6a, and 6b. Analysis of Variance (ANOVA) results revealed that intuitive individuals having a high preference for risk were found to have higher levels of entrepreneurial intentions (mean = 4.56, SD =.14) than analytic individuals having a low preference for risk (mean = 3.98, SD = .08; $F = 4.96$, $p<.05$). To determine if these mean differences were significant, we conducted simple t-tests. This t-test revealed a discernable difference between the above two means (overall support for hypothesis 5). Figure 1 depicts the interaction and plotting of the means for entrepreneurial intentions by cognitive style and risk preference.

Table 2
Descriptive Statistics (Risk Preference)

Self-Efficacy (SE)	*RP: Alpha or Beta*	*Mean*	*Std. Deviation*
SE Opportunity	beta	.32	0.99
	alpha	-.11	0.89
SE Relationships	beta	-.30	1.05
	alpha	.10	0.89
SE Management	beta	-.11	1.02
	alpha	.04	0.95
SE Tolerance Ambiguity	beta	-.36	0.92
	alpha	.13	0.94

Figure 1



preference for risk (please see Table 3 for means.

Finally, in investigating hypothesis 6a, we found that intuitive individuals having a high preference for risk exhibited higher levels of opportunity identification efficacy (mean = .46, SD = .93) than analytic individuals having a low preference for risk (mean = -.09, SD = .85; F = 3.95, p<.05). Follow-up simple t-tests revealed that these two means are indeed significant (t = 4.67, p<.05; see also Figure 2).

As for hypothesis 6b, analytic individuals having a high preference for risk did not exhibit higher levels of relationship efficacy, managerial self-efficacy and tolerance self-efficacy than intuitive individuals having a low

Figure 2

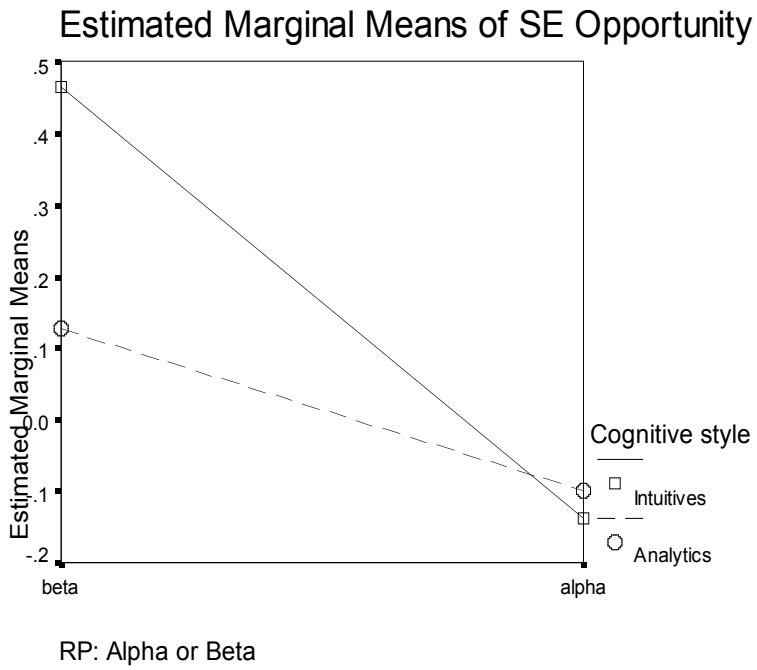


Table 3
Descriptive Statistics (Cognitive Style & Risk Preference)

Self-Efficacy (SE)	*Cognitive style*	*RP: Alpha or Beta*	*Mean*	*Std. Deviation*
SE Opportunity	Intuitives	beta	.46	0.93
		alpha	-.13	0.93
	Analytics	beta	.12	1.07
		alpha	-.09	0.85
SE Relationships	Intuitives	beta	-.51	0.89
		alpha	.06	0.87
	Analytics	beta	.01	1.20
		alpha	.13	0.90
SE Management	Intuitives	beta	-.17	0.98
		alpha	-.05	0.91
	Analytics	beta	-.01	1.07
		alpha	.14	0.97
SE Tolerance Ambiguity	Intuitives	beta	-.56	0.75
		alpha	.08	0.93
	Analytics	beta	-.07	1.08
		alpha	.18	0.94

Although the interactions were significant for relationship self-efficacy ($F = 5.60$, $p<.05$), and tolerance self-efficacy ($F = 3.94$, $p<.05$), we found unplanned effects that did not support hypothesis 6b. More specifically, as shown in Figures 3 and 4, analytic individuals with a low preference for risk had higher levels of relationship and tolerance self-efficacy than intuitive individuals with a high risk preference. Follow-up simple t-tests revealed discernable differences for relationship self-efficacy ($t = 5.36$, $p<.05$) and tolerance self-efficacy ($t = 6.20$, $p<.05$).

Figure 3

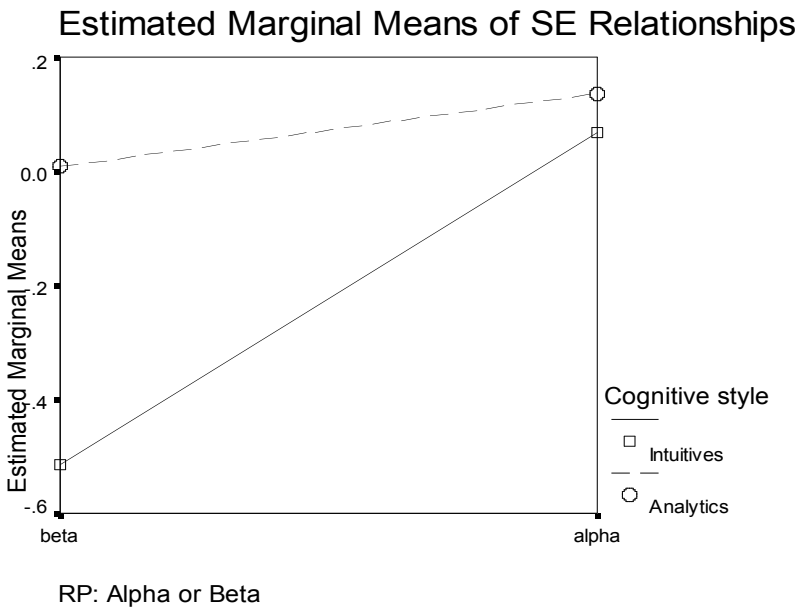
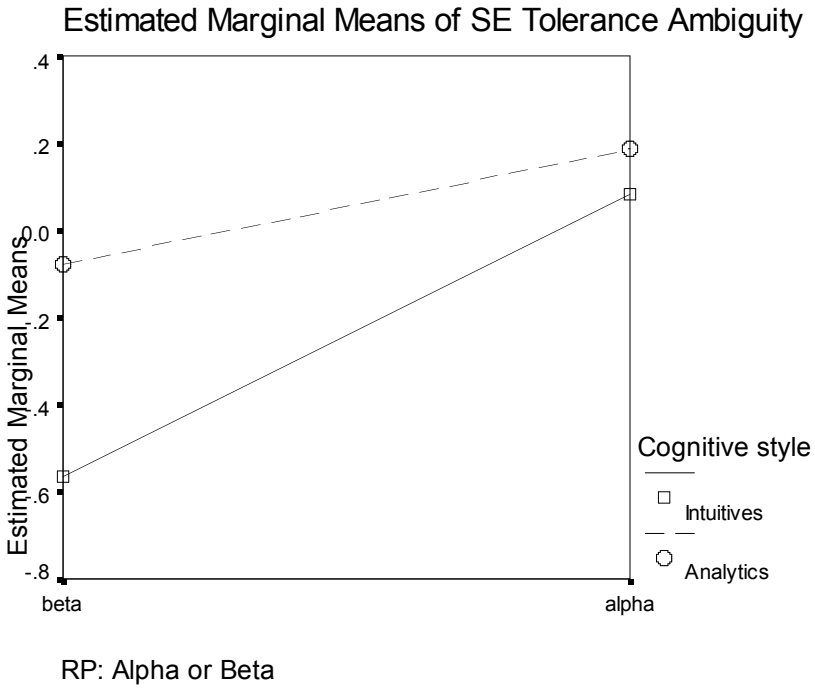


Figure 4



Discussion

Summary of Findings

The results of this study suggest that individuals with a high risk preference have higher levels of entrepreneurial intentions and opportunity-seeking self-efficacy, whereas individuals with a low risk preference had higher levels of relationship efficacy, and tolerance efficacy. Our results also show that intuitives tend to have lower perceived self-efficacy concerning the establishment of relationship with investors, the economic management of the new venture, and their capacity to tolerate ambiguity and stress. In addition, these findings are consistent with the general assertion that analytics and intuitives have different aptitudes that are required in different phases of the venture process (N. F. Krueger & Kickul, 2006; Olson, 1995)—they differ at least in their perceptions of their own aptitudes.

Our results were not supported when examining the general assertion that individuals having an intuitive cognitive style will exhibit higher levels of entrepreneurial intentions than individuals having an analytic cognitive style. Instead, it seems that risk preference plays a more preponderant role on entrepreneurial intentions. This is particularly illustrated by Figure 1, where (a) intuitives with high risk preferences have significantly higher intentions of starting their own business than analytics with high risk preferences, and (b) intuitives with low risk preferences have significantly lower intentions of starting their own business than analytics with low risk preferences. A possible explanation in need of additional research is that analytics tend to process more information before making decisions or evaluations, and are therefore less susceptible to their predispositions toward risk than are intuitives.

Together, these findings support our hypotheses concerning the dual and interactive effect of risk preference and cognitive style on intentionality. We found that intuitive individuals having a high preference for risk exhibited higher levels of opportunity identification efficacy. However, contrary to our final hypothesis, analytic individuals with a low preference for risk had higher levels of relationship and tolerance self-efficacy than intuitive individuals with a high risk preference. Given the complexities of our results, we discuss in further detail our findings concerning each hypothesis in the following section.

Discussion of Findings for Each Hypothesis

The mixed results we found across our six general hypotheses necessitate a more detailed discussion. In the following paragraphs, we discuss the findings and implications for each hypothesis, made in the light of the literature on entrepreneurial risk and cognition. Finally, we also discuss the limitations and practical implications of our study.

First, our data did not support hypothesis 1, i.e., that individuals having an intuitive cognitive style will exhibit higher levels of entrepreneurial intentions than individuals with an analytical cognitive style. This suggests that cognitive style alone is not a strong determinant of entrepreneurial intentions. This hypothesis was formulated based on the argument that entrepreneurs seem to present stronger intuitive thinking, characterized by an intensive use of cognitive heuristics (L. Busenitz & Barney, 1997; L. W. Busenitz, 1999; Palich & Bagby, 1995), and score higher on the intuition pole of the intuition-analysis continuum assessed by the CSI (Allinson, Chell, & Hayes, 2000). Therefore, our results for hypothesis 1 raise the question whether intuition is an antecedent or a consequence of entrepreneurial behavior. Indeed, the failure to support hypothesis 1 (with a student sample) suggests that actual entrepreneurs may score higher on intuition because they develop their intuitive thinking as a consequence of their situation, which means that they may more likely use cognitive heuristics (when compared to nonentrepreneurs) out of necessity. This, of course, is just one possible interpretation of this finding, and this idea should be explored in future research.

We also found mixed results for our hypotheses concerning the relationship between cognitive style and entrepreneurial self-efficacy. In particular, we did not find support for hypothesis 2a, whereas hypothesis 2b was supported by our data. Without further research, we can only speculate about the reasons for these findings. However, one speculation is

worth mentioning: our sample—composed mainly by third year business students—may have contributed to these results.[1] This is because students generally learn analytical tools and develop analytical skills in management courses. As a result, it is possible that the business students in our sample felt more confident with activities requiring a good deal of analysis, especially those students with an analytical cognitive style, which may explain the corroboration of hypothesis 2b. On the other hand, hypothesis 2a was not supported possibly because analytic individuals may also feel capable of identifying opportunities with analytical tools, as opposed to intuition and gut feeling. Once more, we cannot stress enough the need for further research on entrepreneurial cognition in educational contexts, which is the only way to reduce speculations and clarify our results.

We found support for hypothesis 3, i.e. that individuals with a high preference for risk exhibit stronger entrepreneurial intentions than individuals with a low preference for risk. Although this is consistent with previous literature presenting the entrepreneur as a risk-taker (e.g., Kihlstrom & Laffont, 1979), we did not empirically test the idea that actual entrepreneurs have indeed higher risk preferences than nonentrepreneurs. Indeed, previous research has indicated that this is not the case (Brockhaus, 1980; Palich & Bagby, 1995). With a sample of students, it appears that risk preferences are indeed associated with intentions to become an entrepreneur. However, it is well known that the passage from intentions to behavior depends on several factors—many of them context-dependent—that were not assessed in this study. In the following sections we elaborate on the limitations of this study and propose further avenues for research that directly address these issues.

The results for hypothesis 4 suggest that individuals with a high preference for risk have stronger and positive perceptions of their opportunity-identification self-efficacy, relationship self-efficacy, and tolerance self-efficacy. However, we found no significant differences between the two types of risk preference we assessed in terms of their perceived managerial self-efficacy. Here again, one possible explanation for these mixed results remains in our sample. Since third year business students generally have taken several management courses, they may feel fairly confident in their capacity to manage a new venture, regardless of their risk preference. Along this line, further research could investigate the extent to which the effect of personal traits—such as risk preference—may be influenced by education and training.

Our data supported hypothesis 5, indicating that intuitive individuals having a high preference for risk do exhibit higher levels of entrepreneurial intentions than analytic individuals having a low preference for risk. This supports the interaction between cognitive style and risk preference, which is shown in Figure 1. Based on these findings, it seems that cognitive style may foster or inhibit the effects of risk preference (a predisposition toward risk), because, as shown in Figure 1, intuitive individuals present higher levels of entrepreneurial intentions than analytic individuals when both have high preferences for risk (i.e., intuitives with high risk preference exhibit higher intentions than analytics with high risk preference), whereas intuitive individuals present lower levels of entrepreneurial intentions than analytic individuals when both have low preferences for risk (i.e., intuitives with low risk preference exhibit lower intentions than analytics with low risk preference). A possible explanation for this is that analytic individuals may tend to process more information before they make decisions, relying less on their predispositions and more on the external information available to them. These propositions should be investigated in future research.

Finally, we found mixed results for hypotheses 6a and 6b. More specifically, hypothesis 6a was supported, indicating that intuitive individuals with a high preference for risk do exhibit stronger beliefs of opportunity identification efficacy than analytic individuals with a low preference for risk. This offers further evidence for the interaction between cognitive style and risk preference. It is also consistent with our previous findings: in particular, it complements our findings indicating that cognitive style alone is not a

[1] We thank one of the reviewers for raising this issue.

significant determinant of opportunity identification efficacy (Hypothesis 2a—not supported) while risk preference is (Hypothesis 4—supported for opportunity identification efficacy). Indeed, analyzing their interaction allows for a more complete view of their effects on self-efficacy. For instance, Figure 2 shows that cognitive style does have an effect on perceived opportunity identification efficacy, but only for individuals having a high preference for risk.

Hypothesis 6b, however, was not supported by our data, indicating that analytic individuals with a high preference for risk do not systematically exhibit higher levels of relationship self-efficacy, managerial self-efficacy, and tolerance self-efficacy than intuitive individuals having a low preference for risk. On the one hand, the interactive effects of cognitive style and risk preference were not significant for managerial self-efficacy beliefs, possibly because of the composition of our sample (management students), an issue that we addressed earlier. On the other hand, even when the interactions were significant (i.e., for relationship self-efficacy and tolerance self-efficacy), the effects were not as we expected. Figures 3 and 4 show the pattern of the interactive role of cognitive style and risk preference on perceived relationship self-efficacy and perceived tolerance self-efficacy, respectively. As is indicated, it seems that analytic individuals tend to exhibit systematically stronger perceptions of these two types of entrepreneurial self-efficacy, which is consistent with our findings for hypothesis 2b. However, it appears that the difference between intuitive and analytic individuals' perceptions concerning these types of self-efficacy are much more significant among individuals with high preferences for risk than among individuals with low preferences for risk. Although this is consistent with our observation that cognitive style may foster or inhibit the effects of risk preference, these counterintuitive results should be analyzed with caution and further investigated by future research.

In sum, the testing of our hypotheses and the careful analysis of our findings contribute to the literature on entrepreneurship by adding some important pieces to our conceptual map of the cognitive antecedents of entrepreneurial intentions. It adds to the literature on entrepreneurial risk and cognition by investigating the interactive role of risk preference and cognitive style on self-efficacy beliefs related to the venture creation process, as well as on entrepreneurial intentions. Therefore, it helps to provide a more complete view of the cognitive factors that influence one's entrepreneurial intentions and, eventually, one's decision to engage in entrepreneurship. The current study, however, has several limitations that we address in the next section.

Limitations

Our study, like most studies on entrepreneurial intentionality, has several limitations. First, even though implications for practice can be inferred, it is clear that we assessed students' perceptions, and not entrepreneurs' behaviors. Using a sample of students is justified, in our case, because we focus on factors that may affect the intentionality of potential entrepreneurs toward entrepreneurial behavior. That is, since one of the main interests of the study was focused on how entrepreneurs emerge (intentions process), we wanted to investigate the extent to which critical preconditions facilitate or inhibit this emergence (e.g., N. F. Krueger, Reilly, & Carsrud, 2000). In cognitive psychology, intention is the cognitive state immediately prior to executing a behavior. The dominant class of formal intentions models employs critical antecedents of intentions. For example, intentions require the belief that the behavior is achievable (e.g., self-efficacy). Empirically, intentions are consistently the single best predictor of subsequent behavior because any planned behavior is, by definition, intentional. This suggests that our understanding of relatively rare behaviors such as starting a venture will be enhanced by a richer understanding of the causally-prior intentions. In turn, we need to focus on the critical antecedents and students who are currently at the stage of assessing their own cognitive style and perceiving their own beliefs in achieving many of the critical skills and abilities associated with entrepreneurial intentions. This approach is also away from retrospective data collection techniques (entrepreneurial sample) whereby it may be difficult for the entrepreneurs to identify

their cognitive style and self-efficacy post hoc the creation of a new venture (Gaglio & Katz, 2001). Although there is a great deal of previous research establishing the reasonable linkage between intentions and later behavior (Icek Ajzen, 1991; Zhao, Seibert, & Hills, 2005), we acknowledge that intentionality, however, does not automatically imply behavior.

Second, causality cannot be assumed. Even though throughout this study cognitive style and risk preference appear as 'antecedents' of self-efficacy and intentionality, the causal relations linking these constructs can only be inferred, at most, and remain to be clearly demonstrated by future research.

Third, the data in this study is self-reported. While self-report surveys are the typical mechanism for assessing and understanding certain individual differences, such as self-efficacy, and it can be argued that an accurate assessment of constructs such as cognitive style and intentions must occur from the individual, it is important to acknowledge that the data in this study all came from a common source. This may have potentially negative implications, especially common method variance. Common method variance is a methodological issue that affects many studies in social sciences and generates great debate (e.g., Doty & Glick, 1998; Spector, 2006). Our findings are subject to this limitation and must be interpreted as such. We agree with Pedhazur and Schmelkin (1991) in that "it is only a multimethod approach that holds the promise of separating effects due to methods from those that appear to be due to the independent variables of interest." (Pedhazur & Schmelkin, 1991, p. 276). Multimethod approaches, unfortunately, are rare in entrepreneurship research and may not be viable when assessing constructs such as the ones we addressed in the current study. Common method variance remains, therefore, a formidable challenge for future research on entrepreneurial cognition.

Finally, we restricted our examination to a limited set of factors. In particular, and as most studies on entrepreneurial intentionality, our study overlooked situational factors that may be preponderant in the decision of starting a business. This does not affect the validity of our findings, but should serve as a remainder against misinterpretations. Indeed, the association between personal traits and perceptions of self-efficacy and intentionality may be moderated and even fully mediated by different situational factors. In this sense, our findings should be taken with caution, as a contribution to establish a more general map of the cognitive processes that may enhance or inhibit entrepreneurial intentions. Future research should combine both personal and situational variables in order to obtain a more complete picture of the processes that may lead to entrepreneurial behavior.

Implications and Areas for Future Research

The current study has useful implications for both academic entrepreneurial research and entrepreneurial education of potential entrepreneurs. In terms of entrepreneurial research, this study has contributed to the growing body of knowledge on antecedents of entrepreneurial self-efficacy and entrepreneurial intentions by identifying the role of cognitive style and risk preference. Future research should continue to utilize theoretically-grounded frameworks to select and investigate other individual differences that may lead to entrepreneurial efficacy and increased entrepreneurial intentions. Our understanding of entrepreneurial self-efficacy and intentions has to a large extent been guided by Ajzen's (1991) theory of planned behavior (TPB). According to the TPB, attitudes, subjective norms and perceived behavioral control determine intentions. Intentions, in turn, along with perceived behavioral control, determine actual behavior. Empirical testing of entrepreneurial intentions has found support for the TPB model (for a review, see Kolvereid, 1996; N. F. Krueger, Reilly, & Carsrud, 2000). Additional individual difference antecedents including entrepreneurial intensity, proactive personality, and specific facets of subjective norms should be further investigated.

In terms of contribution to the field of entrepreneurial education, this study provides evidence that there are valid individual differences in potential and nascent entrepreneurs that are important to recognize and acknowledge, as they have potential consequences for entrepreneurial efficacy and intentions. We echo the suggestion presented by

Zhao et al. (2005), who call for greater attention and need for diverse learning experiences in entrepreneurial education. Such diverse learning experiences will increase the likelihood that the educational experience for potential entrepreneurs will be a good "fit" for those with differing cognitive styles.

Another implication for entrepreneurial research and entrepreneurial education lies in a closer examination of the concept of risk. While this study has followed in the footsteps of previous research looking at the role of risk propensity and has added to this area of research by examining both the separate and interactive effects of risk preference and cognitive style, more research is needed to investigate the role of differing types of risk and ways that such risk can be avoided or dealt with successfully (e.g., missing the boat vs. sinking the boat risks; Dickson & Giglierano, 1986).

Our findings suggest that potential entrepreneurs with high risk preferences and an intuitive cognitive style are more likely to start new businesses than individuals with a more analytic thinking or lower risk preferences. However, our findings also suggest that individuals with a more analytic thinking believe they are better prepared to execute the activities necessary to the development and survival of a new business. This is consistent with Venkataraman's assertion that "analysis increases a new business's chance of success but decreases the probability of creating a business in the first place" (Venkataraman, 2002, Principle 2). Further research is necessary to verify the validity of such propositions, by examining not only perceptions, but also actual behavior.

In particular, the link between intuition, analysis, and venture outcome, has yet to be explored. Previous research has indicated that entrepreneurs make an intensive use of cognitive heuristics, which are intuitive tools that enable entrepreneurs to make decisions and react quickly in changing markets (L. Busenitz & Barney, 1997; L. W. Busenitz, 1999; Palich & Bagby, 1995). However, the question whether such cognitive heuristics ultimately contribute to venture success or, instead, generate biases and pitfalls that reduce performance, remains open.

Further research should also examine the causal relationships among the variables presented in this study. For instance, the relationship between self-efficacy and risk preference deserves to be treated in more detail. In the framework we adopted from Sitkin and Pablo (1992), risk preference is a determinant of risk propensity and risk behavior. In this sense, it is conceived as a personal trait. However, other scholars have suggested that preferences are in fact determined by perceptions of risks and benefits (Weber, Blais, & Betz, 2002). Moreover, previous research has also shown that self-efficacy beliefs do affect risk taking (N. Krueger & Dickson, 1994). The question if self-efficacy impacts risk preferences, or if instead risk preferences determine self-efficacy, is therefore of particular interest.

Conclusion

Our research addressed the role of cognition and risk preferences on self-efficacy and entrepreneurial intentions. Empirical evidence of the interaction between cognitive style and risk preferences was presented, as well as of their influence on intentionality and different types of self-efficacy. Implications for entrepreneurship research and education were drawn upon articulations of theory, empirical findings, and a detailed discussion of our hypotheses. While much work remains to be done, we hope that our findings give entrepreneurship scholars and educators yet another perspective on the complex role of cognitive style and risk preference in understanding an individual's self-efficacy beliefs and entrepreneurial intentions. This understanding, in turn, can assist us in developing the appropriate curriculum and pedagogy to support a nascent entrepreneur's pursuit of creating and growing a venture, which may ultimately enable the creation of new profitable and sustainable solutions for the marketplace.

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[i] For a critique of the measurement of risk propensity, see (Shaver & Scott, 1991).