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Overconfidence and risk perceptions: do they really matter for venture creation decisions?

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Abstract A cognitive approach for explaining venture creation decisions offers great insights into entrepreneurship research. Examining venture creation decisions from a perspective that considers the cognitive states and perceptions of entrepreneurs further informs the critical role of cognitive constructs in entrepreneurial decision-making. This study provides empirical evidence for a theory of overconfidence that explains why some choose to become entrepreneurs. It explores the interconnections between overconfidence, risk perceptions, and venture creation decisions. More specifically, the growing importance of overconfidence in entrepreneurship encourages an examination of its association with venture creation decisions. Additionally, this research seeks to establish risk perceptions as a mediator for that relationship. Examining these relationships through a psychological perspective contributes to a growing body of entrepreneurial cognition research. This study makes a contribution by providing substantiation for the relationship between overconfidence and venture creation decisions. Equally important, the empirical evidence in this study is the first to provide support for the partially mediating role of risk perceptions. The findings presented here help to provide some insights into understanding why entrepreneurs tend to be more overconfident than non-entrepreneurs, particularly, since overconfidence is positively associated with the decision to start a new venture.

Keywords Entrepreneurs · Overconfidence · Risk perceptions · Venture creation · Cognitive biases

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Introduction

Defined as the failure to know the limits of one's knowledge, overconfidence has received considerable attention in the entrepreneurship literature (Simon et al. 2000). The very nature of entrepreneurial contexts and processes induces the presence of cognitive biases such as overconfidence among entrepreneurs (Baron 1998; Cassar 2010; Edleman and Yli-Renko 2010). Further research suggest that entrepreneurs tend to be more overconfident than managers (Busenitz and Barney 1997), which may cause them to frame business situations more favorably than non-entrepreneurs (Palich and Badgy 1995) and appear more competent (Anderson et al. 2012). The nature of entrepreneurship often involves the introduction of products and research has shown that overconfidence is associated with the ill-advised introduction of risky products (Simon and Houghton 2003), commercializing university inventions (Lowe and Ziedonis 2006), or new technological directions (Galasso and Simcoe 2011). Additionally, some entrepreneurs may be more overconfident than other entrepreneurs, depending upon the age of the entrepreneur and the existence of equity investments in the new venture (Forbes 2005). Even venture capitalists are susceptible to influences of overconfidence, despite having access to greater amounts of information (Zacharakis and Shepherd 2001). This body of research reinforces the importance of overconfidence as a significant cognitive construct for entrepreneurial research.

The extant overconfidence research provides insights into entrepreneurial processes but leaves unanswered questions regarding venture creation choices. For instance, efforts to empirically link overconfidence to aspects of venture creation have not yielded significant results (Simon et al. 2000). Anecdotal evidence and theoretical arguments suggest that overconfidence is associated with aspects of venture creation (Busenitz and Lau 1997; Sarasvathy et al. 2011; Simon et al. 2000). It is reasonable to believe that nascent entrepreneurs tend to be overconfident about their expectations (Cassar 2010). However, the absence of empirical evidence produces more questions than answers given the criticality of venture creation in entrepreneurship research. Arguably, venture creation represents one of the most central facets of entrepreneurship (Gartner 1985). Equally important, entrepreneurial cognition research calls for studies that show whether cognitive differences among individuals account for variances among venture creation activities (Mitchell et al. 2002). If such a relationship exists between a relevant cognitive construct (i.e. overconfidence) and a critical aspect of entrepreneurship (i.e. venture creation), in theory and practice, the absence of empirical evidence warrants further inquiry. Moreover, the importance of overconfidence in entrepreneurship advocates that findings concerning their relationship, or the lack thereof, ought not to be relegated to the mere requirement of accepting null hypotheses in the absence of significant findings regarding alternative hypotheses.

This study addresses a gap in the entrepreneurship literature by providing a theory of overconfidence that explains why some choose to become entrepreneurs. It is among the first to provide unequivocal empirical evidence for the relationship between overconfidence and venture creation decisions building on the notion that entrepreneurs tend to be more overconfident than non-entrepreneurs (Busenitz and Barney 1997; Busenitz and Lau 1997; Edleman and Yli-Renko 2010). These results

explain why overconfidence may further distinguish those who are likely to choose to start new ventures from those who are not. Interestingly, this study appears to raise questions concerning whether the overconfident tend to become entrepreneurs or whether entrepreneurs tend to become overconfident. Finally from a more practical perspective, these results may help to reveal the presence of overconfidence early in the entrepreneurial process. This important finding may affect the extent to which valuable resources (e.g. financial and human) should be committed to new ventures absent a rigorous process of analyzing the existence and impact of overconfidence.

This research also suggests that entrepreneurs are not necessary more comfortable with risk. Rather, they may not perceive risks in the same way that non-entrepreneurs do which is different than aversions to risk (Petrakis 2007). Finally, the results presented in this manuscript offer insights regarding any decision to enter a contest (i.e. venture creation) where the chances and consequences of failure are quite high (Sarasvathy et al. 2011). Hence, when taken in conjunction with a growing importance of entrepreneurial cognition research (Mitchell et al. 2002, 2004, 2007), this examination of our theoretical model (see Fig. 1) further demonstrates the important role cognition and a more psychological perspective (Shaver and Scott 1991) play in understanding critical aspects of entrepreneurship.

The rest of this paper is organized as follows. The next section establishes the theoretical background for the hypotheses followed by a discussion about the research method used to test the hypotheses. The results are provided and a discussion regarding the results and concluding thoughts regarding limitations and future research are explored.

Theory and hypotheses

Cognitive theory

Cognitive theory refers to various information processing activities such as gathering information, interpreting it, and synthesizing it to inform decision-making outcomes. Cognition is defined as all processes by which sensory input is transformed, reduced, elaborated, stored recovered, and used (Neisser 1967). An important aspect of cognition research involves a number of cognitive functions such as sense-making, reasoning, judgment-forming, decision-making, the storage and retrieval of information, the use of language and symbols, perceptions (i.e. acquiring, interpreting, selecting, and organizing sensory information), memory, problem-solving, and

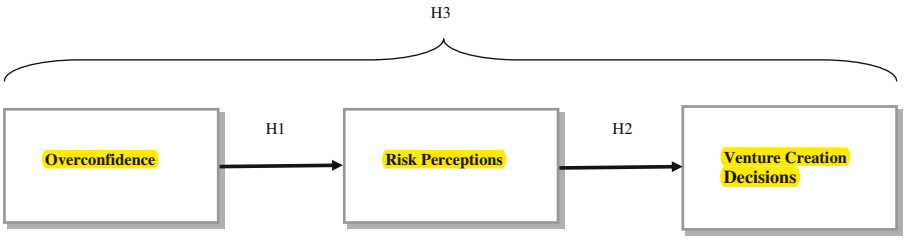

Fig. 1 Theoretical model

thinking (Bazerman 1984; Busenitz 1999; Daft and Weick 1984; Estes 1975; Fiske and Taylor 1991; Neisser 1967; Sutcliffe 1994; Tversky and Kahneman 1974; Weick 1995). Several key findings in cognition research suggest that humans have cognitive constraints (Simon 1976) and experience information processing overload as a consequence of our limited capacity to process new information (Schwenk 1986). As a consequence, humans seek to minimize cognitive effort and engage in mental shortcuts possibly resulting in the absence of rational thinking (Baron 1998).

Applying a cognitive lens to entrepreneurship research provides great insights into the decision-making processes of entrepreneurs (Busenitz and Lau 1997; Linan et al. 2011). Shaver and Scott (1991: p. 26) explain that adopting a psychological approach to new venture creation by examining individual cognitive processes informs entrepreneurship research. Thus, an entrepreneurial cognition perspective emerges as a meaningful extension of cognitive theory. According to Mitchell et al. (2002: p. 97), "entrepreneurial cognitions are the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth." This suggests that a cognitive perspective offers insights into current entrepreneurship research and practice (Camerer and Lovallo 1999; Gartner 1985; Hayward et al. 2006). Linan et al. (2011) advocate for applying a cognitive approach to understand phenomena related to entrepreneurs.

An important aspect of cognitive theory involves heuristics and cognitive biases, which may cause individuals to engage in less than rational decision-making (Barnes 1984; Baron 1998; Bazerman 1998). Heuristics reflect the "rules of thumb" that lead to cognitive biases. Cognitive biases are subjective beliefs that help individuals cope with difficult decisions (Bazerman 1984). Essentially, both are cognitive short cuts, which decrease the complexity associated with some decision processes (Barnes 1984) by reducing the amount of information processed when making a decision (Schwenk 1986). Hence, heuristics and cognitive biases provide influential motivations to act. Despite the importance of a need for action, these heuristics and biases may result in persistent and systematic errors, thus, adversely affecting decision outcomes (Barnes 1984; Tversky and Kahneman 1974). The important, yet often deleterious effects of cognitive biases and heuristics, particularly in uncertain environments, warrant careful examination in entrepreneurial settings.

Cognitive biases have been shown to affect entrepreneurial activities (Schenkel et al. 2009). Busenitz and Barney (1997) found that entrepreneurs tended to be susceptible to the use of biases. The nature of entrepreneurship involves innovations. Simon and Houghton (2003) submit that cognitive biases result in the introduction of risky products. Zacharakis and Shepherd (2001) found evidence to support the existence of cognitive biases among venture capitalists.

Overconfidence

Overconfidence, one of earliest identified cognitive biases (Bazerman 1998; Oskamp 1965), involves the failure to know the limits of one's knowledge and is increasingly becoming a critical phenomenon of interest in entrepreneurship research (Busenitz and Lau 1997; Forbes 2005; Moore and Healy 2008; Zacharakis and Shepherd 2001). Overconfidence often exists when unfamiliar problems and limited information result in the tendency for decision makers to produce overly optimistic decisions regarding

their estimation abilities (Busenitz 1999) resulting in inaccurate perceptions of personal abilities (Moore and Healy 2008) and lower quality decisions (Kydd 1989). Overconfidence is also considered "as arising when founders overestimate the personal wealth that they will generate from their ventures" (Hayward et al. 2006: 161) or as "overoptimistic perceptions of success" (Lowe and Ziedonis 2006: 176). It also may be thought of as an over-estimation of one's ability relative to others (Koellinger et al. 2007) based on a belief that one possesses a unique skill set (Alicke and Govorun 2005; Cooper et al. 1988; Dunning et al. 2004; Krueger and Wright 2011). Equally important, overconfidence outcomes tend not to support ex ante optimism (Gervais et al. 2011; Malmendier and Tate 2005).

Although sometimes used interchangeably, overconfidence and optimism are unique theoretical constructs. Hence, overconfidence offers a distinct perspective relative to optimism. Whereas overconfidence has been defined as the failure to know the limits of one's knowledge (Simon et al. 2000), optimism involves the tendency to see happenings as more likely to produce desired outcomes in spite of considerations such as the situation and the individual (Griffin and Varey 1996). Some have described optimism as a type of personality characteristic (Scheier and Carver 1985). While optimism may not be associated with entrepreneurs who decide to start new ventures (Lowe and Ziedonis 2006), it is still unique from overconfidence (Bazerman 2001). For instance, optimism tends to be more externally focused whereas overconfidence is internally focused. Empirical evidence lends credence to this notion since past researchers found no significant correlations between optimism and overconfidence (Simon et al. 2000). Similarly, optimistic overconfidence occupies a distinct theoretical space relative to overconfidence (Simon and Shrader 2012). Simon and Shrader (2012) define optimistic overconfidence as the certainty regarding success resulting in disappointment. As such, it is comprised of two unique components. Those who are optimistically overconfident tend to have a high degree of confidence combined with a failure to achieve that success.

Similar to other cognitive biases, overconfidence can facilitate faster decision-making in complex environments through a process of cognitive simplification (Duhaime and Schwenk 1985; Tversky and Kahneman 1974). A heightened belief in one's ability, combined with uncertain environments, reduce one's perceived need for additional information to mitigate negative outcomes (Buehler et al. 1994). Hence, a reduced number of variables are considered. The bounded rationality of decision makers in complex environments induces cognitive biases (Kahneman and Lovallo 1993; Simon 1955). Interestingly, the seminal work of Oskamp (1965) showed that subjects who received additional information tended to become more confident upon its receipt. Subsequent research confirms this finding (Steen 2011). The chance for significant loss or high stakes does little to reduce the presence and persistence of overconfidence (Hoelzl and Rustichini 2005; Willimams and Gilovich 2008). Anchoring and adjusting narrow estimation parameters (Tversky and Kahneman; 1974) and seeking confirming information (Einhorn and Hogarth 1978) are underlying aspects of overconfidence not uncommon in complex environments.

The implications for overconfidence in entrepreneurship are not conclusive. Much is yet unknown about its impact on key entrepreneurship constructs such as venture creation decisions. Evidence suggests that cognitive simplification processes like overconfidence yield primarily negative outcomes by adversely affecting the quality

of decisions and judgments (Barnes 1984; Tversky and Kahneman 1974), which may affect the outcomes of entrepreneurial efforts. Yet, those who are responsible for venture creation are thought to be overconfident (Busenitz and Barney 1997; Busenitz 1999; Cassar 2010). The confluence of uncertain environments coupled with the possibility for adverse outcomes of cognitive biases have meaningful implications for significant undertakings such as the decision to start a new venture. Moreover, equivocations abound regarding the role of overconfidence in entrepreneurial settings (Klayman et al. 1999). Employing an entrepreneurial cognition perspective to examine phenomena in entrepreneurship (Mitchell et al. 2002) reinforces the importance of this research field (Shane and Venkataraman 2000).

Overconfidence and entrepreneurship

Entrepreneurs may be different from non-entrepreneurs as it relates to overconfidence (Busenitz and Barney 1997). More specifically, entrepreneurs may be more susceptible to overconfidence (Baron 1998). Those who seek to work for themselves have unwarranted higher expectations (Cassar 2010). Such associations are not without adverse effects. For instance, overconfidence is negatively associated with new venture survival among nascent entrepreneurs (Koellinger et al. 2007).

Overconfidence may be relevant for early aspects of entrepreneurial activities such as venture creation choices. Along these lines, Busenitz (1999:337) suggests that "the use of biases and heuristics may be potentially advantageous," and that "without using biases and heuristics extensively, most new ventures would never get launched within an appropriate window of opportunity." This infers that overconfidence also helps to explain some venture creation decisions (Hayward et al. 2006; Lowe and Ziedonis 2006). Overestimating accuracy has been linked to opportunity evaluations (Keh et al. 2002), and decisions to fund new ventures increase as venture capitalists become more overconfident, suggesting that optimal levels of overconfidence may exist (Zacharakis and Shepherd 2001). Overly confident entrepreneurs secure initial resource commitments early in the life of young ventures, when the identification and acquisition of resources is crucial for its long-term success (Chrisman et al. 1999; Lichtenstein and Brush 2001; Stevenson and Gumpert 1985).

The presence of overconfidence produces biased perceptions. These biased perceptions may affect sense-making, thus helping to explain entrepreneurial activities such as the decisions to create a new venture despite the high failure rates associated with this type of arguably risky behavior (Cooper et al. 1988; Petrakis 2007; Sarasvathy et al. 2011). The following section suggests that one type of perception (i.e. risk perception) is particularly associated with venture creation decisions.

Overconfidence and risk perceptions

The early foundations of cognition are informed by perceptions (Estes 1975). According to cognitive theory, schemas help us to make sense of what we see (Fiske and Taylor 1991) and affect the way we interpret our surroundings under uncertainty (Kreye et al. 2012). Our experiences help to form such schemas, which are also referred to as knowledge/cognitive structures or mental models (Weick 1995). Once formed, these schema become the lenses through which we view the

world and form perceptions (Barr et al. 1992). Finally, perceptions have been shown to have implications for entrepreneurship (Linan et al. 2011).

Risk perceptions involve the way individuals make sense of the degree of uncertainty and the possibility for loss associated with particular actions (Knight 1921; Forlani and Mullins 2000). This cognitive construct is often viewed as the potential for loss and tends to be more closely associated with negative outcomes (Sitkin and Weingart 1995), as opposed to potential for gain. Some describe risk perceptions as "the extent to which there is uncertainty about whether potentially significant and/or disappointing outcomes of decision will be realized" (Sitkin and Pablo 1992: 10). Essentially, risk perceptions are not limited to economic variability, but also are more closely linked to undesired outcomes. This study argues that risks are hazards which are distinct from variability (Forlani and Mullins 2000).

Important distinctions have been made regarding risk perceptions and risk propensity. Risk perception is unique relative to risk propensity since the later refers to "an individual's current tendency to take or avoid risks," (Sitkin and Weingart 1995:1575) and may not be a main determinant of risk taking behavior. However, research has shown that communities characterized as risk averse that seek short-term risk tend to create optimum conditions for entrepreneurial activity to occur (Petrakis 2007). Thus, striving to understand risk perceptions informs entrepreneurship research in general and this study in particular. Similarly, failing to understand risk perceptions as it relates to entrepreneurship impedes our ability to understand new venture activities such as venture creation decisions (Sitkin and Pablo 1992).

Cognitive biases, like overconfidence, may lower perceptions of risk (Busenitz and Barney 1997; Palich and Badgy 1995) resulting in "optimistic judgments of risk" (Kahneman and Lovallo 1993:29). Whereas, overconfidence is proposed to be positively associated with venture formation (Hayward et al. 2006), risk perceptions act as a mediating variable (Sitkin and Pablo 1992). For instance, overconfidence tends to produce biased perceptions of risk leading to the pursuit of riskier behavior (Simon and Houghton 2003). Additionally, actors tend to lower their perceptions of risk when they are overconfident (Russo and Schoemaker 1992); thereby, potentially perceiving less threat to the new venture and the individual. This cognitive perspective for risk-taking suggests that entrepreneurs are subject to biases (Kahneman and Lovallo 1993), which increase perceptions of control and may reduce perceptions of risk.

Together these arguments add credence to the notions that the overconfident may view the act of creating a new venture as being less risky than do those who are not overconfident (Palich and Badgy 1995). The overconfident fail to recognize the full degree of risk (Kahneman and Lovallo 1993). Decision makers who possess inflated views of their abilities are less risk-averse (Gervais et al. 2011). The value of establishing empirical evidence regarding the above noted associations results in the following hypothesis:

Hypothesis 1: *Overconfidence is negatively associated with risk perceptions of the new venture.*

Risk perceptions and New venture creation decisions

Perceptions precede entrepreneurial actions (Mitchell et al. 2002) and offer explanations for key entrepreneurial choices such as whether to start a new venture (Gartner

1985). A psychological approach to entrepreneurship argues that the mental representations of the world, formed by potential entrepreneurs, affect the behaviors in which they engage such as venture creation and personal investments (Shaver and Scott 1991). Under this cognitive approach, decision makers make sense of the world around them and arrive at decisions based upon interpretations of risks (Forlani and Mullins 2000), chances for success (Cooper et al. 1988), and potential threats or opportunities (Palich and Badgy 1995). Hence, subjective assessments, rather than objective realities, influence how decisions are made (Edleman and Yli-Renko 2010; Penrose 1959).

Risks represent the possibility for loss (Forlani and Mullins 2000) and uncertainty (Knight 1921), subsequently influencing decisions. Decisions involving a greater possibility for loss may not be pursued (Janney and Dess 2006). Alternatively, as the possibilities for gains associated with decisions increase, the possibility for loss decreases. Holding all other things constant, individuals may be less inclined to pursue decisions associated with higher risk perceptions due to the greater likelihood for loss and uncertainty. Alternatively, decisions associated with lower perceptions of risk may be pursued.

Individuals' perceptions of risk may influence venture creation decisions based upon anticipated chances for success (Cooper et al. 1988; Koellinger et al. 2007; Palich and Badgy 1995). Lowered risk perceptions help to explain why ventures are formed at such high rates relative to high failure rates (Hayward et al. 2006; Kahneman and Lovallo 1993). For instance, 95 % of entrepreneurs believe that their new ventures will be successful, despite the reality that about half fail (Cooper et al. 1988). They overestimate the chances of success and make use of less information to arrive at conclusions that opportunities associated with an entrepreneurial event are greater than the threats associated with that entrepreneurial event (Palich and Badgy 1995). Hence, entrepreneurs believe that chances for favorable outcomes are greater than chances for undesired outcomes based upon misguided perceptions (Barnes 1984). This assertion is supported by arguments that biased perceptions are associated with venture creation activities (Koellinger et al. 2007). Given this, the following hypothesis is offered:

Hypothesis 2: *Risk perceptions of the new venture are negatively associated with venture creation decisions.*

The mediating role of risk perceptions

The relationship between overconfidence and venture creation decisions is mediated by risk perception. Arguably, risk and overconfidence are related to entrepreneurial decision-making (Sarasvathy et al. 2011). In this way, the presence of risk perceptions as a construct effectively acts as a go-between for overconfidence and venture creation decisions (Simon et al. 2000). This line of reasoning is in keeping with Sitkin and Pablo's (1992) mediated model of risk perceptions. Their model argues that risk variables (i.e. propensity and perception) precede risky decision-making behavior, thereby acting as mediators. Some antecedents of those risk variables may include outcome history (i.e. previous decision made and their outcomes) and problem framing (i.e. whether a problem is framed in a negative or positive light).

Their work is supported by empirical evidence (Sitkin and Weingart 1995), and is included as a hypothesis in this study resulting in the following hypothesis:

Hypothesis 3: *Risk perceptions mediate the relationship between overconfidence and venture creation decisions.*

Research method

Sample

The data in this study were collected from a population of undergraduate business students in various disciplines at a major state university. The sample was comprised of senior strategic management students from several classes who were near graduation and preparing to make career decisions. This population was selected for reasons which are supported by prior cognition research (Simon et al. 2000). First, the classroom offers a controlled environment that is well-suited for testing cognitive biases like overconfidence (Schwenk 1984). Researchers put forth that using student samples continues to be an acceptable way to understand the relationship between cognitive biases such as overconfidence and new venture creation decisions (Moore and Cain 2007; Simon et al. 2000). Second, venture creation represents a career choice (Koellinger et al. 2007) for this sample that will likely choose among entrepreneurial and non-entrepreneurial choices. The growing popularity of entrepreneurship in major universities continues to make the new venture creation choice a viable option among this population, and supports the inclusion of the student population in this study. Finally, selecting a sample that would not invoke a retrospective view of decisions to start a new venture was preferred to avoid recall bias and the influences of the rigors after one has already decided to start a new venture (Shaver and Scott 1991).

Surveys were administered via hand and collected upon completion, which resulted in a relatively high response rate. Eighty-nine respondents were afforded the opportunity to participate in the study for extra credit points. Eighty-four students elected to participate. Incomplete and improperly completed instruments reduced the overall number of usable surveys to 75. Anonymity was maintained throughout the data collection process. Additionally, participation in the study was not compulsory.

Respondents were asked to consider a business opportunity. The instructions requested that the respondents take on the role of the decision-maker and consider thoughtfully the questions being asked prior to making their selections regarding items in the survey. Overconfidence was measured prior to collecting survey responses for the other variables of interest.

Survey instrument

A survey instrument was developed to collect data regarding venture creation, risk perceptions, and overconfidence. The instrument was adapted using items established in the literature (Keh et al. 2002; Russo and Schoemaker 1992; Simon et al. 2000). See the Appendix for the specific items. Respondents indicated their level of

agreement or disagreement on a five-point Likert scale for risk perceptions and venture creation decisions—1 ("strongly disagree") to 5 ("strongly agree").

Variables

Venture creation decision

Venture creation decision involves the choice of creating a business or the organizing of new organizations (Gartner 1985). Three items were used to measure this scale. Consistent with previous research (Simon et al. 2000), respondents were asked about their intention to create a new venture. Responses were recorded on a scale of 1 ("strongly disagree") to 5 ("strongly agree"). The items measured the underlying construct, thus indicating internal consistency (Cronbach alpha=0.80) as indicated in Table 1.

Risk perceptions

Risk perceptions entail the degree of uncertainty and potential for loss associated with particular actions (Forlani and Mullins 2000). Eight items were used to measure this scale. Respondents were asked about the level of risks associated with creating a new venture, thereby, adapting approaches used by previous research (MacCrimmon and Wehrung 1990; Nutt 1986, 1993; Simon et al. 2000; Thomas and McDaniel 1990). Responses were recorded on a scale of 1 ("strongly disagree") to 5 ("strongly agree"). The items measured the underlying construct, thus indicating internal consistency (Cronbach alpha=0.81) as indicated in Table 1.

Overconfidence

Overconfidence involves the failure to know the limits of one's knowledge, and is measured with an established scale (Russo and Schoemaker 1992; Simon and Houghton 2003). Ten items were used to measure this construct. Respondents were asked to provide high and low estimates for ten statements such that they are 90 %

Table 1 Descriptive statistics and correlations among study variables of all respondents

Variable	Mean	SD	1	2	3	4	5	6	Alphas
1. Age	22.29	1.3							
2. Gender	0.81	0.4	.33**						
3. Minority status	0.14	0.35	−0.03	−.31**					
4. Risk propensity	2.51	1.93	0.21	0.08	−0.09				
5. Overconfidence	8.28	1.37	−0.23	−0.16	0.1	−0.19			
6. Risk perceptions	3.7	0.56	0.13	0.12	0.13	−0.22	−0.18		0.81
7. New venture decisions	2.44	1.13	0.05	.26*	−0.04	−0.07	.27*	−.25*	0.80

N=75. Pearson Correlations (2-tailed) *p<.05, **p<.01. Cronbach's Alpha coefficients are reported

confident that the range they provide includes the correct responses. There is only one correct numerical answer for each question. Correct responses that were within the range established by respondents were coded as zero. Incorrect responses were coded as one. The values were summed to determine overconfidence levels with high scores indicating overconfidence.

Controls

Data were collected for several control variables argued to influence variables of interest. Age and gender are thought to be associated with risky behavior and overconfidence (Forbes 2005). Age was measured using the respondents' age at the time of this study. Gender was measured as male or female. Respondents who selected male were coded "0". Respondents who selected female were coded "1". Minority status was measured as two categories. Respondents who selected minority status were coded "0". Respondents who selected nonminority status were coded "1". Risk propensity was measured using an established scale since it may affect risk-taking such as aspects of venture creation (Forlani and Mullins 2000; Sitkin and Weingart 1995). Respondents were asked to choose among two alternatives for five items in which one is more risky than the other. Selecting the more risky option was scored "1", whereas selecting the less risky option were scored "0". The scores were summed to determine risk propensity levels.

Analysis

Common method variance may be an issue for a study of this type given the possibility of common rater effects and measurement context effects. The presence of common method variance could affect (i.e. inflate or deflate) the variance (i.e. correlations) among variables due to the data collection method. To avoid the occurrences of common method bias, several suggestions were followed (Podsakoff et al. 2003). Specifically, the anonymity of respondents was protected and scale items were clear and unambiguous (Podsakoff and Organ 1986). Furthermore, the predictor variables did not have correlations greater than .70 (Vogt 2007), indicating no problem with multicollinearity.

Four regression models were run to test the hypotheses in this study. Two models tested the first set of hypotheses (i.e. hypotheses 1 and 2). Those hypotheses included examinations of the relationship between overconfidence and risk perceptions, and examinations regarding the relationship between risk perceptions and venture creation decisions. Four set of criteria were used to test the final hypothesis, which examined whether risk perceptions mediate the relationship between overconfidence and venture creation decisions (Baron and Kenny 1986). Four control variables (i.e. age, gender, minority status, and risk propensity) were entered for all models. In Model 1, the dependent variable (i.e. venture creation decisions) was regressed on the mediator (i.e. risk perceptions). In Model 2, the mediator (i.e. risk perceptions) was regressed on the independent variable (i.e. overconfidence). In Model 3, the dependent variable (i.e. venture creation decisions) was regressed on the independent variable. In Model 4, the dependent variable (i.e. venture creation decisions) was regressed on the independent variable (i.e. overconfidence) and the mediator (i.e. risk perceptions). The established criteria and models tested are described below according to the Baron and Kenny (1986) model of mediation:

1) In Model 1, the mediator is expected to affect the dependent variable.
2) In Model 2, the independent variable is expected to affect the mediator.
3) In Model 3, the independent variable is expected to affect the dependent variable.
4) In Model 4, the independent variable's effect on the dependent variable in Model 3 is expected to be lower than its effect in Model 4.

For mediation to exist as suggested in hypothesis 3, the four previously mentioned conditions had to exist (Baron and Kenny 1986). In particular, the fourth condition establishes whether risk perceptions fully or partially mediate the relationship between overconfidence and venture creation decisions. If the significant effects of overconfidence on venture creation decisions disappear upon entering risk perceptions into the model, then the relationship is said to be fully mediated by risk perceptions. Alternatively, if the significant effects of overconfidence on venture creation decisions decreases but do not disappear upon entering risk perceptions into the model, then the relationship is said to be partially mediated by risk perceptions.

Results

The means, standard deviations, correlations, reliability coefficients for the independent and dependent variables are reported in Table 1 using SPSS 16.0. According to the correlations presented, overconfidence and risk perceptions are significantly related to new venture creation decisions. The correlation matrix reveals significant relationships between the predictor variable and the dependent variable offering preliminary support for the hypothesized relationships. Risk perceptions ($r = -0.25$, $p < .05$) is associated with venture creation decisions. The negative correlation between the variables provides preliminary support for the hypothesized relationship. Overconfidence ($r = 0.27$, $p < .05$) also is associated with venture creation decisions. Again, the direction of the relation provides initial support for the hypothesis presented. Interestingly, overconfidence and risk perceptions were not significantly correlated in this preliminary test. There were no apparent issues regarding multicollinearity among the variables of interest none of the predictor variables had correlations greater than .70 (Vogt 2007).

Tests for all hypotheses are reported in Table 2. Model 2 was significant at the .05 level and explained a significant portion of variance regarding the effect of overconfidence on risk perceptions ($\beta = -.20$, $R^2 = .15$, Adjusted $R^2 = .09$). Consistent with Hypothesis 1, overconfidence has a significant and negative effect on risk perceptions of the new venture. Model 1 was significant at the .05 level ($\beta = -.34$, $R^2 = .18$, Adjusted $R^2 = .12$) regarding venture creation decisions being regressed on risk perceptions. These results provide empirical support for Hypothesis 2, which states that risk perceptions have a negative effect on venture creation decisions. Tests regarding Hypothesis 3 examined whether risk perceptions mediate the relationship between overconfidence and venture creation decisions. Model 4 provided support for risk perceptions as a mediator ($\beta = -.29$, $R^2 = .24$, Adjusted $R^2 = .17$). When the risk perceptions variable was entered into the model, the effects of overconfidence decreased from β=.32 to β=.26, while its significance increased from the .05 level to the .01 level. This satisfied the fourth condition for partial mediation (Baron and Kenny 1986). Full mediation could not be

established since the significant effects of overconfidence on venture creation decisions were not eliminated with the introduction of risk perceptions to the regression model (see Table 2).

Discussion

This study provides empirical evidence for the effects of overconfidence on venture creation decisions as mediated by risk perceptions. Simon et al. (2000) offer sound theoretical support for expected effects of overconfidence on venture creation decisions. However, while offering rational explanations as to how overconfidence affects venture creation choices, they fall short of the desired outcome of empirical evidence to support their assertions. Addressing this shortcoming is important if entrepreneurial cognition research is to make a significant contribution to our understanding of why some choose to become entrepreneurs and others do not. Moreover, understanding the role overconfidence plays in venture creation decision is critical given the growing explanatory power of entrepreneurial cognition regarding entrepreneurship activities. This is particularly true regarding cognitive biases and heuristics such as overconfidence.

There are several key findings based upon the results presented in this manuscript. First, overconfidence was found to be significantly related to venture creation decisions. According to the results, venture creation decisions in the affirmative increase as overconfidence increases. Hence, consistent with research that finds higher levels of overconfidence to be more prevalent among entrepreneurs than among non-entrepreneurs (Busenitz and Barney 1997), this study finds higher levels of overconfidence to be more prevalent among those who make affirmative venture creation decisions when compared to those who do not express decisions to create new ventures. This provides insights into why some choose to enter a contest where the objective chances of success are perceived as more favorable than they really are. Additionally, it contributes to a body of research that asserts that differences exist between entrepreneurs and non-entrepreneurs (Baron 1998, 2004;

Table 2 Mediated regression analysis

Variables	Model 1 Venture creation	Model 2 Risk perception	Model 3 Venture creation	Model 4 Venture creation
Age	0.02	0.05	0.03	0.06
Gender	.35**	0.18	.31**	.35***
Minority status	0.09	−0.17	0.02	0.07
Risk propensity	−0.17	−.28**	−0.04	−0.12
Overconfidence		−.20*	.32**	.26***
Risk perception	−.34**			−.29**
F statistic	3.06**	2.42**	2.83**	3.63***
R^2	0.18	0.15	0.17	0.24
Adj. R^2	0.12	0.09	0.11	0.17

N=75. Standardized regression coefficients from last step

*p<.10, **p<.05, ***p<.01

Bernardo and Welch 2001; Busenitz and Barney 1997; Camerer and Lovallo 1999; Cassar 2010).

Second, the relationship between overconfidence and venture creation decisions is partially mediated by risk perceptions. Hence, the more overconfident tend to perceive fewer risks, and are more inclined to decide to create a new venture relative to the less confident. The results for this mediated relationship provide explanations for why entrepreneurs who tend to be overconfident (Baron 2004) perceive their chances for success more favorably than objective reality warrants (Cooper et al. 1988). The evidence provides support for the notion that entrepreneurs may not have a higher propensity for risk. Rather, they may not perceive the risk based on overestimations of their own success (Gervais et al. 2011; Hayward et al. 2006). Although the relationship between overconfidence and venture creation decisions is not reduced to zero upon the introduction of risk perceptions, including risk perceptions does increase the level of significance from .05 to .01. Overall, this study's findings provide empirical evidence for hypothesized interrelationships between overconfidence, risk perceptions, and new venture creation decisions.

These findings raise interesting questions about the role of overconfidence among entrepreneurs. Like many biases, overconfidence has adverse implications for decision outcomes such as venture survival (Koellinger et al. 2007; Kydd 1989). Overconfidence results in irrational thinking (Baron 1998) based on overestimated chances of success (Gervais et al. 2011). Yet, many new ventures might not get started absent some level of overconfidence (Busenitz 1999). While higher levels of overconfidence may be necessary at early stages of venture creation, lower levels may have greater utility at later stages of venture creation. If so, how do the desired levels of overconfidence and venture stages vary? Additionally, do they vary across different types of entrepreneurs? Equally important, the findings in this study raise questions about efforts to eliminate overconfidence among entrepreneurs. While doing so might be beneficial during latter stages of the new venture, attempting to minimize overconfidence early in the new venture could reduce the overall number of startups. Hence, overconfidence creates a paradoxical entrepreneurial condition.

This study contributes to entrepreneurial cognition research by examining and establishing evidence for important interrelationships among overconfidence, risk perceptions, and new venture creation decisions. First, hypotheses are developed and tested which establish the mediating effects of risk perceptions regarding associations between overconfidence and venture creation decisions. Such an examination extends entrepreneurial cognition research as stated by Mitchell et al. (2002), which reinforces the important role of the entrepreneur in venture creation phenomena. Alternative perspectives submit that exogenous factors contribute more significantly to venture creation decisions. Second, our findings help to provide some insights into why entrepreneurs tend to be more overconfident than non-entrepreneurs. The more overconfident are more inclined to choose to decide to start a new venture in greater numbers than those who are less overconfident. Essentially, the overconfident select themselves into the act of entrepreneurship. However, selection into this pool of risk-takers is not based on higher propensities for risk. Rather, they are based on misperceptions of risk emanating from a belief that they are "better than most," thus resulting in the overestimation of their chance for success (Cassar 2010; Cooper et al. 1988; Steen 2011; Svenson 1981) and perhaps lower quality decisions (Kydd 1989). Finally, this study takes small steps towards

addressing the utility of overconfidence measures, which may help address concerns raised by some critiques regarding the way in which overconfidence is measured (Moore and Healy 2008). Although this is not the final chapter on the matter, the findings of this manuscript suggest that a long-standing measure for overconfidence established in the psychology literature has continued utility in entrepreneurship research based on the significant results presented here.

Limitations and future research

Important relationships are established in this study that explain how the cognitive states of entrepreneurs affect decisions to create ventures. However, there are several noteworthy limitations. First, this study utilizes a college student sample. Although credible arguments have been made for a sample of college students (Schwenk 1984), some may question the generalizability of findings reported here. Relative to working adults, college students have a different set of experiences resulting in different knowledge levels. Additionally, limiting the sample to business students may also limit generalizability of the findings in this study. Still, it is important to note that college students make decisions regarding their careers such as whether to work for an employer or to work for themselves. Furthermore, college students may be more informed about the true challenges of starting a business given the training received in the pursuit of their college degrees.

Second, the sample is relatively small. Some may view this as problematic. Alternatively, others may argue that these significant findings relative to the sample size is not a limitation. Rather, finding significant relationships given the sample size and based on the data presented is substantial. As sample sizes become increasingly larger, they tend to increase the chance of producing significant results. Finding results with a smaller sample size suggests that the relationships truly exist. Increasing the sample size may also cause the proposed relationship between overconfidence and venture creation decisions to be fully mediated by risk perceptions.

Although this study provides empirical evidence regarding the effects of overconfidence on venture creation decisions as partially mediated by risk perceptions, little is known concerning the subsequent effects of overconfidence on decision-making (Kydd 1989) and various aspects of venture performance. Hence, future research should explore these relationships. For instance, future research should examine the effects of overconfidence on revenues, profitability, and venture growth. Whereas a reduction of overconfidence among potential entrepreneurs might result in a reduction of overall entrepreneurs, maintaining high levels of overconfidence subsequent to decisions to start a new venture may produce a reduction in the overall number of would be entrepreneurs. Future research might examine the extent to which these effects tend to offset one another in a paradoxical relationship.

Future research might also examine whether the relationships presented here hold true across various settings. Examining how industry effects influence the extent to which overconfidence and/or risk perceptions affect venture creation decisions informs future research in entrepreneurship. For instance, some industries may mitigate the relationships hypothesized in this manuscript. Also, studying the impact of exogenous variables such as environmental factors may also explain important

phenomenon such as the impact of environments that tend to be dynamic, uncertain, or hyper competitive. This study is the first of which we know to offer such findings. Given the importance of entrepreneurship, the significant empirical findings presented in this study provide a solid platform upon which future research can be established and have implications for both theory and practice.

Finally, like cognitive constructs, affective constructs continue to explain entrepreneurial phenomena of interest (Cardon et al. 2012) and relevance to the broader conversation which this manuscript contributes. Research has shown that emotions are associated with opportunity evaluation and exploitation thus affecting entrepreneurial outcomes (Welpe et al. 2012). More specifically, Hayton and Cholakova (2012) draw directs links between affective and cognitive constructs along with perceptions and venture creation decisions. The authors provide a number of propositions supporting the role that affect plays regarding opportunities and perception. While they focus on sources of opportunities and idea perceptions, future research may identify testable hypotheses which examine the relationship between affect, opportunity evaluation, and risk perceptions. Notwithstanding studies which found negative associations between hope and risk perceptions (Podoynitsyna et al. 2012), future studies could further scrutinize and provide empirical evidence for direct, mediating, and moderating relationships between affect, cognition, and entrepreneurial phenomena to enrich this conversation.

Appendix

Surveys

Overconfidence survey items

1. How many patents did the U.S. Patent and Trademark Office issue in 1990?
   Low estimate: _____ High estimate: _____
2. How many of *Fortune's* 1990 "Global 500," the world's biggest industrial corporations (in sales), were Japanese?
   Low estimate: _____ High estimate: _____
3. How many passenger arrivals and departures were there at Chicago's O'Hare airport in 1989?
   Low estimate: _____ High estimate: _____
4. What was the total audited worldwide daily circulation of the *Wall Street Journal* during the first half of 1990?
   Low estimate: _____ High estimate: _____
5. How many master's degrees in business and management were conferred in the United States in 1987?
   Low estimate: _____ High estimate: _____
6. How many passenger deaths occurred worldwide in scheduled commercial airliner accidents in the 1980's?
   Low estimate: _____ High estimate: _____
7. What is the shortest navigable distance (in statute miles) between New York City and Istanbul?
   Low estimate: _____ High estimate: _____

8. What was General Motors' total worldwide factory sales of cars and trucks (in units) in the 1980's?
   Low estimate: _____ High estimate: _____
9. How many German automobiles were sold in Japan in 1989?
   Low estimate: _____ High estimate: _____
10. What was the total U.S. merchandise trade deficit with Japan (in billions) in the 1980's?
   Low estimate: _____ High estimate: _____

Risk perception survey items

I believe that…

1. The probability of the business' product introduction doing poorly is very high.
2. The amount the business could lose by introducing new products is substantial.
3. There is great uncertainty when predicting how well the business will do with new product introductions.
4. The overall riskiness of the business' product introduction is high.
5. Overall, I would label the option of introducing new products as something negative.
6. I would label introducing new products as a potential loss.
7. Introducing a new product will have negative ramifications for the business' future.
8. There is high probability of the business losing a great deal by introducing new products.

Risk propensity survey items

Select the alternative that you would feel most comfortable with:

1. a) an 80 % chance of winning $400, or
   b) receiving $320 for sure
2. a) receiving $300 for sure, or
   b) 20 % chance of winning $1,500
3. a) an 90 % chance of winning $200, or
   b) receiving $180 for sure
4. a) receiving $160 for sure, or
   b) 10 % chance of winning $1,600
5. a) an 50 % chance of winning $500, or
   b) receiving $250 for sure

Venture creation decision survey items

1. I would start this business.
2. I would forgo other career choices to start this business.
3. I would quit my job to start this business.

References

Alicke, M. D., & Govorun, O. (2005). The better-than-average effect. In M. D. Alicke, D. Dunning, & J. Krueger (Eds.), *The self in social judgment* (pp. 85–106). New York: Psychology Press.

Anderson, C., Brion, S., Moore, D. A., & Kennedy, A. (2012). A status-enhancement account of overconfidence. *Journal of Personality and Social Psychology, 103*(4), 718–735.

Barnes, J. H., Jr. (1984). Cognitive biases and their impact on strategic planning. *Strategic Management Journal, 5*, 129–137.

Baron, R. A. (1998). Cognitive mechanisms in entrepreneurship: why and when entrepreneurs think differently than other people. *Journal of Business Venturing, 13*, 275–294.

Baron, R. A. (2004). The cognitive perspective: a valuable tool for answering entrepreneurship's basic 'why' questions. *Journal of Business Venturing, 19*(2), 221–239.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Barr, P. S., Stimpert, J. L., & Huff, A. S. (1992). Cognitive change, strategic action, and organizational renewal. *Strategic Management Journal, 13*, 15–36.

Bazerman, M. H. (1984). *Judgment in managerial decision-making* (2nd ed.). New York: Wiley.

Bazerman, M. H. (1998). *Judgment in managerial decision-making* (4th ed.). New York: Wiley.

Bazerman, M. H. (2001). *Judgment in managerial decision-making* (5th ed.). New York: Wiley

Bernardo, A. E., & Welch, I. (2001). On the evolution of overconfidence and entrepreneurs. *Journal of Economics & Management Strategy, 10*(3), 301–330.

Buehler, R., Griffin, D., & Ross, M. (1994). Exploring the "planning fallacy": why people underestimate their task completion times. *Journal of Personality and Social Psychology, 67*, 366–381.

Busenitz, L. (1999). Entrepreneurial risk and strategic decision-making. *Journal of Applied Behavioral Science, 35*, 325–340.

Busenitz, L. W., & Barney, J. B. (1997). Biases and heuristics in strategic decision-making: differences between entrepreneurs and managers in large organizations. *Journal of Business Venturing, 12*(1), 9–31.

Busenitz, L. W., & Lau, C. M. (1997). A cross-cultural cognitive model of new venture creation. *Entrepreneurship Theory and Practice*, 25–39.

Camerer, C., & Lovallo, D. (1999). Overconfidence and excess entry: an experimental approach. *American Economic Review, 89*(1), 306–318.

Cardon, M., Foo, M., Shepherd, D., & Wiklund, J. (2012). Exploring the heart: entrepreneurial emotion is a hot topic. *Entrepreneurship: Theory and Practice, 36*(1), 1–10.

Cassar, G. (2010). Are individuals entering self-employment overly optimistic? An empirical test of plans and projections on nascent entrepreneur expectations. *Strategic Management Journal, 31*, 822–840.

Chrisman, J. J., Bauerschmidt, A., & Hofer, C. W. (1999). The determinants of new venture performance: an extended model. *Entrepreneurship Theory and Practice*, 5–29.

Cooper, A. C., Dunkelberg, W. C., & Woo, C. Y. (1988). Entrepreneurs' perceived chances for success. *Journal of Business Venturing, 3*(2), 97–108.

Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretation systems. *Academy of Management Review, 9*(2), 284–295.

Duhaime, I., & Schwenk, C. R. (1985). Conjectures on cognitive simplification in acquisition and divestment decision making. *Academy of Management Review, 10*, 287–295.

Dunning, D., Heath, C., & Suls, J. M. (2004). Flawed self-assessment: implications for health, education, and the workplace. *Psychological Science in the Public Interest, 5*, 69–106.

Edleman, L., & Yli-Renko, H. (2010). The impact of environment and entrepreneurial perceptions on venture-creation efforts: bridging the discovery and creation views of entrepreneurship. *Entrepreneurship Theory and Practice*, 833–856.

Einhorn, H. J., & Hogarth, R. M. (1978). Confidence in judgment: persistence in the illusion of validity. *Psychological Review, 85*(5), 395–416.

Estes, W. K. (1975). *Handbook of learning and cognitive processes (vol. 1 ed.)*. Hillsdale: Lawrence-Erlbaum.

Fiske, S. T., & Taylor, S. E. (1991). *Social cognition* (2nd ed.). New York: McGraw-Hill.

Forbes, D. P. (2005). Are some entrepreneurs more overconfidence than others? *Journal of Business Venturing, 20*, 623–640.

Forlani, D., & Mullins, J. (2000). Perceived risks and choices in entrepreneurs' new venture decisions. *Journal of Business Venturing, 15*, 305–322.

Galasso, A., & Simcoe, T. S. (2011). CEO overconfidence and innovation. *Management Science*, 1469–1484.

Gartner, W. (1985). A conceptual framework for describing the phenomenon of new venture creation. *Academy of Management Review, 10*(4), 696–706.
Gervais, S., Heaton, J. B., & Odean, T. (2011). Overconfidence, compensation contracts, and capital budgeting. *Journal of Finance, 5*, 1735–1777.
Griffin, D. W., & Varey, C. A. (1996). Towards a consensus on overconfidence. *Journal of Organizational Behavior and Human Decision Processes, 65*(3), 227–231.
Hayton, J., & Cholakova, M. (2012). The role of affect in the creation and intentional pursuit of entrepreneurial ideas. *Entrepreneurship: Theory and Practice, 36*(1), 41–67.
Hayward, M. L., Shepherd, D., & Griffin, D. (2006). A hubris theory of entrepreneurship. *Management Science, 52*(2), 160–172.
Hoelzl, E., & Rustichini, A. (2005). Overconfidence: do you put your money on it? *The Economic Journal, 115*, 305–315.
Janney, J. J., & Dess, G. G. (2006). The risk concept for entrepreneurs reconsidered: new challenges to the conventional wisdom. *Journal of Business Venturing, 21*(3), 385–400.
Kahneman, D., & Lovallo, D. (1993). Timid choices and bold forecasts: a cognitive perspective on risk taking. *Management Science, 39*(1), 17–31.
Keh, H. T., Foo, D. M., & Lim, B. C. (2002). Opportunity evaluation under risky conditions: the cognitive processes of entrepreneurs. *Entrepreneurship, Theory and Practice*, 125–148.
Klayman, J., Soll, J., Gonzalez-Vallejo, J., & Barlas, S. (1999). Overconfidence: it depends on how, what and whom you ask. *Organizational Behavior and Human Decision Processes, 79*, 216–247.
Knight, F. H. (1921). *Risk, uncertainty, and profit*. Boston: Houghton Mifflin.
Koellinger, P., Minniti, M., & Schade, C. (2007). "I think I can, I think I can": overconfidence and entrepreneurial behavior. *Journal of Economic Psychology, 28*, 502–527.
Kreye, M. E., Goh, Y. M., Newnes, L. B., & Goodwin, P. (2012). Approaches to displaying information to assist decisions under uncertainty. *Omega International Journal of Management Science, 40*(6), 682–692.
Krueger, J. I., & Wright, J. C. (2011). Measurement of self-enhancement (and self-protection). In M. D. Alicke & C. Sedikides (Eds.), *Handbook of self-enhancement and self-protection* (pp. 472–494). New York: Guilford Press.
Kydd, C. T. (1989). Cognitive biases in the use of computer-based decision support systems. *Omega International Journal of Management Science, 17*(4), 335–344.
Lichtenstein, M. B., & Brush, C. G. (2001). How do "resource bundles" develop and change in new ventures? A dynamic model and longitudinal exploration. *Entrepreneurship Theory and Practice*, 37–58.
Linan, F., Santos, F. J., & Fernandez, J. (2011). The influence of perceptions on potential entrepreneurs. *International Entrepreneurship and Management Journal, 7*(3), 373–390.
Lowe, R. A., & Ziedonis, A. A. (2006). Overoptimism and the performance of entrepreneurial firms. *Management Science, 52*(2), 173–186.
MacCrimmon, K. R., & Wehrung, D. A. (1990). Characteristics of risk-taking executives. *Management Science, 36*(4), 422–435.
Malmendier, U., & Tate, G. (2005). CEO overconfidence and corporate investment. *Journal of Finance, 60*(6), 2661–2700.
Mitchell, R. K., Buseniz, L. W., Lant, T., McDougall, P. P., Morse, E. A., & Smith, J. B. (2002). Toward a theory of entrepreneurial cognition: rethinking the people side of entrepreneurship research. *Entrepreneurship Theory and Practice*, 93–104.
Mitchell, R. K., Buseniz, L. W., Lant, T., McDougall, P. P., Morse, E. A., & Smith, J. B. (2004). The distinctive and inclusive domain of entrepreneurial cognition research. *Entrepreneurship Theory and Practice*, 505–518.
Mitchell, R. K., Buseniz, L. W., Bird, B., Gaglio, C. M., McMullen, J. S., Morse, E. A., & Smith, J. B. (2007). The central question in entrepreneurial cognition research 2007. *Entrepreneurship Theory and Practice*, 1–27.
Moore, D. A., & Cain, D. M. (2007). Overconfidence and underconfidence: when and why people underestimate (and overestimate) the competition. *Organizational Behavior Human Decision Processes, 103*(2), 197–213.
Moore, D. A., & Healy, P. J. (2008). The trouble with overconfidence. *Psychological Review, 115*(2), 502–517.
Neisser, U. (1967). *Cognitive psychology*. New York: Appleton-Century-Crafts.
Nutt, P. C. (1986). Decision style and strategic decisions of top executives. *Technological Forecasting and Social Change, 30*, 39–62.
Nutt, P. C. (1993). Flexible decision styles and the choices of top executives. *Journal of Management Studies, 30*(5), 695–721.
Oskamp, S. (1965). Overconfidence in case-study judgments. *Journal of Consulting Psychology, 29*, 261–265.

Palich, L., & Badgy, D. (1995). Using cognitive theory to explain entrepreneurial risk-taking: challenging conventional wisdom. *Journal of Business Venturing, 10*(6), 425–438.
Penrose, E. G. (1959). *The theory of the growth of the firm*. New York: Wiley.
Petrakis, P. E. (2007). The effects of risk and time on entrepreneurship. *International Entrepreneurship and Management Journal, 3*(3), 277–291.
Podoynitsyna, K., Van der Bij, H., & Song, M. (2012). The role of mixed emotions in the risk perception of novice and serial entrepreneurs. *Entrepreneurship: Theory and Practice, 36*(1), 115–140.
Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: problems and prospects. *Journal of Management, 12*, 531–544.
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903.
Russo, J. E., & Schoemaker, P. J. (1992). Managing overconfidence. *Sloan Management Review, 23*, 7–17.
Sarasvathy, S. D., Menon, A. R., & Kuechle, G. (2011). Failing firms and successful entrepreneurs: serial entrepreneurship as a temporal portfolio. *Small Business Economics*, 1–16.
Scheier, M. R., & Carver, C. S. (1985). Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychology, 4*, 219–247.
Schenkel, M. T., Matthews, C. H., & Ford, M. T. (2009). Making rational us of 'irrationality'? Exploring the role of need for cognitive closure in nascent entrepreneurial activity. *Entrepreneurship & Regional Development, 21*(1), 51–76.
Schwenk, C. R. (1984). Cognitive simplification processes in strategic decision-making. *Strategic Management Journal, 5*(2), 111–128.
Schwenk, C. R. (1986). Information, cognitive biases, and commitment to a course of action. *Academy of Management Review, 11*, 298–310.
Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review, 25*(1), 217–226.
Shaver, K. G., & Scott, L. R. (1991). Person, process, choice: the psychology of new venture creation. *Entrepreneurship: Theory and Practice, 16*(2), 23–39.
Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics, 69*(1), 99–118.
Simon, H. A. (1976). Bounded rationality and organizational learning. *Organization Science, 2*(1), 125–134.
Simon, M., & Houghton, S. (2003). The relationship between overconfidence and the introduction of risky products: evidence from a field study. *Academy of Management Journal, 46*(2), 139–149.
Simon, M., & Shrader, R. (2012). Entrepreneurial actions and optimistic overconfidence: the role of motivated reasoning in new product introductions. *Journal of Business Venturing, 27*(3), 291–309.
Simon, M., Houghton, S., & Aquino, K. (2000). Cognitive biases, risk perception, and venture formation: how individuals deice to start companies. *Journal of Business Venturing, 15*(2), 113–134.
Sitkin, S., & Pablo, A. (1992). Reconceptualizing the determinants of risk behavior. *Academy of Management Review, 17*(1), 9–38.
Sitkin, S., & Weingart, L. (1995). Determinants of risky decision-making behavior: a test of the mediating role of risk perceptions and propensity. *Academy of Management Journal, 38*(6), 1573–1592.
Steen, E. V. (2011). Overconfidence by Bayesian-rational agents. *Management Science*, 884–896.
Stevenson, H. H., & Gumpert, D. E. (1985). The heart of entrepreneurship. *Harvard Business Review, 63*(2), 85–94.
Sutcliffe, K. M. (1994). What executives notice: accurate perceptions in top management teams. *Academy of Management Journal, 37*(5), 1360–1378.
Svenson, O. (1981). Are we all less risky and more skillful than our fellow drivers? *Acta Psychologica, 47*(2), 143–148.
Thomas, J. B., & McDaniel, R. R., Jr. (1990). Interpreting strategic issues: effects of strategy and the information-processing structure of top management teams. *Academy of Management Journal, 33*(2), 286–306.
Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: heuristics and biases. *Science, 185*(4157), 1124–1131.
Vogt, W. P. (2007). *Quantitative research methods for professionals*. Boston: Pearson.
Weick, K. E. (1995). *Sensemaking in organizations*. Newbury Park: Sage Publications.
Welpe, I. E., Sporrle, M., Grichnik, D., Michl, T., & Audretsch, D. B. (2012). Emotions and opportunities: the interplay of opportunity evaluation, fear, joy, and anger as antecedent of entrepreneurial exploitation. *Entrepreneurship: Theory and Practice, 36*(1), 691–696.
Willimams, E. F., & Gilovich, T. (2008). Do people really believe they are above average? *Journal of Experimental Social Psychology, 44*, 1121–1128.
Zacharakis, A., & Shepherd, D. (2001). The nature of information and overconfidence on venture capitalists' decision making. *Journal of Business Venturing, 16*, 311–332.