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Founder Metacognitive Knowledge and the Adoption of Entrepreneurial Orientation in Leading New Ventures

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Abstract

This study explores the relationship between founding entrepreneurs' metacognitive knowledge and the adoption of entrepreneurial orientation (EO) in their new ventures. While much is known about the nature of EO and its relationship with new venture performance, far less research is available concerning why entrepreneurs adopt EO for their firms. Drawing upon upper echelons and social cognitive theories, we theorize that founders' self-regulation, and more specifically their metacognitive knowledge, may play a significant role across all three elements of EO (innovativeness, pro-activeness, and risk taking). We test our assertions on a sample of 144 entrepreneurs. Our results offer significant support for our hypothesized relationships. We conclude with a discussion of the ramifications of our findings and offer a number of future research avenues as a result of our study.

Keywords: entrepreneurial orientation, metacognition, self-regulation, new venture leadership

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1. Introduction

New ventures are as varied and unique as the entrepreneurs who launch them. Thus, it is far from surprising that they can, and often do, pursue a wide range of strategies in their quest to gain competitive advantage (Barringer & Ireland 2012). Although the scope and variety of such strategies is truly vast, one approach to operating new ventures that has received a great deal of attention from entrepreneurship researchers is entrepreneurial orientation (EO) (Covin & Lumpkin 2011; Wales, Patel & Lumpkin 2013). Entrepreneurial orientation has traditionally been viewed as involving three distinct but related components: pro-activeness, innovativeness, risk-taking, and has been the focus of a large body of research (Miller 1983, 2011). As a result of this ongoing work, much is known about the nature of EO (Covin & Lumpkin 2011), and its role in organizational learning (Kreiser 2011), family business (Dess, Pinkahhba & Yang 2011), new business creation (Miller 2011), and several aspects of firm performance (Rauch Wiklund, Lumpkin & Frese 2009).

In contrast, however, relatively little is currently known about another important issue: "Why do founding entrepreneurs adopt EO for their companies?". In one sense, doing so is puzzling because EO involves very challenging

goals (e.g., being "first" to market; generating an array of highly innovative products), and it is unclear how young companies, which have limited resources and are often headed by founders with little executive experience, can hope to achieve these goals (*see* also Soulder, Simsek & Johnson's findings about differences between CEO founders and agents and firm performance; Souder, Simsek & Johnson 2012). Our primary question is: "Why, then, do founding entrepreneurs often adopt EO for their firms?". One informative study concerning adoption of EO was conducted by Simsek and colleagues (Soulder, Simsek & Johnson 2010) who found that CEO's core self-evaluations (Erez & Judge 2001) were positively related to EO, at least in dynamic environments. These authors predicted that this would be the case because CEOs' with high core self-evaluation would tend to emphasize the upside potential of entrepreneurial opportunities, and, moreover, tend to believe that they can master the environment to obtain positive outcomes – in this case, progress toward the ambitious goals identified by EO. Aside from this there is a paucity of relevant information in current literature concerning why entrepreneurs choose to adopt EO.

The present research seeks to add to this knowledge by investigating the relationship between adoption of EO and a key aspect of founding entrepreneurs' self-regulation. The potential role of self-regulation in adoption of EO is suggested by certain features of Bandura's social cognitive theory (Bandura 1997, 2012), as well as existing research in managerial cognition (i.e., Hambrick & Mason 1984). In what follows, we review the literature on EO, social cognitive theory, upper echelons and self-regulation. We then introduce our hypotheses and the method used for testing our assertions. To conclude, we discuss our results and implications for research.

2. Literature

2.1. The nature of entrepreneurial orientation

Entrepreneurial orientation (EO), as defined by Lumpkin and Dess (Lumpkin & Dess 1996), and as measured by Covin and Slevin (Covin & Slevin 1989), involves three distinct, but interrelated components: *pro-activeness* – a preference for highly competitive actions and for introducing new products or services ahead of competitors; *innovativeness* – an emphasis on developing many new lines of products or services, often through heavy investment in R&D activities; and *risk-taking* – a proclivity for high-risk projects, bold, aggressive actions, and for moving quickly to exploit opportunities (Covin & Lumpkin 2011).

A large body of findings indicates that EO is significantly related to many aspects of firm-level performance, although this relationship is somewhat stronger in very small (micro) organizations than larger ones, and more prevalent in high-tech rather than low-tech firms (Rauch, Wiklund, Lumpkin & Frese 2009). Thus, there is already considerable evidence for the importance of EO which, in a sense, reflects the essence of an entrepreneurial approach to conducting business. In fact, in describing the fundamental role of EO in entrepreneurship, Simsek, Heavey, and Veiga note: "[g]iven that entrepreneurial orientation has become central to a firm's ability to compete, adapt, and perform effectively…scholars have begun to show greater interest in its origins", (Simsek, Heavey & Veiga 2010: 111). It is these origins – factors that may predispose entrepreneurs toward the adoption of EO – that constitute the central motivation behind the present research.

Ongoing research exploring EO has suggested that one such origin of EO is managerial cognition since the top level manager(s) is/are likely to have the greatest ability to shape firm level outcomes (Dess & Lumpkin 2005). In entrepreneurial ventures, the CEO is often the founding entrepreneur(s). As supported by a long line of research in the upper echelons tradition, individuals are likely to act on their cognition (Hambrick & Mason 1984). Thus, we believe that an entrepreneur's self regulatory schema – a key cognitive process, will influence the adoption of EO.

2.2. Self-regulation

Self-regulation includes the cognitive processes through which individuals monitor, guide, and adjust their own behavior in order to move toward, and ultimately attain, key goals (Vohs & Baumeister 2010). Self-regulation has been found to be an important component of success in a wide range of domains and across a wide number of activities (Baumeister & Tierney 2011). Indeed, as noted by Forgas, Baumeister and Tice (Forgas, Baumeister & Tice 2009), self-regulation is only one of two variables that have been found to predict achievement across the entire range of human endeavors – activities ranging from sports and the arts, to science, creative writing and a very wide range of work-related tasks. Intelligence is the only one other variable identified by Forgas, Baumeister and Tice as meeting this broad criterion (Forgas, Baumeister & Tice 2009: 3).

Central to the current research, however, there are several reasons why self-regulation may be especially relevant to the performance of founding entrepreneurs. First, in an important sense, entrepreneurs are very much on their own. In contrast to individuals in many other careers or

walks of life, they face situations in which there are few, if any, external rules or norms to guide their behavior and indicate the most effective ways to proceed. In addition, they generally have no supervisors, coaches, or other persons who evaluate their performance, provide feedback, and advise them on specific actions or how to improve their performance of key tasks.

Certainly, co-founders can, and often do, provide valuable input, and preparing detailed business plans and models can guide entrepreneurs' behavior; although, often these plans are changed radically after a business is launched (Hmieleski & Baron 2008). Similarly, since entrepreneurs, by definition, are attempting to create something new (Baron & Shane 2008), they often face situations in which no external help or guidance is actually available because the products and services they seek to develop are different, in important ways, from those that currently exist. As a result of these and other conditions, entrepreneurs must often depend primarily on their own judgment, knowledge, and skills to identify and implement means for attaining, or at least moving toward, key goals. Thus, self-regulation may be especially relevant to, and important, in this context.

2.3. Metacognition

One such aspect of self-regulation that we theorize is particularly instrumental in the adoption of EO is metacognitive knowledge. Metacognition refers to individuals' understanding of, and knowledge about, their own cognition. It includes knowledge of strategies that can be used for different tasks, knowledge of the conditions under which these strategies are appropriate, and the extent to which they are effective. In addition, and most relevant for the present research, metacognitive knowledge also includes knowledge of oneself – for instance, recognition and understanding of one's own strengths and limitations, and what one knows and does not know (Haynie, Shepherd, Mosakowski & Early 2010). We argue that this self-knowledge is especially relevant to entrepreneurship, and to the adoption of EO, because entrepreneurs must have the capacity to accurately assess current courses of action and their resulting consequences in order to determine whether they are, or are not, achieving their goals.

3. Theoretical foundations

From a theoretical perspective, there are several explanations for why self-regulation, and specifically metacognition, should be related to new ventures' adopting an entrepreneurial orientation. First, Upper Echelon's Theory (Hambrick & Mason 1984; Hambrick 2007) has suggested that firm-level orientations are likely the reflection of the firm's top-level managers. Thus, managers are seen as a chief force in shaping the actions of the firm. To fully understand these actions, it is necessary to explore in more depth the managers making the decisions, and what drives these managers to think and act in the ways that they do.

A wealth of prior research has supported these assertions. Most recently, research in the upper echelon's tradition has focused on how managerial personality impacts firm level attributes. For instance, Chatterjee and Hambrick (Chatterjee & Hambrick 2007) and Hiller and Hambrick (Hiller & Hambrick 2005) both found that CEO personality characteristics, such as narcissism and hyper-core self-evaluations, impacted firm strategy. More recent research, and more in line with this study, Simsek and colleagues (Simsek, Heavey & Veiga 2010) found that CEO core self-evaluation was positively associated with a firm's entrepreneurial orientation.

We highlight these studies not because we believe that the CEOs represented in these studies (in which the CEOs are the heads of larger firms) are analogous to founding entrepreneurs, but to suggest that those in charge of companies often have a profound effect on their company's behavior. In particular, these studies support the notion that upper echelon decision makers' cognitive frames (specifically, personality characteristics) influence firm level strategic actions and orientations. Our study extends this line of inquiry beyond personality traits to the cognitive process of self-regulation.

In addition to upper echelons theory, *social cognitive theory* suggests, in part, that the relationship between cognitive processes, environmental (i.e., external) conditions, and complex human behavior are reciprocal in nature. Cognitive processes shape actions, and are, in turn, strongly influenced by these actions. As Bandura puts it: "[w]hat people think, believe, and feel affects how they behave. The … effects of their actions, in turn, partly determine their thoughts and affective reactions", (Bandura 1997: 25). Further, Bandura adds: "[p]eople regulate their level and distribution of effort in accordance with the effects they expect their actions to have. As a result, their behavior is better predicted by their beliefs than from the actual consequences of their actions", (Bandura 1997: 129), and notes that, "in sum, social cognitive theory calls attention to the crucial role of the cognitive processes individuals employ to regulate and guide their own behavior, and offers insights into why such processes often play a key role in successful performance of many tasks. By extension, it

also suggests that persons high in the capacity to regulate their own behavior often, in a sense, generate their own futures rather than simply experience or predict them", (Bandura 1997, 2012).

Crucially, a social cognitive perspective further suggests that the cognitive processes through which individuals regulate and guide their own behavior play a key role in their actual performance. Through these processes, individuals form beliefs about what they can and cannot do, anticipate the likely consequences of their planned actions, select and set goals, monitor their progress toward these goals, and plan actions and strategies to attain them (Bandura 1986; Johnson & Delmar 2010). Past research on self-regulation and its effects has generally focused on individual level performance (Vohs & Baumeister 2010). In this study we seek to contribute to further development of this theory by examining possible links between self-regulation and decisions that have important consequences for firm-level outcomes – in this case, the adoption of EO.

In accordance with these theoretical lenses, we suggest that founder cognition may play a significant role in the adoption of EO. However, we further believe that this happens because metacoginitive knowledge will impact each aspect of EO. While existing research tends to focus on exploring EO as a singular construct, one of the strengths of our study is that we explore each facet individually. As noted by Miller (Miller 2011), attention to EO's individual components may often be highly informative. As Miller puts it: "[s]ometimes … the components of EO are more telling than the aggregative index", (Miller 2011: 880). For instance, risk-taking may be especially relevant to actually starting a business, while innovativeness may be especially pertinent to operating a startup in a high-tech context (Miller 2011). Thus, although we accept the view that EO is a higher-order construct, and that its components reflect this overall construct, we also recognize that attention to these components and the factors related to them may also be useful. Consistent with this reasoning, the present research considers relationships between aspects of founding entrepreneurs' self-regulation and each component of EO.

4. Hypotheses

In a sense, the primary goal of self-regulation is that of facilitating progress toward, or attainment of important goals. An entrepreneurial orientation suggests a set of goals that new ventures strive to achieve (e.g., being "first" to market; developing highly innovative products or services). Thus, our basic reasoning for why founders' self-regulation may be significantly related to the adoption of EO by their firms is as follows. The goals identified by EO (e.g., being "first" to market with new products, acceptance of high levels of risk) are very challenging. Thus, achieving them requires effective use of available resources and careful strategic planning. We suggest that well-developed self-regulatory skills may be highly beneficial in accomplishing these tasks. Specifically, to the extent that founding entrepreneurs possess strong and effective self-regulatory skills, they may be more willing to adopt EO and attempt to reach the goals it identifies.

Generally most new ventures have limited resources. Yet, active pursuit of the key components of EO (e.g., being highly innovative) may well stretch these resources to the limit or beyond. In order to conserve and protect such limited resources, it is necessary for founding entrepreneurs to be able to accurately evaluate the likelihood that various actions or strategies will lead to desired goal attainment. For instance, consider pro-activeness, which emphasizes the goal of being "first" to market. If attainment of this goal is not, in fact, feasible (e.g., competitors are far ahead in terms of product development), it is important for entrepreneurs to both monitor and recognize this fact and adjust their goals – and strategies – accordingly.

Similarly, innovativeness often requires heavy investment in R&D activities. In order to avoid needless depletion of limited resources by investing them in projects unlikely to succeed, it is important for founding entrepreneurs to be able to recognize, early on, which ideas about products and services are most, and least promising, and to pursue them accordingly (Gebert, Boerner & Lanwehr 2003). Finally risk-taking – a proclivity for taking on high-risk projects, bold, aggressive actions, and for moving quickly to exploit opportunities – again calls for accurate judgments as to which risks are worth assuming and which should be avoided or terminated.

The capacity to make these judgments is especially important for entrepreneurs, since they often face unusually high levels of uncertainty (Alvarez & Barney 2005). Metacognitive knowledge useful in making such judgments can be highly beneficial to founding entrepreneurs. In short, we are proposing that to the extent that entrepreneurs recognize their own capacity to identify failing courses of action or strategies and withdraw from them, they will be more prepared for adopting the very challenging goals of EO. Therefore, we offer the following hypotheses:

Hypothesis 1: There is a positive relationship between founding entrepreneurs' metacognitive knowledge (specifically, knowledge of their own capacity to accurately evaluate the success of current actions or strategies and withdraw rapidly

from ones that unsuccessful) and their firm's adoption of the innovativeness are component of EO.

Hypothesis 2: There is a positive relationship between founding entrepreneurs' metacognitive knowledge and their firm's adoption of the pro-activity component of EO.

Hypothesis 3: There is a positive relationship between founding entrepreneurs' metacognitive knowledge and their firm's adoption of the risk-taking component of EO.

5. Method

5.1. Sample and procedures

Participants in the current research included 144 founding entrepreneurs. These individuals responded to an online survey designed by the researchers and presented on *Qualtrics*. Potential entrepreneurs were identified through their membership in local networking organizations specifically established for startup entrepreneurs. An initial question on the survey was used to determine if respondents were indeed founders of their companies, and only data from individuals who answered affirmatively were included in the research. Completion of the survey required approximately 15 to 20 minutes. To further encourage participation, participants received a chance to win an entrepreneurship textbook and other small awards to be given away randomly to participants who were interested. To participate, respondents emailed their names to that address, and after the drawing, the email addresses were deleted.

5.2 Measures

Metacognitive Knowledge (α = 0.82). To evaluate metacognitive knowledge, six items based on previous research were selected (Haynie & Shepherd 2009). A Likert-type seven-point response scale ranging from one (not at all like me) to seven (just like me) was used for each item. Sample items include "I am usually very good at knowing when to stick with a project/venture, and when to walk away and cut my losses," and "I have a tendency to stick with projects/ventures even if they are not producing the positive results I expected" (reverse scored). Responses were averaged such that higher scores reflect a greater degree to which the individual is able to regulate his/her behavior so as to accurately assess the effectiveness of various courses of action and rapidly withdraw from ones that are not generating progress toward key goals.

Entrepreneurial Orientation. EO was assessed using a measure developed by Covin and Slevin (Covin & Slevin 1989). Three items were used for each facet of EO: innovativeness (α = 0.56), proactiveness (α = 0.65), and risk-taking (α = 0.86). All items used a seven-point semantic differential scale (Friborg, Martinussen & Rosenvinge 2006). Responses were averaged for each dimension of EO, such that higher scores reflect a greater level of the respective facet of EO.

Control Variables. We controlled for one aspect of self-regulation related to metacognition – self-control. Self-control has been described, informally, as *willpower* (Baumeister & Tierney 2011). Self-control refers to the cognitive process through which individuals regulate their own behavior so as to (1) perform actions necessary for goal attainment, even if they do not find these actions intrinsically enjoyable, and (2) resist powerful temptations to engage in actions which will impede or prevent goal attainment but are, however, intrinsically appealing (e.g., drawing a salary rather than re-investing profits in the growth of the business). In one sense, self-control is closely related to metacognition.

To measure self-control (α = 0.79), we used a thirteen-item self-control scale developed by Baumeister, Vohs, and Tice (Baumeister, Vohs & Tice 2007). This scale has been used in many previous studies, and has been shown to have high reliability and validity. Sample items include: "I am good at resisting temptation" and "I am able to work effectively toward long-term goals". A Likert-type five-point response scale ranging from one (not at all like me) to five (just like me) was used for each item. Responses were averaged such that higher scores reflect greater levels of self-control.

In addition to self-control, we also included the following demographic characteristics as controls: gender (male =0, female=1), age (years old), and level of education (a seven-point scale ranging from less than high school degree through doctoral or professional degree).

6. Analysis and statistical procedures

A series of confirmatory factor analyses (CFA) were conducted to access the distinctiveness of the focal variables examined in our study. Goodness of fit was considered using the root-mean-square error of approximation (RMSEA) and the comparative fit index (CFI). Common threshold values were used as indicators of fit (RMSEA ≥ 0.08 and CFI ≤ 0.90). Our first CFA tested a five-factor model (i.e., Metacognitive Knowledge, Self-Control, EO – Innovativeness, EO – Proactivity, EO – Risk-Taking) allowing the latent factors to freely correlate. This model was found to be a good fit to the observed data, $\chi^2(243) = 363.466$, RMSEA = 0.059 (with a 90% CI range of 0.046 to 0.071), and CFI = 0.902. Our five-factor model was then compared to a series of restricted models that each constrained the correlation of one

pair of constructs to 1.0. Findings of chi-square difference tests demonstrated that each alternative model with unity constraints was a worse fitting model to the observed data.

In addition, CFA was also used to determine the degree of common method variance in our data. Through the addition of a latent common method factor to our five-factor measurement model, we were able to determine the potential increase in model fit when taking into account a common method factor and the variance extracted by this factor (Dulac, Coyle-Shapiro, Henderson & Wayne 2008). Findings demonstrated that the addition of a method factor to the five substantive construct factors improved model fit, $\Delta\chi^2$ (28) = 80.213, $p< 0.05$. However, the variance extracted by the common method factor was only 0.267, which falls well below the 0.50 threshold that is commonly used for indicating the presence of a substantive factor (Fornell & Larker 1981). Therefore, even though a small degree of common method variance may be present in our data, it does not seem strong enough to substantially impact our results.

Multiple techniques were used to examine the potential threat of multicollinearity. The maximum correlation between any independent variables was 0.23, the highest variance inflation (VIF) score was 1.10 (mean VIF score = 1.05), and each conditional index (CI) score was less than 2.0 (mean CI score = 1.31). These statistics are each far below levels in which multicollinearity is considered problematic (Cohen, Cohen, West, and Aiken, 2003). Given the relatively small sample size, structural equation modeling was deemed to be inappropriate for examining our data, thus hierarchical regression analysis was utilized as the main statistical procedure for examining our hypotheses (Cohen, Cohen, West & Aiken 2003). We now review the findings with respect to the individual hypotheses.

7. Results

Our hypotheses predicted that founding entrepreneurs' metacognitive knowledge (specifically, metacognitive knowledge relevant to the accurate assessment of current strategies) would be positively related to their firm's adoption of each of the individual dimensions of EO. Hypothesis one predicted that metacognitive knowledge would be positively associated with the innovativeness component of EO. Hypothesis two predicted that metacognitive knowledge would be positively associated with the pro-activeness component of EO. Hypothesis three predicted that metacognitive knowledge would be positively associated with the risk taking component of EO. As shown in Models 1, 2, 3, of Table 2, respectively, founding entrepreneurs' level of metacognitive knowledge was significantly and positively associated with their firm's adoption of the innovativeness component of entrepreneurial orientation (B = 0.24, $p< 0.05$), the pro-activeness component of entrepreneurial orientation (B = 0.19, $p< 0.05$), and the risk-taking component of entrepreneurial orientation (B = 0.24, $p< 0.05$). These results provide significant support for each of our hypotheses. We show descriptive statistics and variable intercorrelations on Table 1.

7.1. Discussion

Table 1. Descriptive statistics and variable intercorrelations

Variables	Mean	SD	r						
			1	2	3	4	5	6	7
1. Age	42.63	10.49							
2. Education	5.18	1.29	.03						
3. Gender[a]	0.25	0.44	-.12	-.13					
4. Metacognative knowledge	4.52	1.10	.04	.09	-.14*				
5. Self-control	3.58	0.56	.23***	.14*	.08	.01			
6. EO: Innovation	4.13	1.36	-.06	.11	-.18**	.22***	-.02		
7. EO: Proactivity	4.53	1.29	.01	.17**	-.12	.19**	.01	.43***	
8. EO: Risk-taking	4.41	1.39	.08	-.06	-.06	.19**	-.14	.51***	.58***

[a] Male = 0, Female = 1; N = 144; * p<0.10; ** p<0.05; *** p<0.01

Table 2. Regression analysis

Variable	Model 1	Model 2	Model 3
	Innovation	Proactivity	Risk-taking
	B (*SE*)	*B* (*SE*)	*B* (*SE*)
Control variables			
Age	-.01 (.01)	-.00 (.01)	.01 (.01)
Education	.08 (.09)	.14* (.09)	-.02 (.09)
Gender	-.49* (.26)	-.22 (.25)	-.03 (.27)
Latent Variable effects			
Metacognitive knowledge (MK)	.24** (.10)	.19** (.10)	.24** (.11)
Self-control (SC)	-.00 (.21)	-.02 (.20)	-.40* (.22)
F-Ratio	2.518**	1.86	2.014*
R^2	0.084	0.063	0.068
Adjusted R^2	0.050	0.029	0.034

N = 144; * $p< 0.10$; ** $p< 0.05$; *** $p< 0.01$

After several decades of careful empirical research, entrepreneurship scholars understand much about the nature of EO and its relationship to many aspects of new venture operations and performance (Covin & Lumpkin 2011). However, considerably less is known about the factors that lead entrepreneurs to adopt EO as an overall approach for

operating their companies. Indeed, only a few studies have addressed this issue (Simsek, Heavey & Veiga 2010). The present research adds to this body of knowledge by providing evidence indicating that a key aspect of founders' self-regulation, mainly metacognition, is significantly related to the adoption of each component of EO. Thus, the present findings suggest that the cognitive processes entrepreneurs use to monitor, regulate, and direct their own actions are significantly related to firm level financial outcomes.

As predicted by Hypotheses one, two, and three, positive relationships were observed between entrepreneurs' metacognitive knowledge – specifically, knowledge useful in accurately assessing the effectiveness of current strategies or courses of action (i.e., in "knowing when to quit") – and each of the components of EO. As noted above, we reasoned that these relationships would exist because such metacognitive knowledge would help entrepreneurs to effectively manage the challenges posed by these strategies, and thus encourage adoption of them. Metacognitive knowledge, by helping entrepreneurs to accurately identify strategies that are, or are not currently succeeding, enhances their ability to change or even withdraw from unsuccessful courses of action.

Additionally, pursuing pro-activeness (efforts to be "first"), innovativeness (generating a steady stream of new products or services), and willingness to assume high risks may all strain the limited resources of new ventures. In order to avoid the potentially disastrous costs that can follow from persisting with ineffective strategies, entrepreneurs must be able to rapidly recognize such dangers and take action to prevent or reduce them. Thus, metacognitive knowledge may contribute to adoption of EO by providing entrepreneurs with skills useful in attaining, or least making progress toward their significant goals.

Further, such metacognitive knowledge can help entrepreneurs avoid the very real dangers of sunk costs – strong tendencies to persist with ineffective strategies or decisions once they have been chosen or adopted (Staw 1981). The costs of becoming cognitively "trapped" in this manner are often extremely high in economic terms, since they consume valuable resources in pursuit of goals that cannot realistically be attained. In addition, they can prove very costly in terms of their negative impact on entrepreneurs, who find it increasingly difficult to reverse initial decisions as investment costs in these decisions mount. Few individuals enjoy admitting that they have made a bad decision, and the psychological costs of doing so – embarrassment, loss of "face" – rise sharply as additional investments are made in the initial poor decision or failing course of action (Staw 1981). To the extent entrepreneurs possess metacognitive knowledge that can help them avoid becoming cognitively trapped in such situations, and are aware that they possess such knowledge, they may find proactivity, innovativeness, and risk-taking increasingly attractive because they recognize that they will be able to "quit while they are ahead", or at least, before disastrous losses result. Together, these factors contribute to the positive relationships between founders' metacognitive knowledge and their adopting these components of EO.

7.2. Theoretical and practical implications

The present results have both theoretical and practical implications. With respect to theory, they are consistent with, and offer support for, basic assertions of social cognitive theory. As noted earlier, this theory emphasizes the fact that human behavior is often more strongly determined by cognition – by individuals' goals, intentions, and expectations – than by actual events and outcomes. The relationship between these cognitive processes and overt behavior, in turn, is often strongly influenced by self-regulatory processes. Thus, social cognitive theory leads to the prediction that self-regulatory processes play a key role in a wide range of human behavior. Almost all previous research designed to test propositions derived from social cognitive theory, however, have focused on the role of self-regulation in individual behavior and performance (Vohs & Baumeister 2010). The present research sought to contribute to this theory by extending its scope to the firm level of strategy adoption. As noted above, findings suggest that self-regulation does indeed play a role in this process. Metacognition was significantly related to adoption of various components of EO, thus suggesting that self-regulation plays a role in processes related to firm, as well as individual performance. This constitutes a potentially useful extension of social cognitive theory.

In addition to the contribution to social cognitive theory, our research data also makes a contribution to the research on managerial cognition. Upper echelons theory, proposed by Hambrick and Mason (Hambrick & Mason 1984), suggests that the top-level managers of an organization often strongly influence its performance. A growing body of evidence offers support for this general proposal (Hambrick 2007). However, as noted by Hambrick (Hambrick 2007), knowledge of precisely *how* top-level managers generate such effects is relatively incomplete. As he puts it, "… the use of demographic indicators leaves us at a loss as to the real psychological and social processes that are driving executive behavior…the well-known 'black box' problem…", (Hambrick 2007: 335). The present findings contribute to further development of upper echelons theory by suggesting that self-regulation may constitute an important component of the processes operating in the "black box".

Specifically, the present findings indicate that founding entrepreneurs' self-regulation is related to their adoption of EO, and thus to the performance of their new ventures. In this way, the present results contribute to addressing an important question concerning upper echelons theory as well as add to research on managerial cognition and firm-level variables.

Turning to practical contributions, the present findings can be viewed as somewhat encouraging. Self-regulation involves several skills that individuals can acquire and strengthen through procedures suggested by a wealth of research in several fields (Baumeister, Vohs & Tice 2007; Forgas, Baumeister & Tice 2009). To the extent entrepreneurs use such procedures to enhance their self-regulatory skills, they may be better able to direct their own efforts into channels likely to generate progress toward the outcomes (i.e., long-term goals) they seek. In short, previous research suggests that entrepreneurs can readily strengthen key aspects of their own self-regulation, and this, in turn, may provide them with skills valuable in operating their new ventures. As noted earlier, self-regulation may be especially important for entrepreneurs because they frequently work in situations where they have few external guides, norms, or rules, and often receive little or no guidance from other persons (e.g., supervisors, mentors, coaches).

7.3. Limitations and directions for future research

As is true of all empirical studies, the present research has important limitations. First, although the sample of entrepreneurs included were all founders of their companies, they responded to a relatively brief on-line survey, and provided only limited information about the nature and scope of their companies. As a result, information on the financial performance of these new ventures was not available – a limitation that prevented investigation of the links between self-regulation, EO and firm-level performance.

Second, because all measures were self-report in nature the issue of common-method variance should be considered carefully when interpreting our results. This concern is, however, somewhat reduced by the fact that our CFA results indicate that common-method variance did not significantly influence our ability to test our study's hypotheses. There are three additional reasons that reduce common-method concerns. First, our survey was designed and administered using procedures intended to reduce susceptibility to common-method bias (e.g., written assurances of confidentiality; distinct questionnaire sections and instructions (*see* Podsakoff, MacKenzie, Lee & Podsakoff 2003). Second, analysis of discriminant validity shown as part of our measurement model assessment confirmed that the latent constructs were empirically distinct. The presence of common-method variance in our data would have led to results supporting fewer factors (Podsakoff, MacKenzie & Podsakoff 2012). Finally, common method bias tends to be less of a concern when the referent for the IVs (in our case, the individual entrepreneur) and the referent for the DVs (in our case, the firm) are at different levels of analysis (Brinckmann, Salomo & Gemuenden 2011). In light of these arguments, it is unlikely that common-method variance fully accounts for our study's findings (Spector 2006).

Third, while our theories suggest that the phenomenon we are studying is multi-level in nature, our analysis does not take multiple levels into account. However, the vast majority of entrepreneurs who responded to our survey and are included in our sample, founded new ventures with very few (less than 10) employees. As a result, the entrepreneur tended to be the sole decision maker in the venture. Thus, the firm-level orientation adopted by the new venture was in effect driven solely by the entrepreneur. We acknowledge that this is a limitation however.

Despite these limitations, the present findings suggest several promising avenues for future research. First, such research should include additional aspects of self-regulation not investigated here. For instance, only one aspect of metacogntion was included. As noted by Haynie and colleagues (Haynie & Shepherd 2009; Haynie, Shepherd, Mosakowski, & Early 2010), the potential role of additional aspects – for example, metacognitive experience – should also be investigated. In addition, the potential relationships between other key aspects of self-regulation, such as delay of gratification (i.e., the capacity to defer current rewards in order to obtain larger ones at later times (Metcalf & Mischel 1999), and entrepreneurs' adoption of specific strategies, should also be examined. Finally, additional aspects of strategy, should be considered. Although EO has received considerable attention in the entrepreneurship literature, additional frameworks – for instance, the distinction between exploration and exploitation (March 1991) offer promising avenues for future research. Do self-regulatory processes influence both of these processes, or primarily exploration? This is a question that can be readily addressed in further empirical research.

Future research might also seek to determine if various self-regulatory processes play a role in entrepreneurs' ability to recover from major setbacks and failure (Shepherd, Covin & Kuratko 2009; Ucbasaran, Shepherd, Lockett & Lyon 2013). Hayward, Forster, Sarasvathy, and Fredrickson (Hayward, Forster, Sarasvathy & Fredrickson 2010) have suggested that entrepreneurs' capacity to recover from failure of their new ventures may involve, in part, their

acquisition of skills that contribute to their emotional and cognitive resilience – skills gained through the "broaden-and-build" framework (Fredrickson & Branigan 2005). Perhaps included in those skills are enhanced self-regulatory mechanisms that assist entrepreneurs to benefit from their previous setbacks through enhanced metacognition knowledge and experience, and strengthened self-control. This and other possibilities can be readily investigated in future studies.

8. Conclusion

The central, overarching question investigated in this research, briefly stated, was: "Why do founding entrepreneurs adopt EO for their new ventures?". Certainly, a broad array of environmental conditions may play a major role in such decisions, however, as noted by several researchers (Chatterjee & Hambrick 2007; Simsek 2007), the characteristics of founding entrepreneurs, too, are likely to play a role. Past research on this issue has often focused on the personality of CEOs (e.g., Chatterjee & Hambrick 2011), demographic variables (e.g., their age, experience, *etc*.; Hambrick, 2007) or, more recently, their personal characteristics, such as core self-evaluations (Simsek, Heavey & Veiga 2010). The present research sought to add to this previous work by investigating relationships between key aspects of founding entrepreneurs' self-regulation and adoption of EO.

Our results indicate that metacognitive knowledge, relevant to assessing the success of current strategies or courses of action so that courses of action which are effective can be continued and those that are not can be changed or discarded, was significantly related to all three components of EO. In a sense, these findings echo the suggestion by Michael Porter that "[t]he essence of strategy is choosing what *not* to do". That is, knowing when to quit (or at least when to adjust current strategies and actions in the light of current outcomes) is indeed crucial for entrepreneurs and the success of their new ventures. Fortunately, such knowledge can be acquired or expanded, and to the extent it is, may provide founding entrepreneurs with cognitive tools useful in choosing the best – that is, most effective – strategies for their new ventures.

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