

Making rational use of ‘irrationality’? Exploring the role of need for cognitive closure in nascent entrepreneurial activity

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A fundamental question of interest to both researchers and practitioners alike focuses on why some individuals discover and elect to exploit opportunities to create future goods and services while others do not. Past studies have focused on the role knowledge-based resources play in the early stages of new venture creation, yet few have considered the role cognitive motivations play in impacting the processing and use of information during this process. In this study, we theorize that a cognitive need for closure (NfC), or possessing a desire for an answer on some topic as opposed to enduring confusion and ambiguity, is an important aspect of the entrepreneurial judgment formation process. We hypothesize that the need for closure will be positively related to nascent entrepreneurial activity because it provides a cognitive mechanism for dealing with the opened-ended nature of opportunity pursuit. Data drawn from the Panel Study of Entrepreneurial Dynamics (PSED) support this hypothesis. More specifically, results suggest that a high NfC is likely to foster the exploitation of discovered opportunity irrespective of their age, gender, position in the family birth order, or unique personal knowledge base. Implications for future research and practice are discussed.

Keywords: nascent activity; new venture creation; closure; cognition

1. Introduction

The process by which individuals form expectations about future economic conditions and the potential for new business ventures is an essential part of the entrepreneurial process (Schumpeter 1934; Kirzner 1997; Casson 2003). Consequently, explaining the formation of expectations associated with the perception of entrepreneurial opportunities and examining how these expectations translate into nascent activity (that is via decision-making processes) are fundamental components of entrepreneurship theory and research (Shane and Venkataraman 2000). Various models of the opportunity exploitation process have been proposed in recent years reflecting the centrality of this idea (see de Koning 1999; Delmar and Davidsson 2000; Lumpkin and Dess 2001; Corbett 2002; Ardichvili, Cardozo, and Ray 2003; Davidsson and Honig 2003; Dimov 2003). Each of these models can be characterized as reflecting somewhat different theoretical perspectives when the full range of underlying assumptions for each is considered

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(Sarasvathy et al. 2003). However, these models share the presumption that information processing and the progressive development of knowledge play essential roles for engaging in entrepreneurship (Cohen and Levinthal 1990; Shane 2000).

While the knowledge development (learning) and decision-making themes have been useful for explaining the recognition and exploitation of opportunity, theoretical development remains incomplete partly because little research has carefully integrated the motivational aspects of these processes (Shane, Locke, and Collins 2003). This lack of integration is interesting in light of decades of research devoted to risk-taking propensity under conditions of economic uncertainty, as well as a growing stream of evidence suggesting that individuals do in fact maintain different tendencies to proactively engage in certain patterns of thinking (see Busenitz and Barney 1997; Ritchhart 2001; Mitchell et al. 2002a). It is also interesting given the findings of cross cultural empirical comparisons suggesting that individuals vary in their propensity for engaging in nascent activity, as well as the extent to which individually and socially-based knowledge factors are associated with such activity (Delmar and Davidsson 2000; Davidsson and Honig 2003), yet fail to explicitly assess the potential role motivational differences play in decision-making during the process.

This paper seeks to extend previous theory and research focusing on early stage entrepreneurial activity (Delmar and Davidsson 2000; Davidsson and Honig 2003) by focusing explicitly on this area of omission. Our intent is to be provocative by building a conceptual bridge between nascent entrepreneurship research and a cognitive factor rooted in lay epistemic theory of social cognition, whereby information processing efforts are considered both motivated and tactical in nature (Sorrentino and Roney 2000). We focus on the role, need for closure (NfC), or the 'desire for an answer on some topic, any answer as opposed to confusion and ambiguity' (Kruglanski 1989, 14), plays in the decision to elect to engage in the new venture creation process. Our primary goal is to launch an exploratory investigation focusing on how the presence of a proclivity toward closure (Kruglanski, Webster, and Klem 1993) can be used to enhance our current understanding of the new venture creation decision process. Given the focus of the construct on information processing as it relates to judgment formation and recent empirical findings suggesting NfC is associated with the development of entrepreneurial intentions among Russian immigrants (Mesch and Czamanski 1997), we explore the conceptual and empirical role NfC may play in predicting and further understanding the origins of nascent entrepreneurial activity. In the next section, we review literature focusing on early stage entrepreneurial activity and NfC. We then develop the central hypothesis for this investigation, followed by a discussion of our research method, findings, and implications for future research and practice.

2. Conceptual framework

2.1. Literature review

Scholars and practitioners have long been interested in attempting to understand the origins of entry into the new venture creation process. Yet interestingly, in a review of the extant entry literature, Geroski concluded that 'perhaps the most striking thing we know about entry is that small-scale, de novo entry seems to be relatively common in most industries, but that small-scale, de novo entrants have a rather

short life expectancy' (Geroski 1995, 435). Thus, one reason widespread interest persists is that theorists have yet to fully explain why such large numbers of individuals choose to engage in new venture creation, given a preponderance of attempts appear doomed to failure (Aldrich and Martinez 2001).

Given the emphasis of early opportunity recognition research on the importance of available knowledge stocks accumulated through personal experience (Shane 2000) and social relations (DeCarolis and Saporito 2006), it is not surprising that entrepreneurship scholars are increasingly turning their attention towards cognitive theory to further understand what has previously been labeled as the 'black box' nature of entrepreneurial phenomena origins (Mitchell et al. 2002b). Focusing on the presumed central and unique role of knowledge in the recognition and exploitation of opportunity (Hayek 1945; Kirzner 1997), entrepreneurship scholars have postulated that information access is a defining characteristic of entrepreneurial cognition. For example, Shane (2000) argues and finds empirical support for the idea that combination of prior knowledge about how to serve markets, address customer problems, and technological innovation puts individuals in a position for discovering economic opportunity that is otherwise unmatched by others. Similarly, a number of studies have speculated on the generally positive impact that different sources of prior information and knowledge have on the ability to recognize opportunity, including: educational and work experiences (Ronstadt 1988); information and perceptions general self-efficacy (Boyd and Vozikis 1994); and position with a larger social structure (Singh 2000).

Empirical support for this line of inquiry has been recently extended to the realm of nascent entrepreneurial activity. Davidsson and Honig (2003), for instance, found evidence that personal knowledge related to one's general and specific work experiences were the single largest individual level factors in predicting the likelihood that an individual would recognize entrepreneurial opportunities in the Swedish population. Similarly, Delmar and Davidsson (2000) found the prevalence of previous business ownership and management experience levels was distinctly higher among nascent entrepreneurs in the USA than among nascent in Nordic countries. Mesch and Czamanski (1997) have also found support for the notion that immigrants have a competitive knowledge advantage in knowledge of customer preferences in ethnic markets that fosters entrepreneurial activity in such markets. In sum, there is growing empirical evidence suggesting that knowledge is indeed an important element throughout the early stages of the entrepreneurial process (Rotefoss and Kolvereid 2005).

While these studies generally support the idea that *access* to certain fundamental elements of information is *necessary* to entrepreneurial activity, scholars have also pointed out that access to information alone is likely to be *insufficient* for understanding the nature of such activity because information related to the potential for economic enterprise rarely exists in fully developed form (Casson 2003). This implies that *in addition to having and/or possessing access to key sources of information*, individuals may also possess distinct cognitive properties for effectively assigning meaning to, evaluating, and incorporating information elements associated with economic opportunity into knowledge stocks vital to fostering subsequent exploitation efforts (Kirzner 1979; Shane 2000; Singh 2000). A substantial body of previous theory does in fact exist (see Hayek 1945; Cyert and March 1963; Busenitz and Barney 1997) suggesting support for the notion that individuals do in fact vary

in their relative ability, or capacity to meaningfully process new sources of information into existing knowledge structures.

Researchers have increasingly focused their efforts toward more clearly understanding the relationship between cognitive processes and entrepreneurial behaviors. Studies which have compared the information search activities of entrepreneurs and managers, show that entrepreneurs tend to spend more time in their off hours actively searching for information and pay more attention to risk cues than their managerial counterparts (Kaish and Gilad 1991; Gaglio and Taub 1992). Studies have also shown that in contrast to managers, entrepreneurs employ more mental shortcuts (that is, heuristics) and biases in their decision-making (Busenitz and Barney 1997), and that whilst both groups seek evidence for the upside of ventures, entrepreneurs make little attempt at the formal quantification of such evidence relative to owners/managers. The evidence also suggests that entrepreneurs differ with respect to attribution style and the extent to which they engage in counterfactual thinking (Baron 1998). Despite methodological limitations and the failure of subsequent efforts to replicate the findings of these initial efforts (Busenitz 1996), some researchers have suggested that the collective evidence does seem to support the notion that entrepreneurs are likely to employ a unique cognitive approach for processing economically oriented information (Hills 1995).

Interestingly, others have noted that if entrepreneurs do in fact employ distinct cognitive processes, the approach may reflect a disproportionate tendency to be overconfident and, hence, 'irrational' in the normative sense (Brunsson 1985) about their own relative abilities (Geroski 1995; Camerer and Lovallo 1999). Yet it is possible that what may be considered 'decision irrationality', particularly in the early stages of decision-making can be alternatively viewed as 'action rationality' (Brunsson 1985). For example, it is possible that engaging in what may initially appear to be 'irrational' activities from a normative and a priori fully informed perspective, in fact provides small yet important pieces of environmentally-based feedback that in turn creates an information foundation for more rational decision-making efforts over time (Lindblom 1959). Such activities may also smooth the way for subsequent difficult 'market making' actions requiring radical change (Sarasvathy 2004), as they help to enhance the motivation and commitment of decision-makers whose challenge it is to promote radical change by allowing them to formulate explicit criteria anchored in an action-based ideology against which subsequent goals and decision alternatives can be judged.

Collectively, the evidence suggests that despite increasing attention and early contributions, researchers have only begun to understand how individuals process and act upon information related to economic opportunity. As a result, the potential that theory focusing on information processing offers to explaining entrepreneurial activity remains less than fully explored. Shane, Locke, and Collins (2003) note, for example, that little comparative work has focused on the specific role individual motivations play throughout the nascent process of recognizing and electing to exploit economic opportunity. We find this void particularly interesting given Brunsson's suggestion that the 'making rational use of irrationality' proposition appears particularly worth considering in highly strategic yet uncertain situations where motivation and commitment are highly desirable, as individuals frequently have different outcome preferences (Von Mises 1949) and opportunity costs for acquiring additional information (Amit, Muller, and Cockburn 1995). Therefore, we

consider how the need for closure (Kruglanski, Webster, and Klem 1993) might affect the likelihood of individuals to engage in nascent, or gestation related economic activity in an effort to extend previous work and shed light on underlying cognitive processes. Our intent is to be provocative as we build a conceptual bridge between nascent entrepreneurship research and lay epistemic theory of social cognition. Let us now turn to a discussion of the NfC and develop our central hypothesis.

2.2. The need for closure

Kruglanski (1989) has postulated that individuals often differ in their motivation to process new sources of information. Specifically, he argued that the need for closure (NfC) reflects the possession of a 'desire for an answer on some topic, any answer as opposed to confusion and ambiguity' (Kruglanski 1989, 14). Under this definition, the term *need* denotes a motivated tendency, or a proclivity, rather than a physically-based deficit. Theoretically, a high need for closure is argued to produce the desire for definite order and structure in life, accompanied by an abhorrence for unconstrained chaos and disorder (Webster and Kruglanski 1994).

Despite the constructs potential for evoking a strong personality, or trait-based interpretation at first blush, the NfC construct draws from the fundamental elements of social learning theory. Social learning theory postulates that rather than being seen as being naïve to, or purely driven by their unconscious instinctual impulses alone, individuals are better seen as being motivated to seek out positive stimulation, or reinforcement, while wanting to avoid unpleasant stimulation (Rotter 1966). In doing so, the NfC construct combines behaviorism and the study of personological disposition in a way that produces the notion of motivated cognitive action that is strategic, or calculating in nature, and therefore avoids relying strictly on physiological instincts or drives alone as a motive force.

Although not strictly physiological, the notion of motivated cognitive action does suggest that the NfC develops, at least in part, into a relatively stable dimension of an individual's internal thought process. The stability of this personological aspect reflects the individual's attempts to make sense of the action-feedback loop, as well as one's own ability to influence it, over time (Webster and Kruglanski 1994). Alternatively, theorists have also postulated that situational factors in one's surroundings such as exogenous noise (Kruglanski, Webster, and Klem 1993), the endogenous dullness of a task being performed (Kruglanski and Webster 1996) and time pressures (Kruglanski and Freund 1983) can also act to instill an individual's desire to attain closure. In sum, the extant literature and theoretical underpinnings suggests there is a 'functional equivalence' with respect to the potential host of antecedents to NfC, whether intrinsically dispositional or situational in nature (Webster and Kruglanski 1998).

Webster and Kruglanski (1994) have noted that the temporally interactive (person-situation) aspect of the NfC theoretical framework described above is precisely what lends unique meaning, or distinguishes NfC from other related person-based difference variables investigated in prior research. Whereas, for example, constructs such as tolerance for ambiguity (Frenkel-Brunswick 1949; Budner 1962) are embedded in psychodynamic, or unchanging instinct-based conceptions of personality development, the NfC notion is more strongly connected

to a social cognitive theory of lay epistemics or the process whereby an individual's base of knowledge is formed and modified based on logical induction and deduction. It highlights the epistemic functions of hypothesis generation and validation over time, or an individually motivated process of learning based on the combination of action, reasoning, and feedback. In other words, whereas most previous theories of how people deal with uncertainty reflect an orientation emphasizing either the positive or the negative value of uncertainty, NfC reflects a more active and learning oriented perspective in which people are considered as *motivated tacticians*, for whom knowledge is sought in the service of action (Sorrentino and Roney 2000). Thus, the function of NfC in the lay epistemic process is to instigate it and determine both its extent and course.

2.2.1. Empirical findings and construct critiques

Empirical studies have suggested that the NfC does indeed arise from a variety of sources and that it has wide effects on subsequent information processing and social interactions. For example, an early study by Kruglanski and Freund (1983) investigated the effects of inducing the NfC through situational time pressures in three experiments related to subject inferences. They found that inducing a high NfC increased the tendency of subjects to succumb to primacy effects in impression formation, render stereotypically driven judgments, and anchor judgments on initial information estimates. NfC has been further demonstrated to have a basis in individual differences (Webster and Kruglanski 1994). It has also been inversely associated with the extensiveness of information search activities (Klein and Webster 2000). Subsequent studies (Freund, Kruglanski, and Schpitzajzen 1985; Sanbonmatsu and Fazio 1990; Heaton and Kruglanski 1991) support the presumption that NfC has a meaningful impact on judgment related information processing activities.

Empirical studies have also focused explicitly on the psychometric properties of NfC. Webster and Kruglanski (1994), for instance, observed a factor structure that was consistent with theoretical expectations in data from two divergent groups of subjects, as well as convergent validity. They also observed high test-retest reliability over a 12 to 13 week period, further suggesting the relative stability of the construct's personological component. In addition, the results suggested that NfC scale demonstrated discriminant validity with respect to related psychological constructs. For instance, the low correlation postulated between NfC and the conceptually related tolerance for ambiguity was confirmed in this study. Lastly, the results of this work also showed high NfC was positively related to the tendency to commit the correspondence bias in attitude attribution observed in earlier research (Jones and Harris 1979).

Turning attention to the effects of NfC, Kruglanski, Webster, and Klem (1993) experimentally investigated the relationship between NfC and persuasion. They found that subjects reporting high NfC resisted persuasion more than those reporting low NfC, particularly in noisy environments that presumably instill a relatively higher NfC. Interestingly, the latter relationship was only found in the presence of an initial informational base for an opinion. Subsequent studies focusing on social judgment have shown that high NfC leads to less differentiated and more extreme judgments of others (Fox and Elraz-Shapira 2006). NfC, for example, has been found to affect group members' reactions to opinion deviates in that individuals

reporting high NfC tend to reject the deviate and extol the conformist when persuasive influence attempts fail (Kruglanski and Webster 1991), and tend to engage in ingroup favoritism (Shah, Kruglanski, and Thompson 1998). In short, empirical findings tend to support the principal theoretical arguments high NfC leads to the tendency to 'seize' on sources of information when forming initial expectations and judgments relatively quickly, and 'freeze' or solidify information judgments based to a substantial degree on past knowledge (Webster and Kruglanski 1998).

Despite robust empirical support for key theoretical tenants over the past decade, NfC theory has not gone without challenges. In perhaps the sharpest critique, Neberg, Judice, and West (1997) call into question the construct's theoretical contribution based on psychometric problems. Specifically, these authors argue that the proposed multidimensional operationalization (that is, 'lack of unidimensionality') of NfC inhibits subsequent theoretical interpretation, and that such an operationalization fails to demonstrate discriminant validity from existing constructs such as Personal Need for Structure (Neberg and Newsom 1993). However, subsequent investigation has demonstrated that neither assertion is incompatible with NfC theory (Kruglanski et al. 1997).

Collectively, the empirical evidence to date suggests a compelling case for the construct's ability to advance theory meaningfully on a variety of important research topics. Specifically, it suggests that NfC can be reliably measured and demonstrates robust convergent, or 'nomological' validity, consistent with theoretical expectations (Webster and Kruglanski 1994; Kruglanski et al. 1997). The empirical evidence also demonstrates that NfC possesses discriminant validity with respect to other closely related constructs (such as, tolerance for ambiguity) that is both statistically and theoretically meaningful (Kruglanski et al. 1997).

2.2.2. *The appropriateness of NfC for nascent entrepreneurship research*

Making a decision is merely a step towards taking action. The decision is not the end product. (Brunsson 1985, 18)

The cognitive perspective has risen to prominence in other social science disciplines and has greatly extended our understanding on important topics such as judgment formation and decision-making. Following suit, entrepreneurship researchers have adopted a cognitive perspective on the presumption that studying the way entrepreneurs 'think' can produce important insights into questions such as, 'Why do some people choose to pursue and develop economic opportunities whereas others do not' (Baron 1998). In essence, this approach focuses on how individuals attempt to make sense of and make decisions within the complex world around them.

Although cognition represents an intuitively intriguing shift in theoretical orientation, a central underlying question remains as to whether or not entrepreneurs really differ from others, and if so, how? A small but growing body of research has begun to address these questions. For example, research has shown that age (Davidsson and Honig 2003) and gender (Delmar and Davidsson 2000; Davidsson and Honig 2003; DeMartino and Barbato 2003) are empirically related to the recognition of opportunity presumably because each is meaningfully associated with both the quantity and quality of an individual's knowledge base. In addition, these factors and others such as an individual's birth order position have also been argued

to have a substantive impact on employment status (Katz 1992), or decisions associated with career choice (Holland 1966).

In an attempt to drill down further on the nature of cognitive processes that play a role in entrepreneurial activity, empirical research has shown that knowledge is indeed one cognitive factor that is likely to promote the recognition of and decision to exploit entrepreneurial opportunities (Ronstadt 1988; Kaish and Gilad 1991; Singh 2000). Moreover, subsequent research has complemented such findings by illustrating that the knowledge influences can be meaningfully separated into those that are of either an explicit or tacit nature in origin (Davidsson and Honig 2003). Turning attention toward active processing characteristics, Palich and Bagby (1995) found in contrast to the 'conventional wisdom', entrepreneurs did not differ from non-entrepreneurs with respect to their overall risk-taking propensity. Rather, they did differ with respect to how they thought about business situations. Specifically, entrepreneurs tended to categorize such situations as possessing more opportunities and strengths, and thus more ripe for potential gain than non-entrepreneurs. Similarly, Busenitz and Barney (1997) found evidence suggesting that entrepreneurs manifested more overconfidence and representativeness biases and heuristics than managers in large organizations, suggesting potentially meaningful strategic decision-making differences.

While elements of opportunities may be often recognized, the exploitation of economic opportunity via the formation of a new venture often requires substantial creative and socially developmental efforts to shape or enact the venture elements (Sarasvathy 2001; Ardichvili, Cardozo, and Ray 2003). For example, the entrepreneur may need to acquire scarce, yet strategically important resources, and/or persuade potential consumers to incur switching costs. Each requires strong social skills, or competencies that facilitate the effective social interactions (Baron and Markman 2000). All the while, this continuous proactive process occurs in situations where individuals confront more information than they can process at any given time (Hayek 1945), face high degrees of uncertainty (Knight 1921), pressure to make strategic decisions under time constraints (Eisenhardt 1989), and the emotional stress that the occupational decision 'to entrepreneur' (or not!) typically carries (Katz 1992). Consequently, the above suggests the importance of information processing and decision-making efforts is magnified in the context of situations where opportunities for nascent entrepreneurial activity are thought to exist, yet simultaneously coupled with pressures to deviate from normative decision-making efforts and techniques (Brunsson 1985).

Consistent with the nature of the demands of a nascent entrepreneurial context, the lay epistemic theory underlying NfC theory and research assumes that much of social cognition and cognitively mediated social interaction is governed by the way persons process information in forming their subjective bases of knowledge (Webster and Kruglanski 1994). More specifically, NfC theory itself assumes the desire for closure to be 'nonspecific' (versus 'specific', that is ego-protective or enhancing) in that the need is assumed to be proportionate to the perceived benefits of having closure, the perceived costs of lacking closure, or both. Given the congruence of the proportionate information processing with employment choice, it appears plausible that NfC may be accorded a significant role in nascent entrepreneurial information processing tasks such as those related to the evaluation of entrepreneurial opportunity. Consistent with such an interpretation, a recent study of Russian

immigrants showed that external pressures related to occupational closure were positively related to the development of entrepreneurial intentions (Mesch and Czamanski 1997). Thus, the collective evidence suggests that NfC theory offers one potentially useful rationale for extending current explanations of the decision to engage in nascent entrepreneurial activity that are predominantly focused on knowledge-based ability.

Kruglanski and Webster (1996) have postulated that NfC induces two general tendencies: the urgency tendency and permanence tendency. The urgency tendency suggests that some individual's will maintain an inclination to attain closure as soon as possible. Focusing strictly on this tendency, it seems plausible to expect that the NfC may produce greater levels of stress for individuals in new and/or ambiguous situations, which in turn reduces his or her receptiveness to processing information pertaining entrepreneurial opportunity. Support for this line of reasoning has been observed through a study of immigrant behaviors, which revealed that immigrants with a high NfC indeed suffered greater stress due to the need to cope with new, unstructured, uncertain, ambiguous, and unpredictable situations on a daily basis (Kosic 2002). Accordingly, this line of reasoning suggests the NfC will be inversely associated with nascent entrepreneurial activity because such situations will frustrate the desire to have order and predictability, prevent decisiveness, and produce feelings of discomfort resulting from ambiguity (Webster and Kruglanski 1994).

By contrast, focusing simultaneously on *both* the urgency and permanence tendency suggests a different prediction. As is previously discussed, theorists have argued and found support for the notion that individuals utilize biases and heuristics under conditions of environmental uncertainty and complexity as simplifying mechanisms for making decisions efficiently and effectively (Simon 1957; Cyert and March 1963; Busenitz and Barney 1997; Baron 1998; Kahneman 2003). As individuals maintain different preferences for economic outcomes (Von Mises 1949), and simultaneously confront significant costs for acquiring additional elements of information (Amit, Muller, and Cockburn 1995), we would expect that the use of such mechanisms would also favor information that fits into the individual's existing knowledge structures in predictable ways.

Consistent with such an expectation, Webster and Kruglanski (1998) have argued that possessing a high NfC leads to the tendency to 'seize' and 'freeze' on information that is consistent with *existing* knowledge structures. Observations of the tendency to assimilate judgments to primed constructs and to base impressions on global or coarse-grained versus fine-grained information are correspondent with the use of pre-existing knowledge structures to form judgments as immediately as possible. Similarly, observations associating the NfC with the resistance to changing one's own beliefs in light of new information are correspondent with the tendency to preserve, or freeze on pre-existing knowledge structures (Kruglanski and Webster 1996). Interestingly, the results of empirical comparisons between entrepreneurs and managers in large organizations suggest that such tendencies do in fact occur to a greater degree for entrepreneurs than managers in large organizations (Busenitz and Barney 1997).

This combined line of reasoning focusing on such tendencies is consistent with previous empirical studies demonstrating that entrepreneurs have a greater tendency to experience regret over missed opportunities (Baron 1998), as well as research suggesting that immigrants are prone to taking advantage of their personal

background knowledge in terms of knowing customer preferences by engaging in entrepreneurial activity that focuses on serving specific ethnic marketplaces (Mesch and Czamanski 1997). It is also consistent with findings suggesting that the entrepreneurs share a disproportionate tendency to rely on heuristics associated with being biased towards overconfidence (overestimating the probability of being right or having illusions of control) and representativeness (tending to overgeneralize from a few characteristics or observations, or being misguided by the belief in the law of small numbers) (Busenitz and Barney 1997; Baron 1998). Researchers have also suggested that entrepreneurs are more effectuation oriented, whereas non-entrepreneurs are more causally-oriented (Sarasvathy 2001). As ‘effectuators’, they attempt to control the future as opposed to predicting it, by developing consensus and strategic partnerships and thereby altering existing value chains to create new sources of value or construct new markets. Thus, the NfC is also consistent with the effectuation line of reasoning in that the NfC would appear to facilitate staying focused on an idea as opposed to being distracted by situational ‘noise’ when formulating future expectations (Kruglanski, Webster, and Klem 1993). In sum, the NfC appears to offer a theoretical rationale for extending current explanations of the decision to engage in nascent entrepreneurial activity that is highly consistent with both a strategic information processing orientation that is based on the notions of incremental feedback (Lindblom 1959) or ‘action reality’ (Brunsson 1985), as well as consistent with the findings of extant previous empirical research. We therefore propose the following hypothesis:

Hypothesis: The need for closure will be positively related to nascent entrepreneurial activity.

3. Method

3.1. *Data collection procedure and sample*

Data from the Panel Study of Entrepreneurial Dynamics (PSED) database (Reynolds 2000, 158) are used for this research. The PSED database was designed to identify and solicit data from a nationally representative sample of nascent entrepreneurs – that is, a group of individuals that were actively involved in the start-up process at the outset of data collection efforts. Comparison data were also collected for a nationally representative group of non entrepreneurs. In total, PSED researchers screened and collected data from over 64,000 US households, from which 1261 respondents agreed and subsequently participated in a detailed telephone and mail survey process over a two-year period. Utilizing the PSED database is compelling in this research because it was designed with a specific focus on early stage processes such as the recognition and exploitation of opportunity, thereby avoiding retrospective accounts that suffer from potential bias associated with memory decay (Reynolds 2000). It also offers an opportunity to address the specific research question of interest while controlling for previous explanations (see Davidsson and Honig 2003). Thus, use of PSED helps extend existing theory, rather than contribute to an ever increasing potpourri (Low and MacMillan 1988; Low 2001) of ‘one-time’ cross-sectional research efforts without follow through or subsequent replication that threaten to inhibit the development of more robust conceptual frameworks (Shane 2000).

As this research is concerned with nascent entrepreneurial activity as an individual phenomenon, it was important to identify cases that reflect the efforts of individual persons. To address this issue, 109 of the initial 1261 cases were excluded due to these respondents indicating that some portion of the expected ownership involved persons or entities beyond the nascent entrepreneur. It was also important to distinguish clearly between nascent and operating businesses, as well as to exclude any individuals from the comparison group engaged in entrepreneurial activity at the initial survey screening, to enhance the interpretability of the findings. Therefore, six additional cases from the nascent group were deleted because respondents reported three or more months of positive cash flow. Thirty-one additional cases from the comparison group were deleted because respondents reported engaging in some form of nascent entrepreneurial activity at the initial screening. One additional case was deleted from the nascent group because the respondent reported no nascent activity at the point of the initial screening. As a result, the overall sample size was reduced from 1261 cases to 1114: 714 in the nascent group and 400 in the comparison group.

3.2. Dependent variable

3.2.1. Nascent activity

In this study we drew upon Davidsson and Honig (2003) and coded nascent activity as a dichotomous variable. Specifically, individuals were categorized as nascent entrepreneurs (1) if they reported having engaged in at least one of any 16 gestation activities (see Appendix 1) toward an independent start-up venture underway at the time of the initial phone survey interview. For example, individuals answering 'yes' to the question 'have you prepared a business plan?' were coded as nascent entrepreneurs. Individuals answering 'no' to this question *and* 'no' to all other questions related to engaging in gestation activities were coded as members of the comparison group (0).

3.3. Independent variable

3.3.1. Need for closure

Although the notion of NfC may evoke a categorical conceptualization at first sight, Kruglanski et al. (1997) point out that some basic tenets of NfC theory is that an overarching NfC may have different facets. Further, facets may originate from several distinct and heterogeneous sources and NfC theory makes no particular claims about how these various sources should relate to one another. For example, one individual (such as an executive) may often find her or himself in decision-making situations and hence feels strongly about being firmly decisive. Another (a prisoner, for example), by contrast, may be strongly future oriented and, hence, care strongly about future predictability, but feel indifferent toward decisions since opportunities for making them are few and far between. In short, facets may be 'differentially salient to different persons', suggesting that scales measuring individuals on this construct should contain multiple facets to enhance the theoretical interpretability of findings (Webster and Kruglanski 1994).

Following this recommendation, we operationalized the NfC by identifying items in the PSED database that reflected three facets previously proposed (Appendix 2

summarizes the questionnaire items employed). Respondents were asked to identify how accurately certain statements described themselves on Likert-type scales. Specifically, respondents were presented with a scenario in which three ventures have the same 'expected payout' in the sense that the probability of success times the profit is the same. They were then asked 'If your skill and energy could affect the outcome of each, which would you prefer: a profit of \$5,000,000, but a 20% chance of success; a profit of \$2,000,000, but a 50% chance of success; or a profit of \$1,250,000, but a 80% chance of success?' Respondents were also asked, 'When confronted with a difficult problem I tend to delay a decision so that I can collect more information' and 'I can talk to almost anybody about almost anything'. The first item was coded to reflect an individual's need for predictability. The remaining two items were coded as decisiveness and closed-mindedness respectively, and both were reverse coded to facilitate the interpretation of results in the context of the current research question.

Gardner et al. note that 'It has become almost a maxim in psychometrics that, holding all else constant, the more items in self-report measures of psychological constructs, the better' (Gardner et al. 1998, 898). However, contrary to the assumption on which this 'maxim' is based (that any test is composed of a random sample of items from a hypothetical domain of all items that measure a construct of interest), Gardner et al. also point out that 'researchers almost always create items based directly on their explication of the construct under study' (Gardner et al. 1998, 899). Consequently, this suggests that some items will be inherently better than others. Therefore, while we acknowledge that the use of single item measures for the NfC construct represents a *potential* limitation and warrants future research focusing on measurement validation, we believe the use of these items is tenable in this exploratory investigation for three reasons. First, the items are consistent with individual facets of the NfC construct as proposed in previous research *and* relevant to the central question of interest (Webster and Kruglanski 1994). Second, earlier exploratory factor analysis (Schenkel 2004) revealed a component structure that is consistent with previous research (Webster and Kruglanski 1994; Kruglanski et al. 1997). Third, multiple empirical studies have shown that single item measures are often highly correlated (that is, converge) with multiple item scales, and in some situations, even preferable because they reduce other potentially biasing effects such as respondent fatigue without substantive loss of nomological validity (Gardner et al. 1989, 1998; Wanous, Reichers, and Hudy 1997). Given the combination of the NfC construct focus on judgment formation and development (Kruglanski 1989), lack of research focusing explicitly on cognitive motivations that may extend current explanations of nascent entrepreneurial activity (Shane, Locke, and Collins 2003) and recent empirical findings suggesting its potential influence on such activity (Mesch and Czamanski 1997), we believe that the potential theoretical contributions under investigation here more than offset the potential limitations of the current operationalization.

3.4. Control variables

3.4.1. Age

The age of respondents is coded in years from a single self-reported item in the mail portion of the PSED survey.

3.4.2. Gender

The sex of the respondent is coded as one for male and two for female based on a single item presented during in the telephone interview portion of the PSED survey.

3.4.3. Birth order

The chronological position of the respondent in the family birth order is coded based upon how many brothers and sisters were reported as being born before the respondent during the telephone interview portion of the PSED survey.

3.4.4. Knowledge

Given that entrepreneurs are potentially exposed to a range of explicit sources economic information such as formal education and exposure to the start-up process, two items from the PSED survey were employed to measure the explicit dimension of knowledge. The first item is the highest level of education the respondent had completed. Potential responses included and were categorized as follows: (1) up to eighth grade; (2) some high school; (3) high school degree; (4) some college; (5) community college degree; (6) college degree; (7) some graduate training; (8) masters degree (MBA, MA, MS); (9) doctorate degree (LLB, MD, PhD, EDD); (99) don't know; not available. The second item is coded as the actual number of other businesses the respondent reported helping start. Studies have also suggested that entrepreneurs accrue important forms of implicit knowledge through general and supervisory experiences, which are also important to the entrepreneurial process. Therefore, two items were employed to measure the implicit aspects of a respondent's knowledge base. Specifically, respondents were asked, 'How many total years of full-time, paid work experience in any field have you had?' They were also asked, 'For how many years, if any, did you have managerial, supervisory, or administrative responsibilities?' Responses were coded as the actual number of years reported for each of these items.

3.5. Analysis and results

Hierarchical logistic regression was employed in order to test the central hypothesis of this investigation (Hosmer and Lemeshow 1989). We first examined whether commonly cited demographic factors (age, gender, and birth order) predicted the probability of an individual engaging in nascent entrepreneurial activity. Second, we used a hierarchical logistic regression technique to examine whether knowledge, in both explicit and implicit forms, was positively related to nascent status beyond these commonly cited demographic factors as has been demonstrated in previous research (Davidsson and Honig 2003). Finally, we used the same hierarchical logistic regression technique to examine whether the NfC was positively related to nascent entrepreneurial activity, and more specifically, whether or not its inclusion in the regression model added to the variation accounted for by these previous explanations.

Prior to examining the results of these tests, Table 1 reports the means, standard deviations, and correlations for the variables included in our study. Focusing first on demographic predictors, the nascent activity was unrelated to age, significantly and

Table 1. Means, standard deviations, and correlations.

Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10
1. Nascent Activity	0.64	0.48	—									
2. Age	39.96	12.26	-0.03									
3. Gender (0 = <i>f</i> , 1 = <i>m</i>)	0.49	0.50	0.07*	-0.06*								
4. Birth #	2.65	2.15	-0.09**	0.02	-0.06 [†]							
5. Formal education	4.51	2.01	0.11***	0.16***	-0.02	-0.14***						
6. Start-up experience	0.81	2.63	-0.11***	0.06*	0.08**	0.00	0.04					
7. General work experience	17.11	11.08	0.05 [†]	0.77***	0.09**	0.00	0.13***	0.06*				
8. Management/supervisory experience	7.95	8.34	0.09**	0.52***	0.11***	-0.08**	0.19***	0.11***	0.60***			
9. Pref. for predictability	2.53	0.56	0.07**	0.12***	-0.06 [†]	0.03	0.03	-0.06 [†]	0.09*	0.09*		
10. Decisiveness	2.29	0.87	0.10**	0.01	0.05 [†]	-0.14***	0.04	-0.04	0.06 [†]	0.05	-0.06 [†]	
11. Closed-mindedness	2.23	1.04	-0.10**	-0.04	0.01	0.03	-0.06 [†]	-0.01	-0.09*	-0.14***	0.04	0.04

Notes: [†] $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$.

positively related to being male ($r=0.07$, $p \leq 0.05$), and highly, but inversely related to an individual's position in the birth order sequence ($r=-0.09$, $p \leq 0.01$). Shifting attention to knowledge, Table 1 also shows that individuals who engage in nascent entrepreneurial activity tend to possess more formal education ($r=0.11$, $p \leq 0.001$) and management experience ($r=0.09$, $p \leq 0.01$) but lack start up experience ($r=-0.11$, $p \leq 0.001$). Finally, Table 1 shows that engaging in nascent entrepreneurial activity was significantly and positively related to possessing a preference for predictability ($r=0.07$, $p \leq 0.01$) and being decisive ($r=0.10$, $p \leq 0.01$), but not simultaneously closed-minded ($r=-0.10$, $p \leq 0.01$).

Is need for cognitive closure related to the recognition of entrepreneurial opportunities? Hierarchical logistic regression results presented in Table 2 suggest that the answer to this question is affirmative. In models 1 to 4, we first tested our hypothesis within the context of the entire sample. As shown in model 3, after controlling for age, gender, and birth order, NfC is significantly and positively related to engaging in nascent entrepreneurial activity, explaining an additional 3.1% variance over the baseline model. Model 4 further suggests that this relationship holds even when controlling for significant influences on, as well as various explicit and implicit sources of personal knowledge. In fact, it increases the overall variance explained in nascent entrepreneurial activity over the knowledge variables alone by more than 27%. Given such knowledge variables have been interpreted in previous research (Davidsson and Honig 2003) as playing a fundamental role in explaining nascent entrepreneurial activity, such a finding is interesting because it suggests that NfC may be particularly promising with respect to its potential for advancing our understanding of nascent entrepreneurial activity. In sum, individuals possessing a high NfC – that is, preferring order and predictability to continued ambiguity (Webster and Kruglanski 1994) – tended to engage in nascent entrepreneurial activity to a greater extent than individuals with a low NfC, irrespective of their age, gender, position in the family birth order, or unique personal knowledge base.

As previously discussed, two broad perspectives on opportunity have begun to emerge among entrepreneurship theorists. The first views opportunities as existing and discovered by alert individuals (Kirzner 1997; Shane 2000), while the other views 'opportunity' as an 'artifact', or social construction, that results from the creative enactment efforts of individuals through imagination and social processes (Saravathy 2001; Ardichvili, Cardozo, and Ray 2003). As a primary goal of the PSED was to provide a broadly representative sample of those individuals engaged in the new venture creation process, it remains possible that our initial findings have been systematically influenced by the confounding effect of nascent efforts that reflect an overly optimistic belief in the value of entrepreneurial imagination (Geroski 1995). Given this potential and the central research question in this investigation, we sought to refine the interpretability of our exploratory effort further by eliminating such individuals in our initial sample. We drew upon subject responses to the following question: 'which came first for you, the business idea or your decision to start some kind of business?' Following the logic that NfC theory is most applicable in situations where action focuses predominantly on prediction and control in favor of creativity and imagination, we eliminated respondents who reported deciding to start the business *in advance of having a venture idea*. We then re-ran the logistic regressions, which represented a second and stricter test of this investigation's central hypothesis.

Table 2. Results of hierarchical logistic regression analyses predicting nascent activity.

Model	Full sample				Refined sample: idea came first			
	1	2	3	4	5	6	7	8
Constant	0.93**	1.03**	0.23	0.03	-0.85**	-0.85**	-2.14**	-2.31**
Age	0.00	-0.03**	-0.01	-0.03**	0.01	0.01	-0.01	-0.02
Gender (0 = <i>f</i> , 1 = <i>m</i>)	-0.22 [†]	-0.14	-0.12	-0.05	-0.09	-0.09	-0.10	-0.09
Birth #	-0.08**	-0.06 [†]	-0.06	-0.04	-0.08 [†]	-0.08 [†]	-0.05	-0.02
Formal education		0.10**		0.09*		0.18**		0.15*
Start-up experience ^a		-0.14**		-0.08		-0.09 [†]		-0.07
General work experience		0.02 [†]		0.01		0.00		-0.01
Management/supervisory experience		0.03**		0.03*		0.03*		0.04*
Pref. for predictability			0.37**	0.31*			0.67***	0.61**
Decisiveness			0.22*	0.19*			0.35**	0.32**
Closed-mindedness			-0.23**	-0.17*			-0.26**	-0.22*
Model chi-square (Step)	11.06*	41.06**	20.99***	13.69***	5.25	27.07***	27.64***	20.33***
Model chi-square (Full)	11.06*	51.66**	25.89***	46.48***	5.25	31.11***	30.24***	45.97***
Goodness of fit index ^b	11.05	7.48	4.77	6.68	8.51	13.23	19.19	10.88
Nagelkerke R ^{2c}	0.014	0.065	0.043	0.079	0.013	0.076	0.083	0.127

Notes: [†] $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$. ^aDue to a large number of missing data values for this variable, a detailed review of data collection procedure was conducted. Based on this review, it appears reasonably plausible that a 'none' response to this question could have been incorrectly coded as 'missing' values. Consequently, all data points initially coded missing values for this variable were recoded with zero values in order to enhance the statistical power of data analyses. Importantly, however, the recoding did not substantively change the pattern of observed results. ^bBased on the Hosmer-Lemeshow chi-square statistic (1989). A non-significant value indicates good fit across the entire predictor range. ^cCorrects the alternatively reported Cox-Snell R square value presented in SPSS for proportionality. See (Nagelkerke 1991) for a thorough definitional discussion.

Models 5 to 8 in Table 2 present the results the revised logistic regressions. Model 7 shows that, after controlling for age, gender, and birth order, need for cognitive closure was again significantly and positively related to engaging in nascent entrepreneurial activity. However, in contrast to the results in Model 3, NfC explained an additional 7% of variance over the baseline model. In addition, Model 8 reveals that this relationship again holds when controlling for personal knowledge, with the NfC explaining an additional 4.8% (nearly a 61% increase over the results in Model 4) of the total variation in the nascent activity (an increase over the knowledge variables alone of more than 100%). Collectively, these results provide compelling additional support for our central hypothesis and the argument that a high NfC is likely to foster the exploitation of discovered opportunity irrespective of their age, gender, position in the family birth order, or unique personal knowledge base.

4. Discussion

4.1. Implications for theory and future research

The present results suggest a number of important theoretical implications for future entrepreneurship research. For example, the present results enforce the idea that it is critical for theorists to begin to incorporate motivational factors into extant theories of entrepreneurial activity if we are to advance our understanding of its underlying nature more fully (Shane, Locke, and Collins 2003). Moreover, it also highlights the theoretical importance of focusing on cognitive factors rooted in the lay epistemic motivations of individuals, rather than those embedded in psychodynamic, or unchanging instinct-based conceptions of personality development, if we are to expect the further extension and development of current extant knowledge-based models (Shane 2000; Davidsson and Honig 2003; De Carolis and Saporito 2006). Future research along these lines may take several forms. For instance, researchers might seek to investigate and compare the NfC to other potentially relevant cognitive motivational influences with respect to their impact on nascent entrepreneurial decision-making processes and activity. Researchers may also seek to investigate whether or not the NfC orientation demonstrates 'domain specificity' (Sorrentino and Roney 2000) in that it is found relevant or important when reported in some situations, but not others. It is certainly plausible that the NfC could vary across entrepreneurial situations.

Similarly, researchers might also consider the relationships between the NfC and specific cognitive biases identified in previous research (Busenitz and Barney 1997), as well as consider whether or not such relationships are culturally specific or more universal in nature (Mitchell et al. 2002a). They might also consider the aforementioned 'domain specificity' issue in concert with extant theories focusing on the centrality of specific knowledge as a source of personal capital and the use of heuristics. For example, it would be valuable to consider how the relationship between differences in the type of formal training received (training in the arts versus sciences, for example) and the use of decision-making heuristics may be differentially accentuated or attenuated by varying types of situational pressures toward closure.

Given previous research demonstrating important relationships between NfC and persuasion in the context of prior information (Kruglanski, Webster, and Klem 1993), the present findings suggest that it would also be interesting to investigate

further how NfC impacts nascent activity in the presence of specific forms of social capital (friends, family). For example, research might consider how types of social capital work individually, and in combination, to create situational pressures that could impact the decision, the nature of strategic decisions associated with the specific ways in which nascent entrepreneurs choose to ‘develop’ perceived opportunities (Ardichvili, Cardozo, and Ray 2003). Moreover, a question that is likely to be of significant interest is whether or not such influences bear an important predictive relationship with the subsequent forms of venture success observed.

In sum, each of these potential avenues for future research suggests that NfC theory offers a chance to extend current theory by providing a means of further informing important theoretical debates such as whether nascent entrepreneurial activity should be explained as illustrative of overconfidence (‘decision irrationality’) (Geroski 1995; Camerer and Lovo 1999; Aldrich and Martinez 2001) or a more instrumental form of incremental decision-making (‘action rationality’) (Brunsson 1985). By focusing attention on the lay epistemic process, they suggest that NfC theory may contribute meaningfully toward advancing our understanding of the specific nature of forces that influence nascent entrepreneurial efforts.

4.2. Implications for practice

There are also important practical implications that derive from this investigation. The current results, for example, suggest that individuals with a high NfC should seek to educate themselves on the potential risks and rewards associated with the tendency to rush into nascent entrepreneurial activity (‘seize’), particularly as it pertains to the process of venture strategy formulation. More specifically, our results suggest that having the tendency to seize prematurely could have potentially harmful consequences in that it may lead to a disproportionate tendency to adopt strategies that are inherently premature in terms of their development. This could result in a market place image that is characterized as being less than innovative relative to competitors, or an unwillingness to take risks on innovations that truly have the sense to ‘make’ new market space. Notably, NfC theory suggests the odds for such an outcome could be made worse by the corresponding tendency to stick to (‘freeze’) his or her initially conceived approach. It would seem then, to behoove any budding entrepreneur with a long-term perspective of success, to consider carefully how his or her motivations to close on certain types of information may be affecting the chance for success via the proclivity (or lack of it) toward certain types of strategies. Doing so may foster identifying and highlighting, more clearly, the advantages and disadvantages of alternatives, thereby resulting in a more effective consideration the information they have at their disposal throughout the entrepreneurial process (Rotefoss and Kolvereid 2005).

Similarly, the findings in our study also yield some important practical implications with respect to resource acquisition and use in the execution of venture strategy. For example, garnering resources for radically innovative activities can be challenging given that resource providers must often be persuaded to believe in the likelihood that prospective entrepreneurs can generate success with such resources through deliberate efforts to create and shape new market space. Assuming for a moment that resource providers may face situational pressures toward closure for financial returns to reflect the ‘wiseness’ of an investment, NfC theory would suggest

that they may be predisposed against investing in such activities in favor of less radical innovative activities. Therefore, the present findings suggest that it is important for entrepreneurs to find ways of actively overcoming the potentially natural tendencies for investors to resist ‘rushing’ toward and/or ‘sticking’ to traditional investment heuristics in instances where the evolving nature of an opportunity suggests significant return potential, yet may be fundamentally at odds with the use of existing heuristics. In other words, the findings suggest that entrepreneurs must not only be prepared to combat the potentially inhibiting effects of the NfC in their own thought processes but, also, to combat such influences when trying to persuade other important prospective stakeholders.

The present findings also have implications for leaders in organizations seeking to encourage entrepreneurial activity within ‘the ranks’, or to public officials searching to improve existing methods of providing public advisory services to small and medium-sized enterprises (Hjalmarsson and Johansson 2003). The present findings, for example, suggest that where leadership wants to establish or modify the collective mindset of the organization toward a strategic intent that emphasizes ‘stretching’ current resources (Hamel and Prahalad 1993), careful thought should be devoted toward the design of organizational incentives and management techniques. For instance, one way leadership might influence such a mindset is by focusing on identifying individuals that share a similar disposition toward closure and tasking them with the development of new innovation. In conjunction with such efforts, leadership may seek to target the development with a mix of methods including leadership roles, policies, and organizational procedures that reinforce the facets of closure as identified in this investigation in order to make the organization more entrepreneurial in its strategic orientation (Covin and Slevin 1991; Hitt et al. 2002).

From a game theoretic perspective, our results also have some interesting strategic decision-making implications for individuals who bear the responsibility of recognizing opportunities on an ongoing basis to provide new sources of value for the venture. Observing, for instance, how a competitor’s, as well as one’s own tendency toward closure, relates to cognitive heuristics and biases may help to provide some insight into the likely pattern of viable competitive responses rival is likely to consider and pursue over time (Mintzberg and Waters 1978). Such insight could have important strategic value in that it would help determine the credibility of potential competitive threats that one should consider (Dixit and Nalebuff 1991). Consequently, understanding how the NfC relates to the use of biases and heuristics could help to provide strategic-decision makers with a means of parsing down and managing the frequently overwhelming amount of competitive information they confront.

4.3. Potential study limitations

Our primary intent in this investigation was to launch a study of an exploratory, yet provocative, nature as a foundation for more broad-based and generalizable studies. Nevertheless, our research is potentially limited in several respects despite what we believe is the inherent potential of this intent. First, although based on a US nationally representative sample, it is possible that our results may not generalize to other cultures. It is also possible that NfC may play a differentially important role from that observed here in the cognitive information processing efforts in

other cultures. Reinforcement for these possibilities can be found in a comparison of our findings to those in other investigations. For instance, whereas our study shows possessing more substantive management experience is a defining knowledge-based characteristic reported among nascent US entrepreneurs, a recent study (Davidsson and Honig 2003) focusing on the Swedish population found no such association. Consequently, future research is necessary to address the potentially important cross-cultural possibilities.

The methodological use of single item measures undoubtedly introduces the potential for measurement error. As a result, another potential study limitation is that it remains possible that the present results have been somehow unduly influenced by unspecified measurement bias. However, this seems unlikely based on several observations. Specifically, the items identified to reflect the NfC do appear to capture the 'essence' of the construct as outlined by NfC theory (Webster and Kruglanski 1994). Second, earlier exploratory factor analysis (Schenkel 2004) revealed a component structure among the items that is consistent with that observed in previous research (Webster and Kruglanski 1994; Kruglanski et al. 1997). Third, the results of our refined sample demonstrated even greater consistency with NfC theory than in the full sample, which suggests that the nomological validity of the present results is consistent with that demonstrated in prior research using the full original scales (Webster and Kruglanski 1994). Each of these observations is consistent with findings from multiple empirical studies suggesting that single item measures are often highly correlated (that is, they converge) with multiple item scales (Gardner et al. 1989, 1998; Wanous, Reichers, and Hudy 1997). Despite each of these observations, future research is warranted to validate the present findings based upon the more complete NfC scale as previously proposed (Webster and Kruglanski 1994).

Given exploratory goals and the intent of the present investigation in conjunction with a lack of comparative entrepreneurial studies employing the central construct of interest, it was elected to adopt broader knowledge-based measures in the empirical portion of the study. The authors did so in order to maintain what they saw as a scope that balanced the need to remain true to the central intent of the investigation against that of providing an effective foundation for future research on the role of NfC in entrepreneurship. In this sense, the breadth of the measures currently employed works to do this by acting as a statistical 'control' for a potentially wide range of fundamental knowledge-based explanations that could otherwise be suggested to limit the confidence associated with the current relationship observed between the NfC and nascent activity. However, it is important to acknowledge various sources of personal background such as family and friends, as well as the variation in the type of formal education are not fully handled in this study. Consideration of such sources offers the potential for interesting and potentially meaningful insights for further refining the ideas put forth in the present manuscript. Accordingly, each represents a fruitful direction for future research.

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Appendix 1. List of gestation activities

PSED Q#	Activity type	Question text
111	Business plan	Have you prepared a business plan?
114	Business plan	What is the current form of your business plan – unwritten or in your head, informally written, formally prepared, or something else?
120	Development of product/service	At what stage of development is the product or service that will be provided to the customer? Idea or concept, initial development, tested on customers, ready for sale or delivery.
122	Marketing	Have you started any marketing or promotional efforts?
124	Patent/copyright	Have you applied for a patent, copyright, or trademark relevant to this new business been submitted?
126	Patent/copyright	Has the patent, copyright, or trademark been granted or is it in the process?
128	Raw material	Have any raw materials, inventory, supplies, or components for the new (start-up/business) been purchased?
131	Equipment	Have any major items like equipment, facilities, or property been purchased, leased, or rented for the new (start-up/business)?
134	Gathering information	Has an effort been made to define the market opportunities by talking with potential customers or getting information about the competition?
143	Finance	Have you invested any of your own money in this business?
145	Finance	Have financial institutions or other people been asked for funds?
146	Finance	Is asking others or institutions for funds completed or still in the process?
137	Finance	Have projected financial statements, such as income and cash flow statements or break-even analysis, been developed?
160	Finance	Has a bank account been opened exclusively for this new business?
139	Saved money	Are you now saving money to invest in this business?
140	Saved money	Have you finished saving money to invest in the new firm, or is that still in process?
149	Credit with a supplier	Has credit with a supplier been established?
151	Household help	Have you arranged childcare or household help to allow yourself time to work on the business, either formally or informally with friends or relatives?
153	Workforce	Have you begun to devote full time to the business, that is 35 or more hours per week?
155	Workforce	Have any employees or managers been hired for pay – workers that would NOT share ownership?
167	Education	Have you taken any classes or workshops on starting a business?
171	Contact information	Does the new business have its own listing in the phone book?
181	Contact information	To your knowledge, is the new business listed with Dun and Bradstreet, the credit rating firm?
194	Contact information	How would you describe the location where this new business is (currently located/being developed)? Is it a residence or farm, or vacation home; is it on the site of an existing business; is it a special location for this (business/start-up), like rented space, an incubator, or something like that; or is it not developed to the point where a specific location is needed?
165	Gestation income	Are the salaries for the managers who are also owners included in the computation of monthly expenses?
175	Legal form	Has the business paid any state unemployment insurance taxes?
177	Legal form	Has the new business paid any federal social security taxes, sometimes called FICA payments?
179	Legal form	Has the new business filed a federal income tax return?

Appendix 2.

PSED Q#	Construct facet	Item
QH1	Preference for predictability	If your skill and energy could affect the outcome of each, which would you prefer: A profit of \$5,000,000, but a 20 percent chance of success; a profit of \$2,000,000, but a 50 percent chance of success; or a profit of \$1,250,000, but an 80 percent chance of success?
QL1r	Decisiveness	When confronted with a difficult problem I tend to delay a decision so that I can collect more information. (Reverse coded)
Ql1y	Closed-mindedness	I can talk to almost anybody about almost anything. (Reverse coded)

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